

ENVIRONMENTAL ASSESSMENT
WY-040-EA15-120

Bridger Coal Company
Lease Modification to WYW154595

8 November 2015



Rock Springs Field Office, Wyoming

BLM

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Environmental Assessment
For
Bridger Coal Company Lease Modification to WYW154595

Bureau of Land Management
Rock Springs Field Office
Wyoming

WY-040-EA15-120

December 2015

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1. INTRODUCTION

Proposed Action Title: Bridger Coal Lease Modification to WYW154595

Environmental Assessment (EA) Number: WY-040-EA15-120

Preparing Office: Bureau of Land Management
Rock Springs Field Office
280 Highway 191 North
Rock Springs, Wyoming 82901

Proposed Action Type and Location: To modify the existing federal coal lease WYW154595 by adding 120.02 acres to include tracts of unleased federal coal lands in Section 28, Township 22 North, Range 101 West.

Applicant: Bridger Coal Company
c/o Interwest Mining Company
1407 West North Temple, Suite 310
Salt Lake City, Utah 84116

Lease/Serial/Case File Number: WYW154595 (Coal Lease)

1.1. Background

The Jim Bridger Coal Mine complex (Bridger Mine Complex), located in southwestern Wyoming approximately 35 miles northeast of Rock Springs (Figure 1-1), is operated by Bridger Coal Company (BCC). The complex consists of a multifaceted mining operation with surface and underground operations as well as ongoing reclamation activities. Collectively, the Bridger Mine Complex produces upward of 6 million tons of coal per year, supported by 4.0–4.5 million tons of coal from the underground operation, and 1.0–1.5 million tons from the surface operation. The mine produces coal from federal, private, and state lands located in the area known as the “Union Pacific Railroad checkerboard land grant.” Union Pacific lands are now owned and controlled by Anadarko Petroleum Corporation. BCC is a joint venture composed of two owners: 1) Idaho Energy Resource Company, and 2) Pacific Minerals, Inc., a wholly owned subsidiary of PacifiCorp. The Bridger Mine Complex is a captive operation (the entire mine’s production goes to one use and is not for public sale), and has been in production since 1974, providing coal to the adjacent Jim Bridger Power Plant.

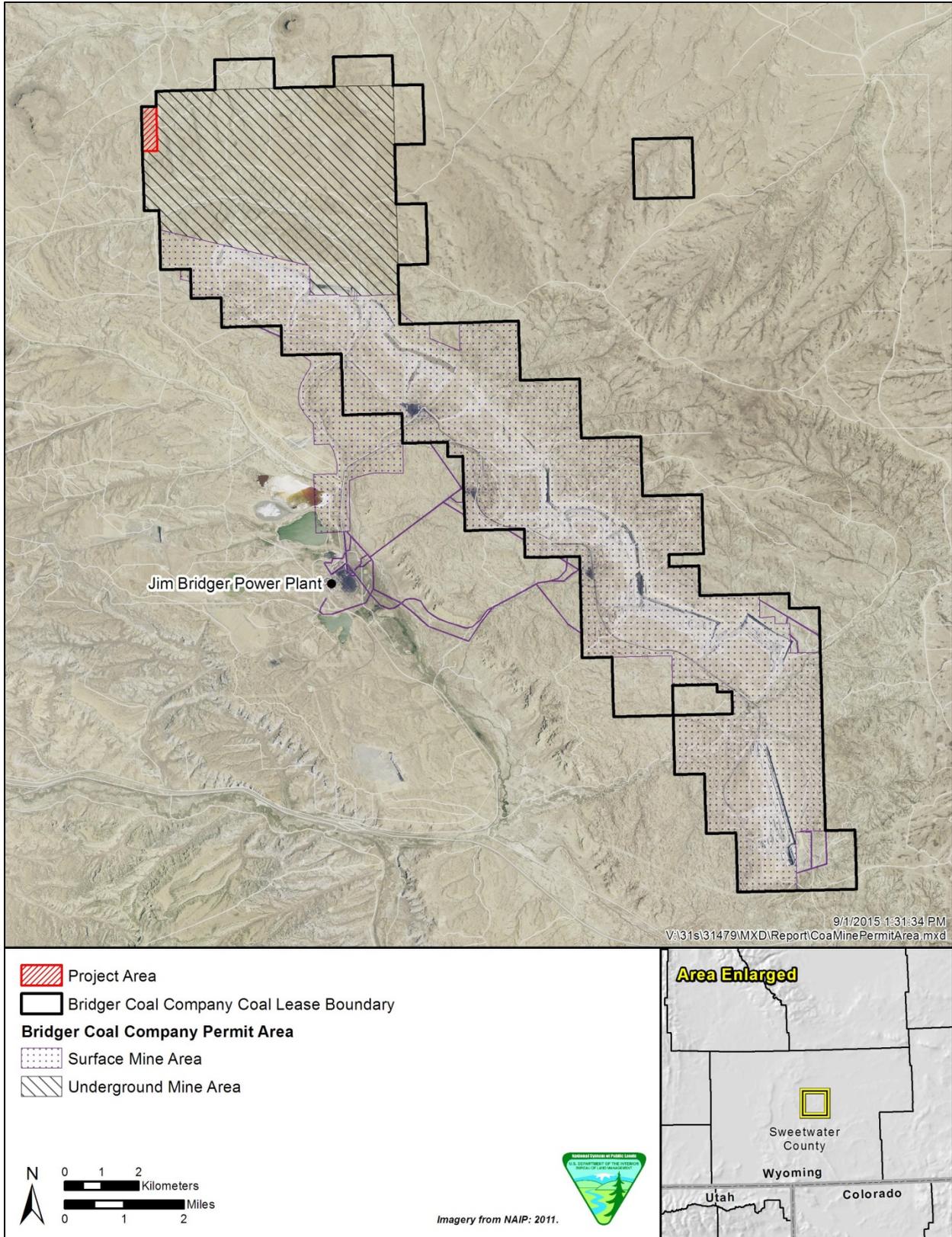


Figure 1-1. Bridger Mine Complex and the proposed lease modification of federal coal lease WYW154595

Bridger Mine Complex surface operations have been supplying most of the coal requirements for the 2,120-megawatt Jim Bridger Power Plant since 1974. The underground mine within the mining complex began full production in 2007, and is now providing most of the overall production, with the surface mine and coal from other Wyoming sources supplementing the annual fueling requirements to the power plant. The coal produced by underground mining methods replaces coal previously produced by surface mining methods, with no resulting change in annual coal production. As a result of shifting from surface mining to underground mining in the mining complex, BCC has increased its reclamation of disturbed lands associated with completed surface operations, as required under its mine permitting requirements with the Wyoming Department of Environmental Quality (WDEQ), Land Quality Division (LQD).

To secure additional underground coal resources, BCC applied to the Bureau of Land Management (BLM) Rock Springs Field Office (RSFO) in July 2011 for 320.26 acres of unleased underground federal coal reserves (5.7 million tons of mineable coal) to be incorporated into the WYW154595 federal coal lease tract. BLM approved the lease modification in May 2013 after completion of the *Environmental Assessment Bridger Coal Lease Modification to WYW154595, WY-040-EA12-19* in January 2013 (2013 Lease Modification EA; BLM 2013a) and the decision record (BLM 2013b) and finding of no significant impact (FONSI; BLM 2013c) in February 2013. This modification has supported the underground mine's western expansion, and currently provides the only technologically feasible means of recovering federal coal reserves in this portion of the lease tract.

When the application for the 320.26-acre lease modification was submitted to the BLM in 2011, the general outlook for additional mining to the west was limited because of the available geologic overburden modeling. The modeling data at this time were sufficient only to determine the possibility of underground mining within the 320.26-acre parcel. After further exploration and geologic modeling in the latter part of 2013, BCC determined that the underground mine could accommodate one additional western longwall panel given the latest data on geologic structure. BCC applied for a 120.02-acre lease modification of WYW154595 in March 2014 to add the additional longwall panel and to continue the feasible recovery of unleased federal coal on the northwest side of its underground operation (see Figure 1-1). Federal coal in this proposed lease modification (project area) is located on BLM-owned surface lands in Lots 8, 9, and 15 of Section 28, Township 22 North, Range 101 West, Sixth Principal Meridian (Figure 1-2). BCC has already secured the rights to mine coal from adjacent private lands. The proposed modification of the WYW154595 federal coal lease would ensure that all potentially mineable coal can be reached. If the federal resource under consideration for lease is not mined in conjunction with the intervening private underground coal, it would likely be bypassed by BCC. The federal coal reserves contained in the 120.02-acre proposed lease modification are estimated by BCC at approximately 738,000 tons of economically recoverable coal. The inclusion of this proposed lease modification into BCC's Bridger Mining Complex would provide for efficient mining, and would be the only economical and technologically feasible means of recovering these federal coal reserves.

BCC would use these federal coal reserves to maintain mine operations. The proposed lease modification would support expanded recovery for BCC's underground operation, and would provide access to adjacent private underground coal. It would allow for BCC's logical progression with the planned sequenced longwall mining panels in this area, ensure that these resources are not bypassed, and achieve maximum economic recovery (MER) of federal coal resources. MER, as defined in 43 Code of Federal Regulations (CFR) 3480.0-5, means that all profitable portions of a leased federal coal deposit must be mined. Bypass coal is defined as an isolated coal deposit that cannot, for the foreseeable future, be mined economically and in an environmentally sound manner (43 CFR 3400.0-5).

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.

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., the Black Butte Mine and/or 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.

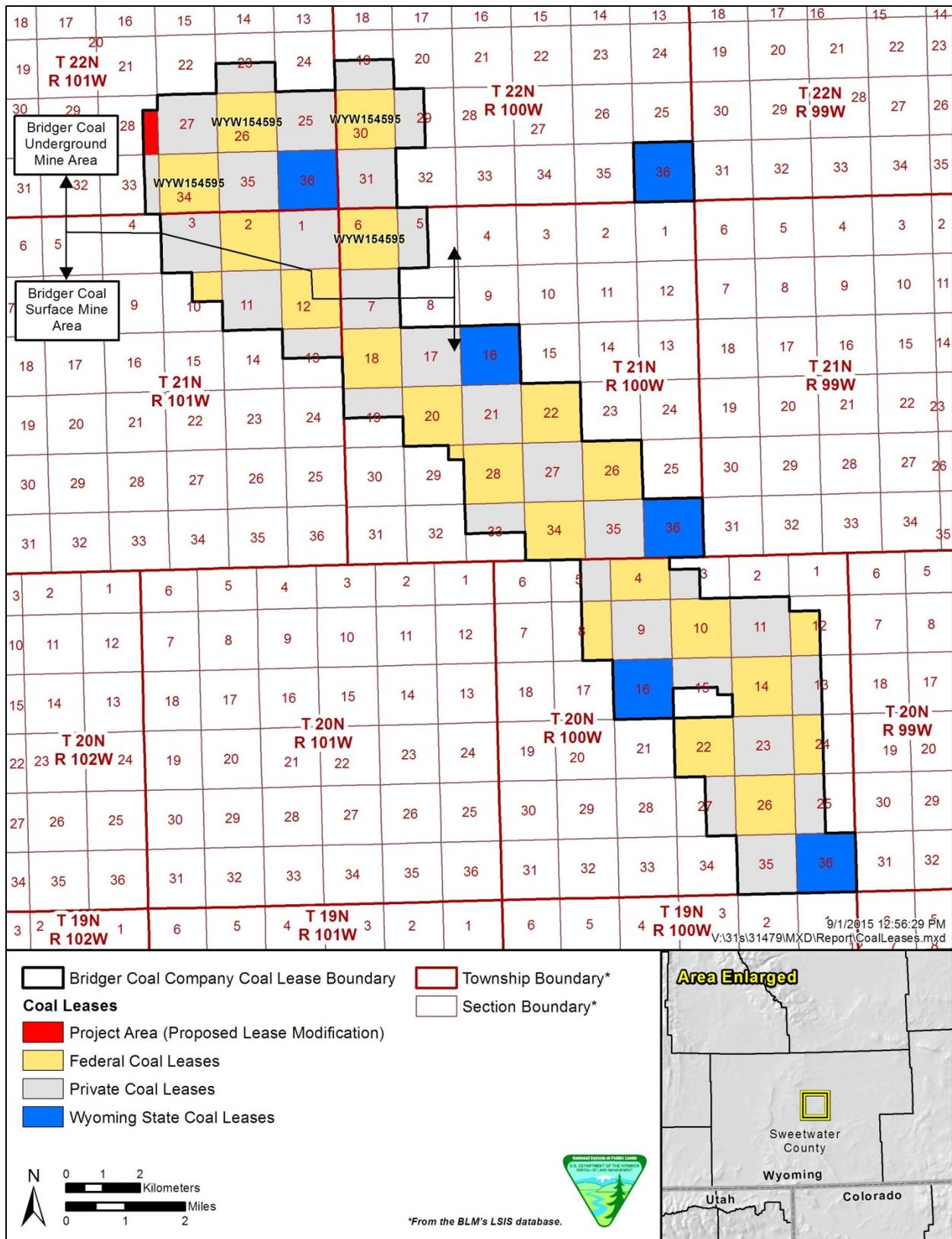


Figure 1-2. Bridger Mine Complex coal lease ownership map.

1.2. Purpose and Need for the Proposed Action

The purpose of the action is to respond to a request from BCC to modify federal coal lease WYW154595 by 120.02 acres (the Proposed Action), thereby providing underground access for the extraction of federal coal resources that would otherwise be bypassed without the modification. The need for the action is established by BLM's responsibility under the Mineral Leasing Act of 1920 (MLA), as amended by the Federal Coal Leasing Amendments Act of 1976 (FCLAA) and the Federal Land Policy and Management Act of 1976 (FLPMA). Part of BLM's responsibility includes managing the public lands "in a manner which recognizes the Nation's need for domestic sources of minerals..." (43 United States Code 1701(a)(12)).

The Office of Surface Mining Reclamation and Enforcement (OSMRE) is a cooperating agency and is responsible for reviewing proposed BCC plans to conduct coal mining and reclamation operations on lands containing leased federal coal. Pursuant to 30 CFR 746, OSMRE would 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 would be based, at a minimum, on the following:

- The permit application package, including the resource recovery and protection plan (R2P2).
- Information prepared in compliance with the National Environmental Policy Act (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 BLM with respect to the R2P2, federal lease requirements, and the MLA.
- Findings and recommendations of WDEQ with respect to the mine permit application and the Wyoming State program.
- Findings and recommendations of the OSMRE with respect to the additional requirements of 30 CFR Chapter VII, Subchapter D.

1.2.1. Decision to be Made

The BLM decision regarding the modification of federal coal lease WYW154595 includes the following options:

- Approve the 120.02-acre lease modification with no changes.
- Approve the lease modification with changes to the lease modification area and/or include additional terms and conditions.
- Reject the approval of the lease modification.

If the No Action Alternative is chosen, the BLM decision would result in the rejection of the lease modification application.

For OSMRE, the Secretary of the Interior will issue a decision document approving, approving with conditions, or denying the mining plan modification if the lease modification is granted by the BLM and secured by BCC for continuing operation of the underground portion of the Bridger Mine Complex.

1.3. Relationship to Statutes, Regulations, Plans, or Other Environmental Analyses

BLM processed and evaluated BCC's March 2014 lease modification application under the following authorities:

- MLA
- FCLAA
- FLPMA
- NEPA of 1969, as amended
- Surface Mining Control and Reclamation Act of 1977 (SMCRA)
- 43 CFR, Subtitle B, Chapter II, Subchapter C (Minerals Management (3000))
- 43 CFR Part 3420, Subpart 3425.1-9 (Leasing on Application)

BLM is responsible for leasing federal coal under the FCLAA. After a federal coal lease is issued, SMCRA gives OSMRE the primary responsibility to administer programs that regulate surface coal mining operations and the surface effects of underground coal mining operations. OSMRE is a cooperating agency on this EA. No surface coal mining and reclamation operations on lands with leased federal coal can be conducted without a mining plan approved by the Secretary (30 CFR 746.11). As part of the mining plan approval process, OSMRE is required to prepare and submit a decision document recommending approval, disapproval, or conditional approval of the mining plan to the Secretary (30 CFR 746.13). This process for review and approval of mining plans also applies to mining plan modifications (30 CFR 746.18). OSMRE will use the EA analysis to create a decision document related to mining federal coal in this proposed lease modification.

Pursuant to Section 503 of SMCRA, the State of Wyoming developed a permanent program (as approved by the U.S. Secretary of Interior in November 1980) authorizing WDEQ-LQD to regulate surface coal mining operations and surface effects of underground mining on non-federal lands in the state. In January 1987, pursuant to Section 523(c) of SMCRA, WDEQ-LQD entered into a cooperative agreement with the Secretary of the Interior authorizing the agency to regulate surface coal mining operations and surface effects of underground mining on federal lands in the state. WDEQ-LQD is also a cooperating agency on this EA.

Pursuant to this agreement, federal coal leaseholders in Wyoming must submit permit application packages to OSMRE and WDEQ for proposed mining and reclamation operations on federal lands in the state. WDEQ-LQD reviews these packages 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 permanent program. If it does comply, WDEQ-LQD issues the applicant a permit to conduct coal mining operations. WDEQ-LQD 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 would be required to obtain a coal mining permit before mining the coal.

If the Proposed Action is approved, the lessee would be required to revise its coal mining permit and obtain mining plan approval with WDEQ-LQD, with input from OSMRE and BLM before mining the newly leased coal. As a part of that process, a detailed permit application and/or permit modification would be developed to outline how the newly leased lands would be mined and reclaimed. Specific impacts that may occur during mining and reclamation of the project area would be addressed in the WDEQ-LQD permit approval process, and specific mitigation measures for anticipated impacts would be described in detail at that time.

1.3.1. Conformance to the Land Use Plan

Regulations at 43 CFR 1610.5-3 (Conformity and Implementation) require actions to conform to the approved land use plan. The *Green River Resource Management Plan [RMP] and Record of Decision* (signed August 8, 1997) 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 1997 and BLM 2015a) allows for coal leasing and development, and BLM has determined that the proposed modification of lease WYW154595 conforms to the RMP. The RMP provides land use guidance for coal leasing in the proposed project area. The RMP decisions pertaining to this proposal include the following:

- Solid Leasables (Coal)
 - “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.” (BLM 1997:13)
 - “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.” (BLM 1997:13). The proposed lease modification lies within these federal coal lands.

1.3.2. Relationship to Other Environmental Analyses

As allowed by regulations at 40 CFR 1500 and 43 CFR 46 as well as BLM guidance (*BLM National Environmental Policy Act Handbook H-1790-1*; BLM 2008), this environmental analysis incorporates by reference information found in the EA completed for the previous modification to lease WYW154595 (2013 Lease Modification EA; BLM 2013a), as well as the *Final Environmental Assessment for the Proposed Ten Mile Rim Coal Lease-by-Application and Associated Rights-of-Way, Sweetwater County, Wyoming* (TMRT EA; BLM 2004). The TMRT EA analyzed the leasing and mining of federal coal reserves in the Ten Mile Rim Tract in response to a lease by application filed by BCC, and it was used by BLM as the basis for the decision to hold a competitive, sealed-bid sale and eventual issuance of coal lease WYW154595.

Incorporation by reference of the EA for the previous lease modification and the TMRT EA is appropriate to supplement the description of the affected environment and general conclusions about environmental impacts associated with underground mining operations in the area. To ensure full disclosure, this EA provides additional analyses and description of impacts specific to this proposal.

1.4. Scoping, Public Involvement, and Issues

BLM RSFO issued a news release on December 11, 2014, requesting public comment on the Proposed Action. The 30-day comment period ended on January 16, 2015. The news release was sent to 118 different media sources throughout Wyoming and in Salt Lake City, Utah, including newspapers, public radio, television stations, the SweetwaterNow website (<http://sweetwaterNow.com/blm-rock-springs-seeks-public-input-modification-federal-coal-lease/>), and the BLM website (http://www.blm.gov/wy/st/en/info/news_room/2014/december/1rsfo-Bridger.html). During this period, BLM received two comment letters: 1) a letter from the Sierra Club and WildEarth Guardians and 2) a letter from the Powder River Basin Resource Council. These comment letters express concerns about climate change, accessibility of privately owned coal, cumulative impacts, subsidence, air quality, water

quality and quantity, threatened and endangered species, wildlife, and reclamation. The letters also express concerns about the analysis process, such as requests to treat the operation of the Jim Bridger Power Plant as a connected action, complete an EIS, disclose the amount of coal leased, and address and disclose issues with BLM's coal valuation process. A summary of scoping comments and their disposition is included in the administrative record for this EA.

Issues and concerns identified during both external scoping and internal discussions with the BLM interdisciplinary team include the following:

- **Air quality and climate change:** How would modifying the lease and mining the project area affect air quality and greenhouse gas (GHG) emissions?
- **Cultural resources:** How would modifying the lease and mining the project area affect cultural resources? How would modifying the lease and mining the project area affect sites eligible for the National Register of Historic Places (NRHP)? What impacts would there be on unknown (buried) cultural sites?
- **Geology and minerals:** How would modifying the lease and mining the project area affect the coal resource and the potential for subsidence?
- **Lands and access:** How would modifying the lease and mining the project area affect existing land use, including existing roads?
- **Socioeconomics:** How would modifying the lease and mining the project area affect socioeconomics, including direct employment, income, and tax revenue, as well as indirect employment, income, and revenue from vendor purchases? How would modifying the lease and mining the project area affect population and demographics?
- **Water resources:** How would modifying the lease and mining the project area affect the quality and quantity of surface water and groundwater in the region?

Issues considered but dismissed from detailed analysis include the following:

- Environmental justice
- Fuels/fire management
- Wastes (hazardous or solid)
- Invasive species/noxious weeds
- Livestock grazing
- Paleontology
- Public health and safety
- Rangeland health standards
- Recreation
- Soils
- Special-status species
- Threatened, endangered, or candidate plant species
- Threatened, endangered, or candidate animal species
- Vegetation
- Visual resources
- Wild horses and burros
- Wildlife

Rationale for the dismissal of these issues from detailed analysis is provided in Table 3-1 in Chapter 3.

The following resources do not exist in or near the project area and were dismissed from detailed analysis:

- Areas of Critical Environmental Concern
- Native American religious concerns
- Farmlands (prime or unique)
- Floodplains
- Wetlands/riparian zones
- Wild and scenic rivers
- Wilderness
- Woodland/forestry

2. PROPOSED ACTION AND ALTERNATIVES

2.1. Introduction

This EA analyzes the potential effects of implementing Alternative I (the No Action Alternative) and Alternative II (the Proposed Action). The No Action Alternative is considered and analyzed to provide a baseline against which to compare the impacts of the Proposed Action. No other alternatives were brought forward for detailed analysis (see section 2.4 for further details and rationale concerning alternatives eliminated from detailed analysis).

2.2. Alternative I. No Action Alternative

The No Action Alternative would reject the application for a second federal coal lease modification to WYW154595 and would not allow extraction of the additional estimated 738,000 tons of economically recoverable coal in the 120.02-acre area. Under the No Action Alternative, it is unlikely that the federal coal proposed for recovery would be mined in the near future or at all. Because of the coal's location in a checkerboard land grant area, and because of the current limitations of underground extraction technology, it is improbable that BCC or any other coal operator would be able to economically mine the lease modification project area once adjoining operations have moved away.

Under this alternative, BLM would continue to manage the federal surface lands in the project area for multiple use, including livestock and wild horse grazing, recreation, and oil and gas exploration and development. The Jim Bridger Power Plant would continue to operate at its current production level.

2.3. Alternative II. Proposed Action

Under the Proposed Action, BLM would approve the application for a second federal coal lease modification to WYW154595, which would result in the addition of 120.02 acres of contiguous coal lands to the lease and mining plan. Federal coal lease WYW154595 was originally issued to BCC on March 1, 2005. BCC estimates that there are approximately 738,000 tons of economically recoverable coal in the project area. The project area is adjacent to current underground mining operations at the larger Bridger Mine Complex.

If successful in obtaining the lease modification, BCC would provide the access, equipment, and technology to mine the coal from this operation. Any federal coal produced by anticipated underground mining methods in the proposed modification would continue to replace coal previously produced by surface mining methods in other portions of the Bridger Mine Complex, with no resulting change in overall annual coal production. BCC's mining schedule would change under the Proposed Action, with mining of the estimated 738,000 tons of economically recoverable coal in the lease modification project area being projected to add approximately 1.5 additional years to the life of the mine. If the coal lease modification is not approved, this coal would likely be bypassed by BCC. Based on the timing and progression of existing mining by BCC, all required application and permit approvals for the lease modification would need to be in place by the first quarter of 2016 to mine the proposed coal reserves.

The proposed lease modification would not displace other competitive commercial interests in the lands or deposits, and would not include coal deposits that could be developed by a non-BCC potential or existing mining operation. The proposed lease modification would not exceed the modified acreage limitation of 960 acres, as described in Section 432 of the Energy Policy Act of 2005.

2.3.1. Location and Overview

The Bridger Mine Complex is approximately 35 miles northeast of Rock Springs in Sweetwater County, Wyoming. The project area for the Proposed Action encompasses 120.02 acres bordering the existing underground mine on the northwest and comprises federal surface and subsurface estate managed by BLM. The Public Land Survey System description for the project area is as follows: Lots 8, 9, and 15 of Section 28, Township 22 North, Range 101 West, on the Sixth Principal Meridian, on the Black Rock South (1986), Wyoming, U.S. Geological Survey 7.5-minute quadrangle (Figure 2-1).

The existing underground mine depth ranges from 299 to 899 feet, with an average of approximately 600 feet. Expected depth in the project area would be approximately 370 feet.

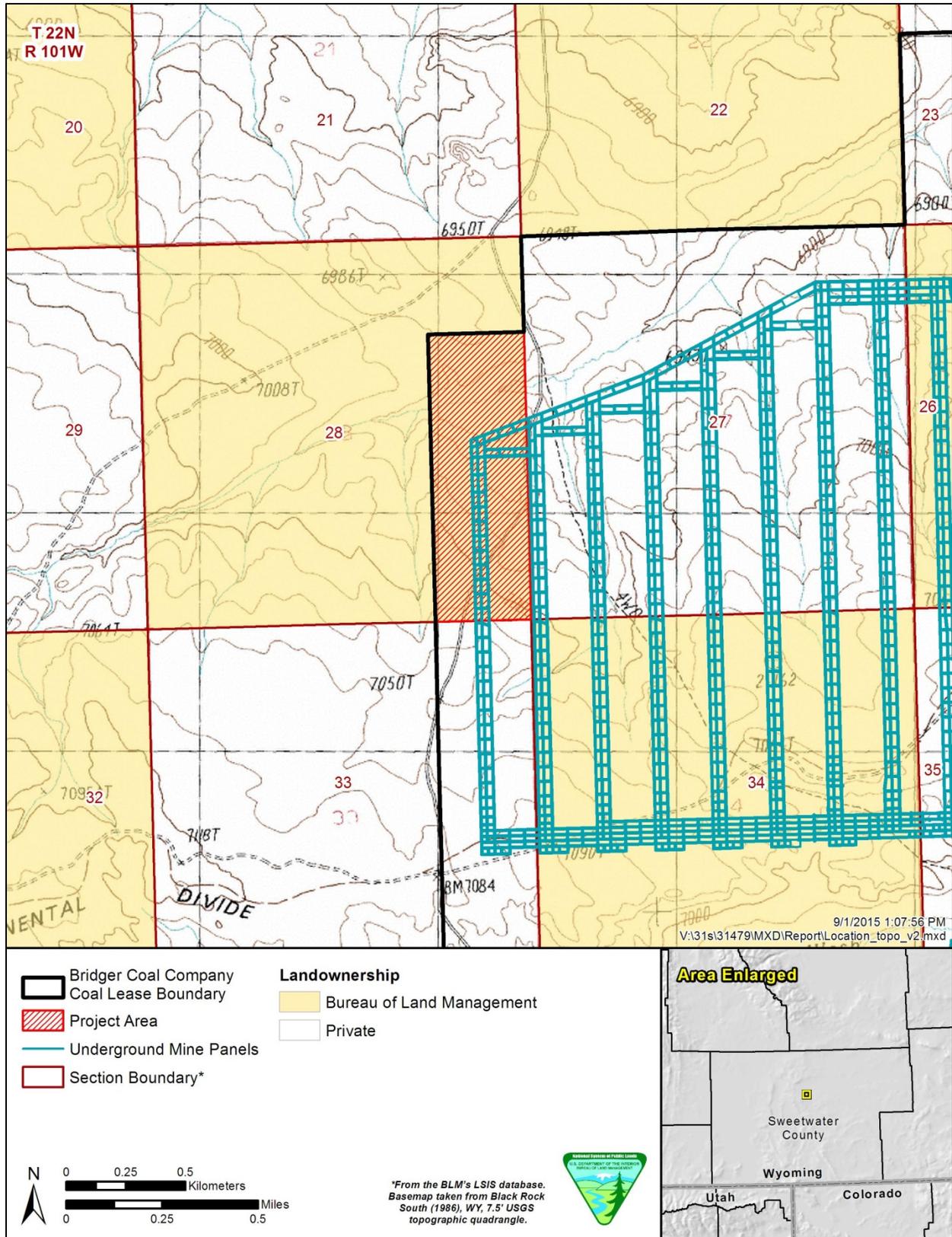


Figure 2-1. General project location and underground mining area.

2.3.2. Mining Methods

Under the Proposed Action, underground mining would be conducted through a combination of continuous mining and retreat longwall mining. The underground mine would first be developed with continuous miners (typically consisting of large rotating steel drums with teeth or cutting bits) to provide access to a long rectangular panel of coal through the establishment of gateroads. Gateroads are roadways that are driven to the back of each coal panel from main and sub-main tunnels or entries before longwall mining begins. Longwall mining would then be conducted using hydraulic shields, varying from 5 to 12 feet high, to support the roof of the mine while a shearing machine traverses the coal face and removes a 2- to 3-foot slab of coal from the panel with each pass. Controlled surface subsidence would occur behind the retreating longwall machinery. Based on subsidence modeling conducted for the permitting process, BCC projects 6–9 feet of trough subsidence over mined-out panels. Longwall mining panels are shown on Figure 2-1.

Sweetwater County Road 15 crosses the southern third of the project area. BCC and the Sweetwater County engineer would sign an agreement to guide repairs of any subsidence damage to the road. The agreement would be included in the WDEQ-LQD mine permit. During mining operations, BCC would monitor the county road for subsidence damage and would promptly make any needed repairs. The BLM and Sweetwater County would first be notified of needed repairs, and the necessary permits and authorizations would be obtained. BCC would also post signs to notify and caution county road users of the subsidence potential.

No new surface facilities or associated surface disturbance would be required to mine the coal reserves under the Proposed Action. Existing surface facilities at the Bridger Mine Complex would be used to provide access and to support mining in the proposed lease modification area. These facilities are located outside of the project area but within the Bridger Mine Complex and include three portals serving as the main entries to existing underground mining operations. Two of the portal entries are used for miner access, and the third is used to transport coal from the mine to a surface coal handling facility in a surface mining pit. Other existing surface facilities to be used include a water well, rock dust supply, mine power distribution, underground mine office, bathhouse, and maintenance and warehouse facilities. Ventilation systems in the existing underground mine would also serve the proposed mining activities. Currently, all extracted coal is transported approximately 6.6 miles by a series of conveyors to the Jim Bridger Power Plant.

Coal from the Proposed Action would be transferred to the Jim Bridger Power Plant on a 2.4-mile belt conveyor system. The Jim Bridger Power Plant has a generating capability of 2,120 megawatts of electricity (PacifiCorp 2011) and is connected to the western power grid through a series of transmission lines.

2.3.3. Reclamation

At the height of operations, the open-pit mine as part of surface operations in the Bridger Mine Complex was almost 17 miles long, with nearly 10,500 acres of land disturbed by mining operations. As of 2013, approximately 4,000 acres had been reclaimed (PacifiCorp 2013). The Bridger Mine Complex reclamation schedule is dependent on the WDEQ-LQD–approved mine and reclamation plan and mining sequence. Although underground, the Proposed Action would delay the anticipated timeline for final reclamation of disturbed areas surrounding the portal (Ramp 14) by at least 2–3 years, because it would extend the use of the surface support facilities in this area.

No surface reshaping would be anticipated upon completion of underground mining in the project area because it is not expected to be necessary. Reclamation of any subsidence in the project area would consist of 1) reseeding with the same native species seed mix used for surface reclamation, and 2) mulching.

2.4. Other Action Alternatives

No other alternatives were identified for analysis. BLM mining specialists identified the area that would best ensure MER of the coal reserves, as required by MLA. No other tract size would meet federal standards.

There is no logical competitive interest based on the use of the lands or mining of the deposits because

- BCC is the lessee of record, holding the private, state, and federal leases adjacent to the proposed lease modification;
- the lease modification would allow a continuum of an existing mining block and could not be economically developed on a stand-alone basis;
- there is no other nearby operation that could economically mine the proposed lease modification; and
- the only logical access is from the Bridger Mine Complex.

2.5. Alternatives Considered but not Analyzed in Detail

No other alternatives were identified that met the purpose and need for this action. No unresolved conflicts concerning alternative uses of available resources were identified

3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL EFFECTS

This chapter describes the existing environment of the area that would be affected by the Proposed Action or No Action Alternative, and it discloses the potential effects of these alternatives. The affected environment was considered and analyzed by an interdisciplinary team, as documented in the Interdisciplinary Team Checklist (Table 3-1). The checklist indicates which resources or elements of concern are either not present in the project area or would not be impacted to a degree that requires detailed analysis. The elimination of non-relevant resources is consistent with 40 CFR 1500.4. Resources or uses that could be affected by the Proposed Action or the No Action Alternative are analyzed in the remainder of this chapter.

Table 3-1. Interdisciplinary Team Checklist

Determination	Element/Resource	Rationale for Determination
PI	Air quality and GHG emissions	See discussion in Affected Environment and Environmental Effects sections.
NP	Areas of critical environmental concern (ACEC)	No ACECs are present in the project area. The nearest ACEC (Natural Corrals) is 2.7 miles away.
PI	Cultural resources	See discussion in Affected Environment and Environmental Effects sections
NI	Environmental justice	The closest town to the project area is Superior, Wyoming, approximately 8 miles southwest. No environmental justice impacts are expected because mining would be underground and would be a continuation of existing mining.
NP	Farmlands (prime or unique)	Previous EAs do not note any farmlands in the project area.
NP	Floodplains	No large floodplain areas are present in the project area.
NI	Fuels and fire management	Fuels/fire management would not be impacted because there would be no surface use or surface operations.
PI	Geology, geologic hazards, mineral resources	See discussion in Affected Environment and Environmental Effects sections.
NI	Invasive species and noxious weeds	No invasive species/noxious weeds would be introduced to the project area from mining activity because operations would be subsurface.
PI	Lands and access	See discussion in Affected Environment and Environmental Effects sections.
NI	Livestock grazing	The project area is in the Rock Springs Allotment. However, underground coal mining would not impact livestock grazing because there would be no surface use or surface operations.
NP	Native American religious concerns	No Native American Religious Concerns were identified in the project area during a cultural resource inventory.
NI	Paleontology	The project area is in Potential Fossil Yield Classification system Class 3 (moderate potential to contain fossils). Subsidence would likely occur but is not anticipated to destroy any fossils, although the context of their preservation may be altered. However, it would be technically and financially infeasible to conduct underground or deep underground paleontological resource inventories.
NI	Public health and safety	Underground coal mining would not impact public health and safety because no operations would occur on the surface of the project area. The Mine Safety and Health Administration (MSHA) requires the mine operator to restrict public access in the permitted mine area. Public safety concerns from potential subsidence of the county road that crosses the project area are addressed as part of the lands/access analysis.

Table 3-1. Interdisciplinary Team Checklist

Determination	Element/Resource	Rationale for Determination
NI	Rangeland health standards	Underground coal mining would not impact the health of rangeland because there would be no surface use or surface operations.
NI	Recreation	Expanding the area of underground coal mining would not impact recreation because there would be no surface use or surface operations.
PI	Socioeconomics	See discussion in Affected Environment and Environmental Effects sections.
NI	Soils	Expanding the area of underground coal mining would not impact soils because there would be no surface use or surface operations.
NI	Special status species	Expanding the area of underground coal mining would not impact special status species because there would be no surface use or surface operations.
NI	Threatened, endangered, or candidate plant species	The project would not impact habitat or individual plants because there would be no surface use or surface activity.
NI	Threatened, endangered or candidate animal species	The project would not impact habitat or individual animals because there would be no surface use or surface activity. Also, no visible or audible disturbances would occur.
NI	Wastes (hazardous or solid)	The proposed lease modification would not increase production (or waste) quantities.
PI	Water resources and water quality (drinking, surface, and ground)	See discussion in Affected Environment and Environmental Effects sections.
NP	Wetlands and riparian zones	The National Wetlands Inventory shows no wetlands in the project area. The nearest wetland is approximately 0.5 mile away. No riparian zones are present in the project area.
NP	Wild and scenic rivers	None are located in the project area.
NP	Wilderness	None are located in or near the project area. The nearest wilderness (Alkali Draw Wilderness Study Area) is 9.5 miles away.
NP	Woodland and forestry	Based on aerial mapping, no woodland or forestry areas are in the project area.
NI	Vegetation	Expanding the area of underground coal mining would not impact vegetation because there would be no surface use or surface operations.
NI	Visual resources	Underground coal mining would not impact visual resources because there would be no surface use or surface operations.
NI	Wild horses and burros	The project area is in the Divide Basin Wild Horse Management Area. Underground coal mining would not impact wild horses and burros because there would be no surface use or surface operations.
NI	Wildlife	The project area is in elk year-long range, as well as mule deer and pronghorn winter/year-long range. Underground coal mining would not impact surface use by big game or other wildlife.

Notes:

PI: Potential impact could occur from one or more alternatives; therefore, the element/resource is analyzed in this NEPA document.

NP: Not present in the project area; therefore, the element/resource is not analyzed in this NEPA document.

NI: No impact expected from action alternatives, or potential impacts already addressed in referenced NEPA document(s); therefore, the element/resource is not analyzed in this NEPA document.

For each element or resource brought forward for analysis in this EA, an analysis area is identified in which to examine potential project-related impacts. The analysis area is defined as the outer boundary of an area that encompasses potential direct, indirect, and cumulative impacts that may affect the element or resource. Issues identified by BLM RSFO during interdisciplinary team analysis of the area and public scoping have guided the development of the affected environment and environmental effects sections.

3.1. Air Quality and Climate Change

The analysis area for impacts to air quality and climate change is Sweetwater County, Wyoming. This area was chosen because it is a typical spatial boundary used to determine compliance with the National Ambient Air Quality Standards (NAAQS) established in the Clean Air Act (CAA). A county is often selected to be the geographic area evaluated or designated as meeting or not meeting NAAQS. The analysis area is approximately 6,672,640 acres (Gardner 2015).

3.1.1. Affected Environment

3.1.1.1. Local Climate and Meteorology

The project area is on a semi-arid high plateau where climate is strongly influenced by altitude, terrain, and mountain ranges. Climate in the area of the Bridger Mine Complex is discussed in Section 3.1 of the 2013 Lease Modification EA. Recent meteorological data from the Bridger Mine Complex indicate that wind speed in the fourth quarter of 2014 averaged 11.2 miles per hour. The predominant wind direction was from the west-southwest sector. Total precipitation during this quarter was 0.84 inch, and the average temperature was 32.9 degrees Fahrenheit (IML Air Science 2014).

3.1.1.2. Air Quality

3.1.1.2.1. Regulatory Compliance

NAAQS and Ambient Air Quality

EPA established NAAQS to limit the amount of air pollutants considered harmful to public health and the environment. Standards have been set for six criteria pollutants: carbon monoxide, lead, nitrogen dioxide (also known as nitrogen oxides, oxides of nitrogen, or NO_x), ozone, sulfur dioxide, and particulate (solid) matter (PM). Ground level ozone is not directly emitted into the air but is created by chemical reactions between NO_x and volatile organic compounds (VOCs) in the presence of sunlight. Areas that do not comply with NAAQS requirements for criteria pollutants are considered nonattainment areas. A particular geographic region may be designated an attainment area for some pollutants and a nonattainment area for others. A portion of Sweetwater County (the Upper Green River Basin area) is currently a nonattainment area for ozone (8-hour). The Bridger Mine Complex is not in the Upper Green River Basin and is in an area currently considered in attainment with NAAQS (WDEQ 2014a). As a result, the General Conformity Rule does not apply to the Proposed Action (the General Conformity Rule ensures that actions taken by federal agencies in nonattainment and maintenance areas are consistent with a state's plans to meet NAAQS [CAA Section 176(c)]).

The WDEQ Air Quality Division (AQD) has also established its own ambient air quality standards (Wyoming Ambient Air Quality Standards [WAAQS]). Applicable WAAQS are included in Table 3-2; they are also summarized in Table 3.3 of the 2013 Lease Modification EA.

Compliance with NAAQS is demonstrated by monitoring for ground level atmospheric air pollutant concentrations. WDEQ-AQD operates and maintains a network of ambient air quality monitors across the state to collect ambient air quality data and to evaluate compliance with the NAAQS. Table 3-2 summarizes ambient air quality recorded at air quality monitors closest to the project area (WDEQ 2015a).

Table 3-2. Ambient Air Quality Data from 2012 through 2014

Pollutant	Averaging Period (units)	Monitoring Station Data	NAAQS	WAAQS
Carbon monoxide	Maximum 1-hour average concentration (parts per million [ppm])	0.79 (2012) 0.51 (2013) 0.53 (2014)	35	35
	Maximum 8-hour average concentration (ppm)	0.5 (2012) 0.3 (2013) 0.3 (2014)	9	9
NO _x	Annual arithmetic mean (parts per billion [ppb])	5 (2012) 4 (2013) 3 (2014)	53	53
	Annual 98% of daily maximum 1-hour average, 3-year average (ppb)	35	100	100
Ozone*	4 th highest 8-hour average, 3-year average (ppm)	0.062	0.075	0.075
Sulfur dioxide	Annual 99% 1-hour average, 3-year average (ppb)	17	75	75
PM ₁₀ ^{††}	Highest 24-hour average (micrograms per cubic meter [µg/m ³])	72 (2012) 193 (2013) 41 (2014) Design Value: 0.3	150	150
PM _{2.5} [†]	Annual arithmetic mean, 3-year average (µg/m ³)	5.5	12	15
	98% 24-hour average, 3-year average (µg/m ³)	16	35	35

Source: WDEQ (2015a; 2015b).

Note: NO_x, ozone, and PM₁₀ data are from the Wamsutter monitoring station. PM_{2.5} data are from the Rock Springs monitoring station. Sulfur dioxide data are from the Moxa monitoring station. Carbon monoxide data are from the Cheyenne NCore monitoring station.

* The EPA published a final rule on October 26, 2015, which reduces the ozone NAAQS standard from 0.075 ppm to 0.070 ppm. The final rule is scheduled to become effective on December 28, 2015.

† PM₁₀ = PM between 2.5 and 10 micrometers in diameter, and PM_{2.5} = PM less than 2.5 micrometers in diameter.

‡ To comply with the 24-hour PM₁₀ NAAQS, a monitor must record one or fewer exceedances (24-hour concentration greater than 150 µg/m³) per year over a 3-year period. The design value is the average number of exceedances per year from 2012 to 2014. Though an exceedance was recorded in 2013, the station is still in compliance with NAAQS.

All data shown in Table 3-2 are in compliance with NAAQS and WAAQS.

Prevention of Significant Deterioration

The Prevention of Significant Deterioration (PSD) is a CAA permitting program for new and modified major sources of air pollution that are located in attainment areas. It is designed to prevent NAAQS violations. Under PSD regulations, EPA classifies airsheds as Class I, Class II, or Class III. Class I areas are those areas where almost no change from current air quality is allowed. They are areas of special national or regional natural, scenic, recreational, or historic value for which PSD regulations provide special protection. Moderated change is allowed in Class II areas, but stringent air quality constraints are desired. In Class III areas, substantial industrial or other growth is allowed, and increases in

concentrations up to the NAAQS are considered insignificant. Wyoming has seven Class I national parks and wilderness areas; the closest is the Bridger Wilderness approximately 52 miles north of the project area (EPA 2012a). All portions of Wyoming outside of Class I areas are designated as Class II areas. The proposed lease modification is located in a Class II area. PSD regulations would not apply to the Proposed Action because there would be no change to current emissions at the Bridger Mine Complex (no permit modification would be required).

Other Air Quality Regulations

Emissions sources generally fall into two broad categories: stationary and mobile. Stationary sources are non-moving, fixed sources of air pollution that emit pollutants through process vents/stacks or through fugitive releases. Stationary sources are classified as major or minor. A major source emits or has the potential to emit a regulated air pollutant in quantities above defined CAA thresholds. Stationary sources that are not major are considered minor or area sources. The Bridger Mine Complex is a minor source.

Section 111 of the CAA requires EPA to establish federal emission standards for source categories, which cause or contribute significantly to air pollution (New Source Performance Standards or NSPS). The Bridger Mine Complex operates equipment that is subject to NSPS regulations (e.g., passive enclosure control systems and coal truck dumps). The Proposed Action would not require the purchase or use of new equipment or source categories potentially subject to NSPS 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 Bridger Mine Complex and would not require any changes that are subject to NESHAPs.

Regional haze refers to haze that impairs visibility in all directions over a large area. EPA's regional haze rule (originally promulgated in July 1999) calls for state and federal agencies to work together to improve visibility in 156 national parks and wilderness areas (Class I areas). The rule requires the states, in coordination with federal agencies and other interested parties, to develop and implement air quality protection plans to reduce the pollution that causes visibility impairment (EPA 2015a). The proposed lease modification is not located within or near any Class I areas.

3.1.1.2.2. Bridger Mine Complex Emissions

An emissions inventory is a summary of emissions for a particular source during a given time period. The most recent Bridger Mine Complex emissions inventory data from 2014 (BCC 2015) are summarized in Table 3-3. These emissions data include both the underground and surface portions of the mine. Underground mining emissions would be difficult to separate from surface mining emissions because of interrelated components such as shared equipment and vehicle traffic.

Table 3-3. Bridger Mine Complex 2014 Emissions Inventory

Pollutant	Emissions (tons per year)
Carbon monoxide	169.0
NO _x	193.6
PM ₁₀	923.2
PM _{2.5}	196.0
Sulfur oxides	19.0

Source: BCC (2015).

PM₁₀ is the primary pollutant of concern because of the large amount of PM₁₀ emissions from the Bridger Mine Complex. The air permit for the Bridger Mine Complex establishes limits on specific particulate emission sources, but does not set limits for emissions of other criteria pollutants (other than a general limit on the annual coal production rate). Therefore, this discussion focuses on particulate emissions.

PM is emitted from both surface operations and vehicle travel on unpaved roads at the Bridger Mine Complex. The facility is required to implement a fugitive dust control plan for open coal storage piles and for road dust. Fugitive dust is PM released to the air by wind or similar forces. In addition, the Bridger Mine Complex is required to operate a particulate and meteorological monitoring network that includes two PM₁₀ continuous particulate monitors (JB4 and JB5). Historical monitored PM₁₀ concentrations are presented in Table 3.5 of the 2013 Lease Modification EA. Recent monitoring data from 2014 are summarized in Table 3-4 below (IML Air Science 2014).

Table 3-4. Bridger Mine Complex 2014 Year-to-Date Particulate Concentration Summaries

PM ₁₀ Measurement	PM ₁₀ Concentration (µg/m ³)	
	JB4	JB5
Annual mean concentration	11.3	20.0
24-hour high concentration	68.5	134.1
24-hour 2 nd high concentration	63.4	134.0

Source: IML Air Science (2014).

These concentrations are in compliance with the PM₁₀ NAAQS (150 µg/m³ highest 24-hour average) and PM₁₀ WAAQS (150 µg/m³ highest 24-hour average and 50 µg/m³ annual mean). BCC also has a fugitive dust action plan, which stipulates actions to be taken if elevated PM₁₀ readings are detected at JB4 and JB5.

3.1.1.2.3. Adjacent Emission Sources

The Jim Bridger Power Plant operates under a 2005 Title V Operating Permit No. 3-1-120-2 (WDEQ 2005). A number of amendments or waivers to the operating permit have been issued for equipment modifications and updates, process changes, and for pollution control equipment projects (e.g., new mercury control technology was implemented at the plant in April 2015). The Jim Bridger Power Plant would be subject to the new Clean Power Plant Final Rule (Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units) announced on August 3, 2015, and plans

to address all requirements under the rule (Childs et al. 2015). A summary of emissions from the Jim Bridger Power Plant is included here to provide context and to assist with analysis of the combustion of coal mined from the proposed lease modification. Table 3-5 summarizes the Jim Bridger Power Plant's 2014 annual emission inventory data.

Table 3-5. Jim Bridger Power Plant 2014 Emissions Inventory

Pollutant	Emissions (tons per year)
Carbon monoxide	5,626
NO _x	13,906
PM ₁₀	948
PM _{2.5}	300
PM	1,818
Sulfur dioxide	10,726
Volatile organic compounds	233
HAPs	1,299
Ammonia	2.4

Source: PacifiCorp (2014a).

Annual coal throughput at the Jim Bridger Power Plant in 2014 was 7,841,842 tons (the permitted annual amount is 9,500,000 tons) (PacifiCorp 2014b). The Jim Bridger Power Plant is currently in compliance with all permit conditions.

3.1.1.3. Climate Change

Global warming refers to the ongoing rise in global average temperature near the Earth's surface. It is caused mostly by increasing concentrations of GHGs (primarily CO₂, methane, NO_x, and fluorinated gases) in the atmosphere, and it is changing climate patterns. Climate change refers to any significant change in the measures of climate (e.g., temperature, precipitation, and wind patterns) lasting for an extended period of time (EPA 2014). In 2010, the National Research Council concluded that "climate change is occurring, is caused largely by human activities, and poses significant risks for a broad range of human and natural systems" (National Research Council 2010).

In May 2014, the U.S. Global Change Research Program released the *Climate Change Impacts in the United States: The Third National Climate Assessment* (Assessment), a comprehensive report on climate change and its impacts in the United States (Melillo et al. 2014). In the Assessment, the Great Plains region comprises the states of Montana, Wyoming, North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, and Texas. According to the Assessment, projections suggest more frequent and more intense droughts, severe rainfall events, and heat waves in this region. High temperatures are projected to occur much more frequently. Key climate change highlights for the Great Plains region include the following, excerpted directly from the Assessment:

- Rising temperatures are leading to increased demand for water and energy. In parts of the region, this will constrain development, stress natural resources, and increase competition for water among communities, agriculture, energy production, and ecological needs.
- Landscape fragmentation is increasing, for example, in the context of energy development activities in the northern Great Plains. A highly fragmented landscape will hinder adaptation of species when climate change alters habitat composition and timing of plant development cycles.

- Communities that are already the most vulnerable to weather and climate extremes will be stressed even further by more frequent extreme events occurring within an already highly variable climate system.
- The magnitude of expected changes will exceed those experienced in the last century. Existing adaptation and planning efforts are inadequate to respond to these projected impacts. (Melillo et al. 2014)

Specifically in Wyoming, the average temperature in Laramie, Wyoming, increased 1.5 degrees Fahrenheit over the last century. Precipitation decreased by up to 20% in many parts of the state (EPA 1998). More recent temperature data for Wyoming continue to show an increase in mean annual temperature from 1998 to 2013 (National Oceanic and Atmospheric Administration 2015). By 2100, temperatures in the state could increase by 4 degrees Fahrenheit in spring and fall, 5 degrees Fahrenheit in summer, and 6 degrees Fahrenheit in winter (EPA 1998). A recent study concludes that snow cover in the Wind River Range (Fremont Lake Basin) is melting approximately 16 days earlier, on average, in the 2000s compared to the period of 1972–1999 (Hall et al. 2015). Increasing spring and summer nighttime temperatures are likely driving the earlier snowmelt (Hall et al. 2015).

Carbon dioxide (CO₂) is the primary GHG emitted through human activities that contributes to climate change (82% of total United States GHG emissions in 2013); it is followed by methane (10% of total 2013 emissions), NO_x (5% of total 2013 emissions), and fluorinated gases (3% of total 2013 emissions) (EPA 2015b). The main human activity emitting CO₂ is the combustion of fossil fuels (including the combustion of coal) for energy and transportation (EPA 2015c). Coal mining produces methane, which is created during coal formation and is released from the coal seam and the surrounding rock strata. Methane is also emitted from the production and transport of natural gas and oil, as well as from livestock, other agricultural practices, and the decay of organic waste in municipal solid waste landfills (EPA 2015b). NO_x is emitted from agricultural and industrial activities, as well as during the combustion of fossil fuels and solid waste. Fluorinated gases, which are synthetic, are emitted from a variety of industrial processes (EPA 2015b).

The global warming potential (GWP) of gases was developed to allow comparisons of global warming impacts between different gases. The GWP of a gas depends on how well the gas absorbs energy and how long the gas stays in the atmosphere. It is a measure of the total energy that a gas absorbs over a particular period of time (usually 100 years) compared to CO₂. CO₂ has a GWP of 1. The larger the GWP, the more warming the gas causes. For example, methane's 100-year GWP is estimated to be 28–36, meaning that methane will cause 28–36 times as much warming as an equivalent mass of CO₂ over a 100-year time period (EPA 2015d).

The term carbon dioxide equivalent (CO₂e) is used to describe different GHGs in a common unit. For any quantity and type of GHG, CO₂e represents the amount of CO₂ that would have the equivalent global warming impact (Brander 2012). Underground coal mines in the United States reported emissions of 41.5 million metric tons of CO₂e in 2013 (out of a total of 3,184.3 million metric tons CO₂e reported by direct emitters) (EPA 2013b). These underground coal mine CO₂e emissions represent 1.3% of the total CO₂e emissions for 2013. Data specific to Wyoming are provided in the 2013 Lease Modification EA.

In 2009, EPA established mandatory GHG reporting requirements for certain types of facilities (*Federal Register* 74(209):56260). 40 CFR 98, Subpart FF provides specific guidance for underground coal mines. The reporting threshold for underground coal mines is 36,500,000 actual cubic feet (acf) of methane per year. Methane is monitored on a quarterly basis during MSHA inspections at the underground mine in the Bridger Mine Complex. The measured methane volume in 2014 was 769,674 acf (Hargis 2015a), which is below the reporting threshold.

3.1.2. Direct and Indirect Effects

3.1.2.1. No Action Alternative

Under the No Action Alternative, BLM would reject the application for a second federal coal lease modification to WYW154595 and would not allow extraction of the additional recoverable coal in the 120.02-acre project area. No new mining activity would occur. The Bridger Mine Complex would continue to operate at current production levels and emit approximately the same amount of air pollution. Existing sources of air pollution (such as the Jim Bridger Power Plant and other mines) would continue to impact air quality in the analysis area.

3.1.2.2. Proposed Action Alternative

3.1.2.2.1. Air Quality

Emissions of air pollutants at the Bridger Mine Complex are currently limited by air quality permits issued by WDEQ-AQD (Air Quality Permits MD-9156 and MD-12225). Because the proposed lease modification is an extension (rather than an increase) of existing underground mining, no permit modifications would be required. Mining of the proposed lease modification would occur under the current air quality permits. The Proposed Action would not authorize a change in already permitted actions or in production levels. There would be no incremental increase in emissions from implementation of the Proposed Action.

Under the Proposed Action, no fugitive dust emissions would be generated from the ground surface because there would be no surface disturbance. Emissions would occur from underground coal mining activities in the project area and would consist of methane released from coal seams and emitted from the mine ventilation shafts and from criteria pollutants and HAPs emitted from vehicles and equipment such as loaders, haul trucks, dozers, scrapers, forklifts, and water trucks. The transfer of coal from point to point would also create fugitive dust emissions. Fugitive dust emissions inside the underground mine would likely be limited by the natural moisture content of the underground traveled surface and would be controlled with water application if necessary (BLM 2013a). In addition, employee travel to and from the project area on paved and unpaved roads would create criteria and HAP emissions, as well as fugitive dust emissions. Reportable emissions are summarized in Table 3-3 (with the exception of methane emissions which are discussed in section 3.1.2.2.2).

The Proposed Action would not result in a production increase but would add approximately 1.5 additional years to the life of the mine. Activity levels and equipment use at the underground mine would remain the same but would move into the project area. Employee levels would remain essentially unchanged. The underground mine intake and exhaust from the mine portal would continue at a similar rate. Therefore, emissions (including the venting of methane) would remain at or near current levels (see Table 3-3). No NAAQS or WAAQS exceedances are expected to occur.

Indirect emissions from the burning of the coal in the proposed lease modification can be estimated using emissions from the Jim Bridger Power Plant. The annual coal throughput at the Jim Bridger Power Plant in 2014 was 7,841,842 tons. The proposed lease modification has approximately 738,000 tons of economically recoverable coal; the time needed to remove the coal from the project area is anticipated to be 1.5 years. Assuming two-thirds of the coal is excavated in the first year, 492,000 tons of coal would be burned at the Jim Bridger Power Plant. This represents approximately 6.3% of the annual coal throughput at the plant. Using the Jim Bridger Power Plant's 2014 emission inventory (see Table 3-5), and assuming that the coal from the proposed lease modification is equal to 6.3% of the power plant's annual coal throughput, emissions from burning of the coal from the proposed lease modification in the first year are

presented in Table 3-6. Emissions for the second year are based on the combustion of 246,000 tons of coal. These emissions would not change overall emission levels at the power plant because the plant would continue to operate at the same production rate whether or not the proposed lease modification area is developed (the proposed lease modification emissions are not additive).

Table 3-6. Estimated Emissions Associated with Burning of Federal Coal from the Proposed Lease Modification

Pollutant	Year 1 Emissions (tons per year)	Year 2 Emissions (tons per year)	Total Emissions (tons)
Carbon monoxide	354	174	529
NO _x	876	431	1,307
PM ₁₀	60	29	89
PM _{2.5}	19	9	28
PM	115	56	171
Sulfur dioxide	676	333	1,008
Volatile organic compounds	15	7	22
HAPs	82	40	122
Ammonia	0.2	0.1	0.2

3.1.2.2.2. Climate Change

The coal from the project area that would be burned at the Jim Bridger Power Plant would not change the GHG emission levels at the power plant, because the plant would continue to operate whether or not the proposed lease modification area is developed. However, this analysis estimates GHG emissions from the off-site burning of the coal from the proposed lease modification, which would consist primarily of CO₂ and NO_x. Methane emissions would also occur from on-site vents during underground mining of the coal.

BCC estimates that the project area has approximately 738,000 tons (1,476,000,000 pounds) of economically recoverable coal. EPA estimates that there is 0.000931 metric ton of CO₂ emissions per pound of coal burned (EPA 2015e). Based on this estimate, the coal in the project area would release a total of 1,374,156 metric tons of CO₂ when burned. Globally, approximately 32,310 million metric tons of CO₂ were added to the atmosphere through the combustion of fossil fuels in 2012, of which the U.S. accounted for approximately 16% or approximately 5,170 million metric tons (EPA 2015f). The CO₂ emissions from burning the removed coal under the Proposed Action would be 1.37 million metric tons, which would represent approximately 0.004% of the 2012 global fossil fuel emissions and 0.03% of the 2012 United States fossil fuel emissions from combustion.

Total NO_x emissions from burning the coal in the project area are estimated to be 1,307 total tons (see Table 3-6) or 1,186 metric tons. For comparison to national data, the 1,186 metric tons of NO_x must be converted to CO₂e. CO₂e is calculated by multiplying the mass emissions of the GHG by the GWP for the GHG. Using a GWP of 298 for NO_x, 1,186 metric tons is equal to 353,428 metric tons of CO₂e. This represents approximately 0.9% of the 41.3 million metric tons of CO₂e NO_x emissions in 2013 from fossil fuel combustion (EPA 2015f).

The measured methane volume venting from the underground mine at the Bridger Mine Complex in 2014 was 769,674 acf (32,680 pounds or 16.34 tons) (Hargis 2015a). This is equivalent to 14.82 metric tons of methane. This methane volume is expected to remain the same under the Proposed Action. As of January

2014, the GWP for methane under the GHG reporting rule is 25 (*Federal Register* 78:71904). CO₂e is calculated by multiplying the mass emissions of the GHG by the GWP for the GHG. Therefore, 14.82 metric tons of methane are equivalent to 370.5 metric tons of CO₂e in 2014. This represents 0.0006% of the reported emissions of 64.6 million metric tons of CO₂e methane in 2013 from coal mining in the United States (EPA 2015f).

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 Resources

Cultural resources are evidence of past human activity. They can be either prehistoric or historic in age (i.e., dating to either before or after the time of Euro-American settlement), and they include artifacts (portable objects of human manufacture such as tools); features such as fire pits, houses, earthworks, and other types of structures; human burial sites; art; trails; and archaeological sites where any of the above may be found. Cultural resources can also include other types of places that are important to the heritage of contemporary peoples (e.g., sacred and traditional cultural properties).

Cultural resources are managed under a variety of laws and regulations, including Section 106 of the National Historic Preservation Act of 1966 (NHPA) (36 CFR 800). This section requires that federal agencies take into account the effect that a federal undertaking (or Proposed Action) may have on historic properties—that is, any district, site, building, structure, or object that is included in or eligible for the NRHP.

The analysis area for impacts to cultural resources is the 120.02-acre project area. This is the area of potential effects for purposes of review under Section 106 of the NHPA, all of which has been inventoried for cultural resources by Western Archaeological Services, Inc. (WAS).

3.2.1. Affected Environment

WAS conducted a Class III cultural resource inventory in 2014 (WAS 2014). The cultural resource inventory included a file and record search, examination of General Land Office maps, examination of aerial photographs, and an intensive pedestrian survey.

The cultural resource inventory notes that land use in and near the project area includes the Bridger Mine Complex, Jim Bridger Power Plant, Interstate 80, upgraded roads, two-track roads, overhead power lines, and some gas development with associated infrastructure. Two-track roads are widespread and reflect initial use of the area by wagons and current use by four-wheeled vehicles. Many of the two-track roads provide access to water sources, fence lines, and stock-herding camps. Some have been used for energy-related projects such as seismic studies and surveying.

One newly documented site was identified in the project area during the cultural resource inventory (48SW18840, Black Rock South 137); this site is recommended not eligible for the NRHP (WAS 2014). No other cultural resources were identified in the project area, and no previously documented sites have been identified in the project area. However, one previously documented site, the Point of Rocks to South Pass City Stage Road, appears to intersect the northeast corner of the project area, based on the Historical Trails in Wyoming dataset. This dataset represents only an approximation of the centerline of the trails system, and the exact location of the road in relation to the project area is not known. Maps in the cultural resource inventory place the road just outside the northeast corner of the project area (WAS 2014). This historic trail is a former stage and freight wagon road constructed after 1869 to serve newly developing communities to the north (BLM 2010). The trail was previously evaluated as eligible for the NRHP, with State Historic Preservation Office concurrence (WAS 2014).

In 2010, a memorandum of agreement (MOA) was signed between OSMRE, BLM, Wyoming State Historic Preservation Office, WDEQ, and BCC for the mitigation of adverse effects on historic properties eligible for the NRHP at the Bridger Mine Complex (OSMRE et al. 2010). The MOA outlines stipulations for data recovery; the encountering of human remains, funerary objects, or objects of cultural patrimony; reporting; treatment of the Point of Rocks to South Pass City Stage Road; emergency situations; discovery of new cultural resources; funding; and inspections. The MOA was effective for a period of 5 years. A first amendment to the MOA was signed in July 2015, which extends the duration of the agreement for an additional 2 years (OSMRE et al. 2015). The MOA does not pertain to the project area.

3.2.2. Direct and Indirect Effects

3.2.2.1. No Action Alternative

Under the No Action Alternative, BLM would reject the application for a second federal coal lease modification to WYW154595 and would not allow extraction of the additional recoverable coal in the 120.02-acre project area. As such, no new coal mining activity would occur in the project area under this alternative, and no cultural resources would be directly or indirectly affected by these activities. Continued existing uses of the project area (e.g., road use) could impact cultural resources.

3.2.2.2. Proposed Action Alternative

Actions that cause surface and subsurface physical disturbance could result in the damage, destruction, or inadvertent discovery of cultural resources. Any damage or destruction of cultural resources would be direct and permanent. Indirect impacts would include the loss of research potential and interpretation possibilities. No surface disturbance would occur under the Proposed Action because it is underground mining. However, 6–9 feet of subsidence are expected to occur and would have the potential to impact cultural resources on the ground surface.

One newly documented site, 48SW18840, was identified in the project area. Site 48SW18840 was recommended not eligible for the NRHP because it does not have the potential to contribute significant data to the study of the prehistory of the area and does not address regionally identified research objectives (WAS 2014). No additional work was recommended in the cultural resource inventory for this site.

Assuming the Point of Rocks to South Pass City Stage Road intersects the northeast corner of the project area, impacts to the road could occur from the Proposed Action (e.g., from 6 to 9 feet of subsidence). However, subsidence is not expected to extend much past the underground limits of the longwall panels (studies at similar longwall underground coal mines indicate that subsidence effects do not typically extend more than 50 feet beyond the limits of the panels [BLM 2004]). Based on the locations of the longwall panels (see Figure 2-1), which are well over 660 feet from the northeast corner of the project area, subsidence is not expected to impact the Point of Rocks to South Pass City Stage Road.

3.3. Geology and Minerals

The analysis area for potential effects to geology and mineral resources is the 120.02-acre project area. This analysis area was chosen because it includes the resources that could experience direct, indirect, and cumulative effects from the proposed leasing and mining activities. Effects are expected to be limited to the project area because subsidence is only expected to affect surface lands overlying the areas that would be mined.

3.3.1. Affected Environment

Geology and mineral resources are described in the 2013 Lease Modification EA and the TMRT EA. In general, the project area is on the eastern flank of the Rock Springs Uplift, which is an anticlinal dome trending north to south through the center of the Greater Green River Basin (BLM 2004). The terrain undulates with greater relief along the ridges. The ridges and hogbacks are formed by sandstones of Tertiary and Cretaceous age; softer shales form strike valleys between the more resistant outcrops. Elevations range from 6,500 to 7,200 feet. The Continental Divide extends north and east through the area (WDEQ 2014b).

The Rock Springs Uplift dome of Cretaceous and Tertiary rocks was formed during the Laramide Orogeny. The major axis of the dome trends north to south and is approximately 50 miles long. The core of the uplift consists of Upper Cretaceous rocks flanked by the Paleocene Fort Union Formation and the Eocene Wasatch Formation. Several small anticlines and synclines developed on the main dome and numerous faults radiate outward from it (WDEQ 2014b). Figure 3-1 shows a composite erosional columnar section of the Rock Springs Uplift in the Bridger Mine Complex area.

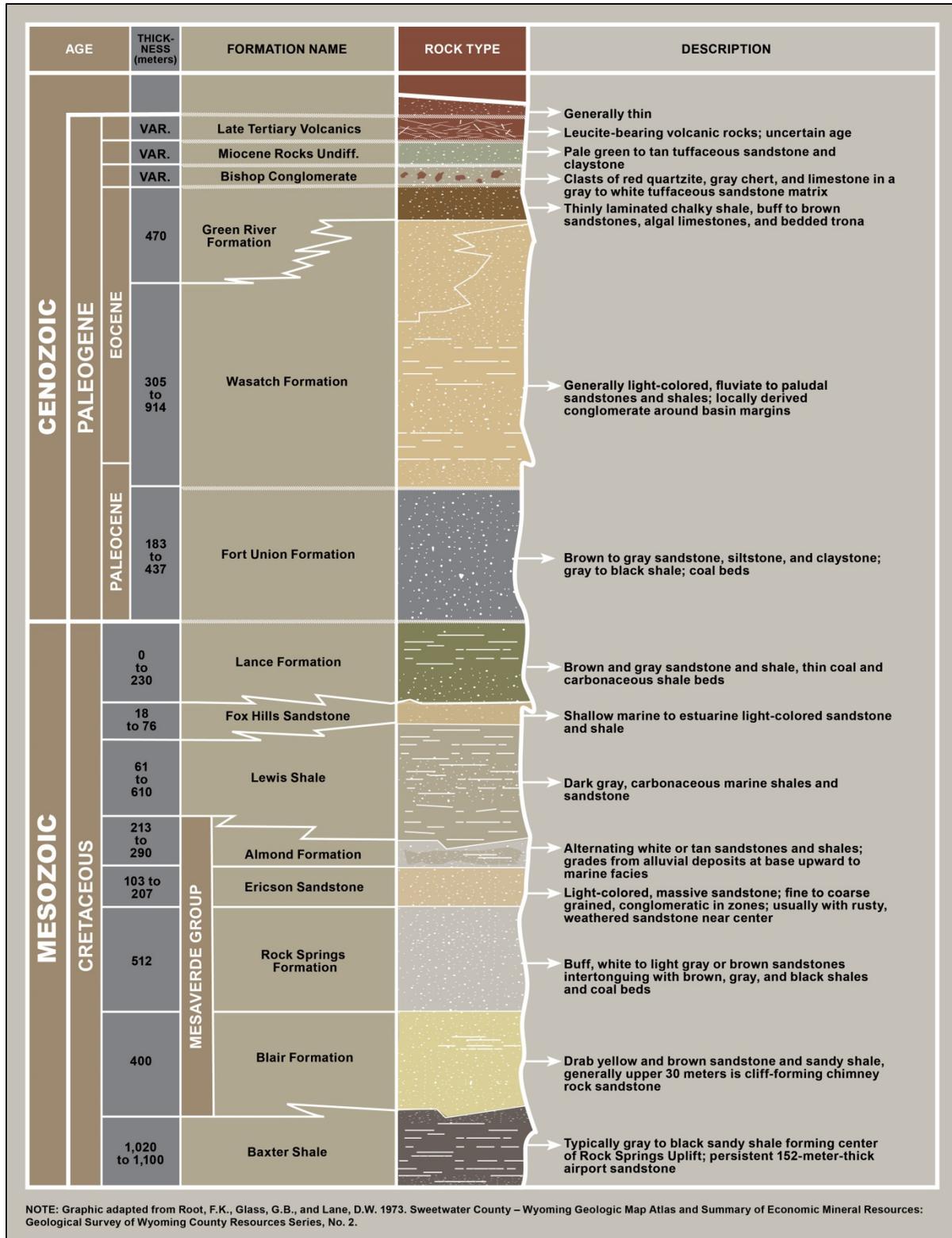


Figure 3-1. Composite erosional columnar section of the Rock Springs Uplift.

Coal reserves in the project area are part of the Fort Union Formation (see Figure 3-1). This formation consists of brown to gray sandstone, gray to black shale, and thin coal beds. The coal beds are present mostly in the lower half of the formation. The Fort Union Formation has an approximate stratigraphic thickness of 800–1,600 feet, with three to five mineable coal seams, and an approximately coal thickness of 2–32 feet (WDEQ 2014b). The Deadman coal zone of the Fort Union Formation has five coal seams; the coal seam to be mined has a thickness of approximately 7–11 feet (WDEQ 2014b; BLM 2004). BCC estimates that the project area has approximately 738,000 tons of economically recoverable coal. More specific information on the Fort Union Formation in the area of the Bridger Mine Complex is provided in the 2013 Lease Modification EA and the TMRT EA.

Surface geology in the Bridger Mine Complex area consists of the following four major classification units:

1. Aeolian mixed with scattered deposits of residuum, alluvium, and slope wash.
2. Bedrock and glaciated bedrock, including volcanic necks mixed with scattered shallow deposits of aeolian, grus, slope wash, colluvium, residuum, and alluvium.
3. Residuum mixed with alluvium, aeolian, slope wash, grus, and/or bedrock outcrops.
4. Playa deposits mixed with scattered deposits of alluvium and aeolian soils. (BLM 2004)

The potential for seismic activity in the general area is low to moderate. No other known geologic hazards (landslide areas, hydrogen sulfide-producing wells, windblown sand, and special flood management areas) have been identified (BLM 2004).

There is a moderate potential for oil and gas development in the general area; however, the 2013 Lease Modification EA indicated that no producing wells had been reported (BLM 2013a). A review of the Wyoming Oil and Gas Conservation Commission website for well production in townships and ranges occupied by the Bridger Mine Complex indicates that there are three producing natural gas wells in Township 21 North, Range 101 West (in sections west of the Bridger Mine Complex) (Wyoming Oil and Gas Conservation Commission 2015). No other producing wells were identified in this area. No active oil and gas leases, no active locatable mineral mines, and no construction aggregate quarries are currently in the project area (BLM 2013a). Coalbed methane content is insufficient to support economic gas development in the Deadman coal zone of the Fort Union Formation (BLM 2004).

3.3.2. Direct and Indirect Effects

3.3.2.1. No Action Alternative

Under the No Action Alternative, BLM would reject the application for a second federal coal lease modification to WYW154595 and would not allow extraction of the additional recoverable coal in the 120.02-acre project area. As such, no new coal mining activity would occur in the project area under this alternative, and there would be no new impacts to geology and minerals. The coal resource would be available for future extraction; however, the size and isolated nature of the coal make this unlikely under current economic conditions. Therefore, the coal would most likely be bypassed, which would result in the loss of the use of the resource, as well as the loss of federal revenues from the leasing and sale of the coal.

3.3.2.2. Proposed Action Alternative

The Proposed Action would impact geology and mineral resources by removing approximately 738,000 tons of coal from the proposed lease modification area. If the coal lease modification is approved, BCC would be required to revise its coal mining permit and obtain mining plan approval with OSMRE and WDEQ-LQD before mining. Reclamation would be included in the plan.

As the coal is mined out under the Proposed Action, the longwall machinery (and roof support equipment) would retreat, and the roof material and overburden would collapse into the mined-out area. Although the collapsed material would provide considerable support for the overlying strata, surface subsidence would occur. Subsidence associated with longwall mining is relatively quick and usually expressed during mining; however, delayed surface expressions of subsidence can also occur after mining (WDEQ 2014b).

Subsidence monitoring by BCC as of October 2014 in the current underground mine shows that maximum subsidence is in the center of the troughs and is 6–9 feet deep (Hargis 2015b). Field observations indicate that there is only minor cracking at the surface and that the visual evidence of subsidence is masked by natural topography. Only a few cracks have been large enough to require repair. In general, surface strata are soft enough that the cracks are small and heal themselves. Actual subsidence conforms well to subsidence predicted by modeling conducted for the mine permit (Hargis 2015b). Because of similar geology and underground methods, surface subsidence in the project area would be similar to that modeled and observed in relation to the adjacent active underground mining.

Studies at similar longwall underground coal mines indicate that subsidence effects do not typically extend more than 50 feet beyond the limits of the longwall panels (BLM 2004); therefore, subsidence in the project area would not be expected to extend much past the underground limits of the longwall panels.

The Bridger Mine Complex has a subsidence monitoring program that includes monthly visual inspections over active longwall panels, semi-annual surveys of channel longitudinal profiles and cross sections, and annual photogrammetric mapping and light detection and ranging remote sensing. The project area would be included in this program.

The project area has no known conflicts between oil and gas development and mining. Oil and gas development can still occur adjacent to the mining operation.

3.4. Lands and Access

The analysis area for lands and access is the 120.02-acre project area. This area was chosen because all activities with the potential to affect lands and access would occur within these boundaries.

3.4.1. Affected Environment

BLM administers the surface and subsurface in the proposed lease modification. As shown in Figure 1-2, surface ownership in the area of the proposed lease modification is a checkerboard pattern. Even-numbered sections are typically owned by the federal government (with some sections owned by the State of Wyoming), and odd-numbered sections are usually privately owned. Land uses in the general area include the Bridger Mine Complex, livestock grazing, wildlife habitat, small sand and gravel mines, oil and gas wells, the Jim Bridger Power Plant, and the Black Butte Mine. BCC has obtained rights-of way and/or special use permits for all mine-related activities on BLM-administered land (but outside the federal lease area) (BLM 2004).

The Bridger Mine Complex can be reached by heading east on Interstate 80 from Rock Springs to Point of Rocks. At Point of Rocks, Wyoming State Highway 377 (paved) and County Road 15 (paved) lead to the mine headquarters. Most of the roads throughout the Bridger Mine Complex are unpaved.

Sweetwater County Road 15 extends north of the Bridger Mine Complex and connects with County Road 17 (leading to Rock Springs), County Road 83, and County Road 21. County Road 15 crosses the southern third of the project area and is a dirt road in this area. The length of the road in the project area is 0.36 mile.

3.4.2. Direct and Indirect Effects

3.4.2.1. No Action Alternative

Under the No Action Alternative, BLM would reject the application for a second federal coal lease modification to WYW154595 and would not allow extraction of the additional recoverable coal in the 120.02-acre project area. As such, no new coal mining activity would occur in the project area under this alternative, and any activities in the area would continue under their current condition. Prior rights to the project area would remain unchanged.

3.4.2.2. Proposed Action Alternative

Under the Proposed Action, surface land uses would remain unchanged. Current land uses in the project area would continue. However, Sweetwater County Road 15 could be impacted by 6–9 feet of subsidence where the road crosses the longwall panel (see Figure 2-1), which would degrade the condition of the road. The length of the road above the longwall panel that would be impacted is approximately 320 feet or 0.06 mile (approximately 0.7% of the entire 8.13-mile road and 16.7% of the 0.36 mile of road within the project area). As discussed in section 3.3.2.2, subsidence is not expected to extend much past the underground limits of the longwall panels (subsidence effects do not typically extend more than 50 feet beyond the limits of the panels [BLM 2004]).

As described in section 2.3.2, BCC and the Sweetwater County engineer would sign an agreement to guide repairs of any subsidence damage to the road. The agreement would be included in the WDEQ-LQD mine permit. To minimize road effects and ensure public safety, BCC would conduct subsidence monitoring and road maintenance to address any travel or safety issues resulting from underground mining beneath the road. During mining operations, BCC would monitor the county road for subsidence damage and would promptly make any needed repairs (the prompt attention to needed repairs would help prevent larger amounts of damage from accumulating). BCC would also post signs to notify and caution county road users of the subsidence potential.

3.5. Socioeconomics

The analysis area for impacts to socioeconomics is Sweetwater County. This area was chosen because the economic and demographic effects of the Proposed Action would likely be experienced by the surrounding communities in the county. This area is where most of the employees of proposed mining operations on the project area would likely reside or take temporary accommodations. The analysis area is approximately 6,672,640 acres (Gardner 2015).

3.5.1. Affected Environment

The population of Sweetwater County in 2010 was 43,599 (U.S. Census Bureau 2015a). Sweetwater County's population was estimated to be 45,010 people in 2014, which is an increase of approximately 3.2% (U.S. Census Bureau 2015a). In 2013, mining was the largest employment sector of the county (6,330 jobs), followed by local government (4,104 jobs), retail trade (2,926 jobs), accommodation and food services (2,524 jobs), construction (2,013 jobs), transportation and warehousing (1,752 jobs), manufacturing (1,531 jobs), health care and social assistance (1,422 jobs), and real estate, rental, and

leasing (1,263 jobs) (Bureau of Economic Analysis 2014). In the 2010 census, the 18,735 total housing units in Sweetwater County were 87.9% occupied (U.S. Census Bureau 2010). The number of housing units was estimated to be 19,077 in 2014, which is an increase of approximately 1.8% (U.S. Census Bureau 2015b). The median household income in Sweetwater County was estimated to be \$72,899 (U.S. Census Bureau 2013a) and the unemployment rate (for the civilian labor force) was 4.7% in June 2015 (Wyoming Department of Workforce Services 2015).

As discussed in the 2013 Lease Modification EA, Rock Springs is the closest city to the project area. Most of the workers at the Bridger Mine Complex likely live in Rock Springs. The estimated population of Rock Springs in 2014 was 24,045 (U.S. Census Bureau 2015a), which is a 4.4% increase from the 2010 census population of 23,036 (U.S. Census Bureau 2010). In the 2010 census, the 10,070 total housing units in Rock Springs were 87.0% occupied (U.S. Census Bureau 2010). The number of housing units was estimated to be 10,126 in 2013, which is an increase of approximately 0.6% from 2010 (U.S. Census Bureau 2013b).

3.5.2. Direct and Indirect Effects

3.5.2.1. No Action Alternative

Under the No Action Alternative, BLM would reject the application for a second federal coal lease modification to WYW154595 and would not allow extraction of the additional recoverable coal in the 120.02-acre project area. As such, no new coal mining activity would occur in the project area under this alternative, and no changes would occur to the social and economic conditions of nearby communities. The local population, employment, housing conditions, and revenue would remain similar to current conditions, because mining would continue in other areas of the Bridger Mine Complex. However, changes in other local industries could impact the socioeconomics of these communities. The extension of mine activities for an additional 1.5 years and associated employment and economic benefits would not occur under the No Action Alternative.

3.5.2.2. Proposed Action Alternative

Under the Proposed Action, production and employment levels at the Bridger Mine Complex would be extended for an additional 1.5 years, resulting in continued socioeconomic effects to the area. Underground mining at the Bridger Mine Complex currently employs 302 regular and contract employees, which would not change with the implementation of the Proposed Action. Using the 1.78 coal mining employment multiplier for Wyoming's southwest coal industry (Godby et al. 2015), underground mining at the Bridger Mine Complex generates 538 additional jobs in the local economy (the industry multiplier accounts for other jobs that are created by the labor, services, and goods needed to operate a coal mine). The proposed lease modification would support these secondary jobs for an additional 1.5 years. Other indirect effects to the local economy would also continue through the purchase and use of goods and services needed for mine operations, vehicles, and employees.

Existing infrastructure in Sweetwater County is sufficient to sustain the current Bridger Mine Complex workforce for the additional time period (e.g., housing units are not fully occupied, and the population is growing at approximately 0.68% a year).

Taxes and royalty payments from the mining of coal in the project area would provide revenue to the state and federal government, but the overall revenue from the Bridger Mine Complex would be approximately the same. However, the Proposed Action would add approximately 1.5 additional years to the life of the mine, which would extend the amount of time revenue is provided to the state and federal government. The Proposed Action would also provide access to adjacent private underground coal, which could result in additional revenue.

3.6. Water Resources

The analysis area for potential effects to water resources consists of the Middle Black Rock Creek watershed (35,390 acres). This area was chosen because it is a natural topographical boundary that provides a context for the potential impacts of the Proposed Action on water resources in the area (Figure 3-2).

3.6.1. Affected Environment

3.6.1.1. Surface Water Resources

The project area is in the Middle Black Rock Creek watershed, which is part of the Black Rock Creek watershed and the Great Divide Basin. The Great Divide Basin is a closed, internally drained basin or topographic depression that sits at a high elevation across the western Continental Divide of the United States (Heller et al. 2010).

One unnamed intermittent stream (a tributary of Black Rock Creek) crosses the northern half of the project area (Figure 3-3). No other streams or waterbodies are in the project area. According to the National Hydrography Dataset, no wetlands are in the project area. Black Rock Creek is approximately 1.2 miles north of the project area, and Deadman Wash is approximately 1.5 miles south of the project area. Deadman Wash is in the Green River Basin rather than in the Great Divide Basin.



Figure 3-2. Middle Black Rock Creek watershed (water resources analysis area).

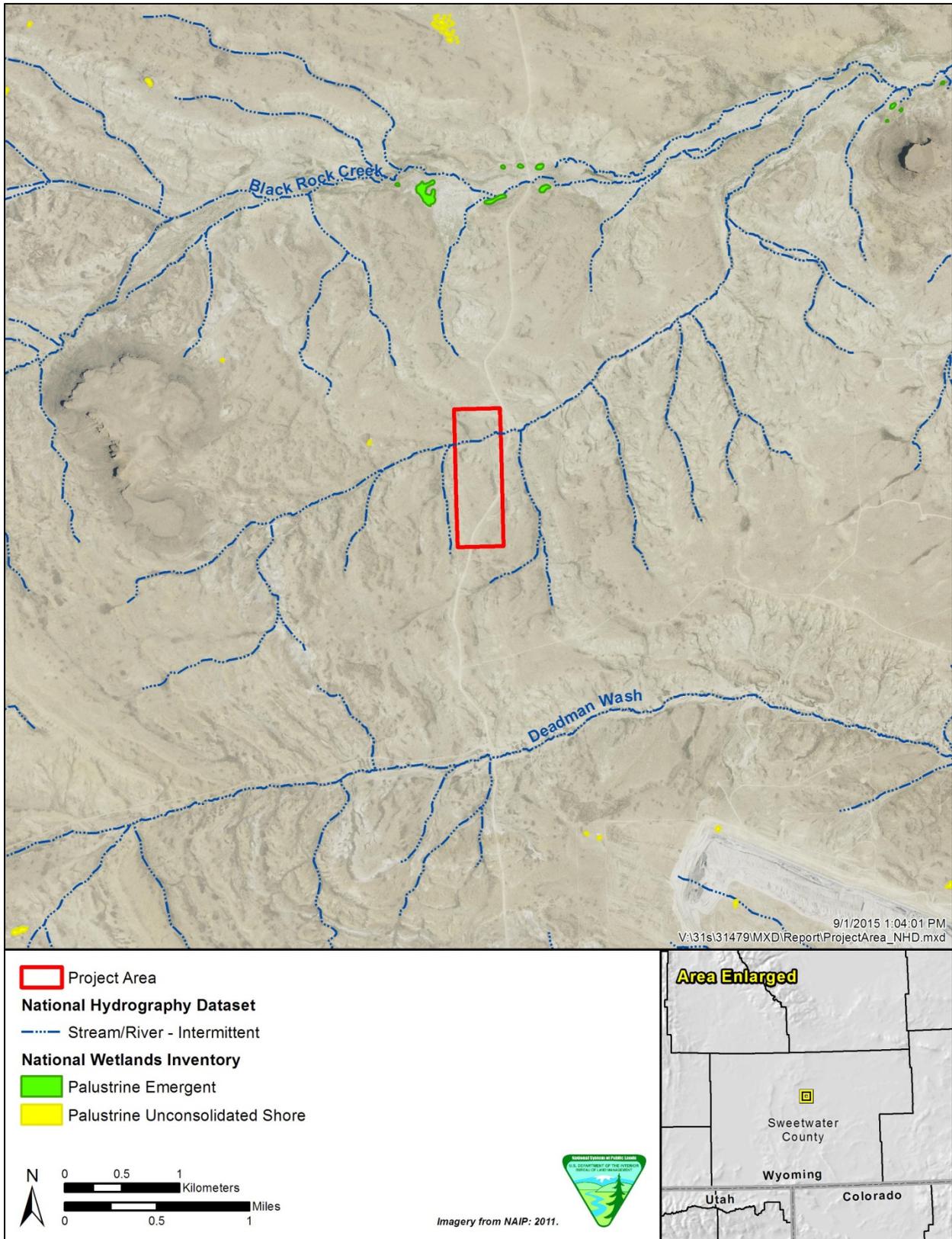


Figure 3-3. National Hydrography Dataset and National Wetlands Inventory features in and/or around the project area.

The WDEQ Water Quality Division classifies Black Rock Creek as a Class 3B surface water (WDEQ 2013a). Class 3B waters are intermittent and ephemeral streams with adequate hydrology to support and sustain aquatic life communities such as invertebrates and amphibians (WDEQ 2013b). A stream classified as 3B has use designations of aquatic life other than fish, recreation, wildlife, agriculture, industry, and scenic value (WDEQ 2013a).

Surface mining activities at the Bridger Mine Complex intersect Deadman Wash. Deadman Wash and its tributaries are generally ephemeral drainages. Downstream of the Jim Bridger Power Plant, Deadman Wash sustains perennial flow due to seepage from the plant's surge pond (WDEQ 2014b). Deadman Wash has two different surface water classifications: Class 3B above the Jim Bridger Power Plant and Class 2ABww below the Jim Bridger Power Plant. Class 2AB waters support game fish populations or spawning and nursery areas (Deadman Wash is classified as a warm water game fishery). These waters are assumed to have sufficient water quality and quantity to support drinking water supplies, and they are protected for that use. Class 2AB waters are also protected for nongame fish, fish consumption, aquatic life other than fish, recreation, wildlife, agriculture, industry, and scenic value (WDEQ 2013a).

No data were identified for the unnamed intermittent stream in the project area. Although no data were identified for Black Rock Creek, its flow characteristics and water quality are likely similar to that of Deadman Wash (BLM 2013a). Baseline data from 1979 to 1980 support the ephemeral nature of streams in the Bridger Mine Complex area, with flows occurring only in response to summer rainfall and to a lesser extent, spring snowmelt (WDEQ 2014b). Surface water that flows in Deadman Wash is highly variable in quality: runoff from snowmelt typically generates lower concentrations of total dissolved solids (TDS) and total suspended solids (TSS) than runoff from rainfall storm events (BLM 2013a). Limited water quality data from a monitoring station located on the Class 3B section of Deadman Wash indicate a maximum TDS concentration of 400 milligrams/liter (mg/L), a maximum TSS concentration of 1,460 mg/L, and a maximum pH of 8.30 (WDEQ 2014b). The data show no exceedances of Class 3B water quality standards (WDEQ 2014b).

The unnamed intermittent stream, Black Rock Creek, and Deadman Wash are not included on the 303(d) list of waterbodies with water quality impairments (EPA 2012b). This list includes rivers, streams, creeks, or waterbodies that are impaired or threatened by a pollutant and for which pollutant controls are not sufficient to attain or maintain applicable water quality standards.

3.6.1.2. Groundwater Resources

As identified in the WDEQ-LQD's *Cumulative Hydrologic Impact Assessment (CHIA) of Coal Mining in the Greater Green River Basin, Southwestern Wyoming* (WDEQ 2014b), the primary aquifer units of concern in the area of the Bridger Mine Complex consist of the following:

- Alluvial aquifer unit: Alluvial deposits along major stream channels (including Deadman Wash) that store and transmit water in sufficient quantities to be considered an aquifer in some areas.
- Overburden aquifer unit: Any overlying lithologic units above coal seams; includes the Fort Union Formation and Almond Formation.
- Coal aquifer unit: Coal mine seams in the Fort Union Formation, Almond Formation, and Lance Formation.
- Underburden aquifer unit: Lithologic units immediately below the coal seams at the Fort Union Formation, Almond Formation, and Lance Formation.
- Ericson Sandstone unit: Ericson Sandstone outcrops to the eastern edge of the Bridger Mine Complex and consisting of massive beds of sandstone and conglomerate with a thickness of up to 700 feet.

The proposed lease modification would likely intercept groundwater contained in the Fort Union Formation (which would contain groundwater in an overburden aquifer, coal aquifer, and underburden aquifer). In the Bridger Mine Complex area, the major sedimentary units of the Fort Union Formation are sandstone, siltstone, claystone, and coal. The proportions and relative positions of the sandstone, siltstone, and claystone vary from one area of the mine to the other (WDEQ 2014b). The north portion of the mine (closer to the project area) consists of predominantly coarser-grained sediments. The sandstones in the overburden aquifer can yield up to 25 gallons per minute (WDEQ 2014b). During recent aquifer testing, the median hydraulic conductivity of the overburden aquifer was 1.2 feet per day. In the underburden and coal aquifers of the Fort Union Formation, median hydraulic conductivity was 0.10 feet per day and 0.90 feet per day, respectively.

Selected water quality statistics for the Fort Union Formation are presented in Table 3-7.

Table 3-7. Selected Water Quality Statistics for the Fort Union Formation (during mining 2001–2012)

Constituent (unit)	Class II Agricultural Standard	Class III Livestock Standard	Fort Union Formation Well Data		
			Overburden Aquifer	Coal Aquifer	Underburden Aquifer
TDS (mg/L)	2,000	5,000	1,180	1,430	1,640
pH (standard units)	4.5–9.0	6.5–8.5	7.98	8.2	8.02
Bicarbonate (mg/L)	–	–	683	997	895

Note: All well data values are median values. Class II groundwater is suitable for agricultural use where soil conditions and other factors are adequate. Class III groundwater is suitable for livestock.

Source: WDEQ (2014b).

There are no known groundwater appropriations (i.e., water rights) issued by the Wyoming State Engineer's Office for use of groundwater from the Deadman coal zone in the Fort Union Formation near the 2013 WYW154595 lease modification area, except for water used by BCC for exploration drilling (BLM 2013a). BCC has appropriations for groundwater rights for portions of the Deadman coal zone aquifer within the existing surface mining operation (BLM 2013a). Groundwater rights in the general area have been issued for miscellaneous use, stock use, domestic use, industrial use, and municipal use (WDEQ 2014b).

Water from the existing Bridger Mine Complex underground mine workings is used for dust suppression, cleaning equipment, and other industrial requirements associated with mining. Groundwater pumped by the Jim Bridger Coal Mine in 2006 and 2007 was less than 300 acre-feet per year (WDEQ 2014b). Starting in 2008, water use increased to 2,179 acre-feet due to increased pumping rates at Turbine Well No. 1 to control inflows to the underground mine. Initially, water from this well was stored in the pit lake at the mine. In 2010, a second underground mine pumping well, Turbine Well No. 2, was put into service to handle increased inflows. Beginning in 2010, most of the water from these two wells is conveyed to the Jim Bridger Power Plant to be used as cooling water (which was previously provided by a pipeline from the Green River). Groundwater use from mine pit sumps and dewatering wells at the Bridger Mine Complex in 2012 was 5,759 acre-feet (WDEQ 2014b).

The Town of Superior operates two water wells in the Ericson Sandstone aquifer located in the northeast quarter of Section 26, Township 21 North, Range 101 West. These wells are a primary source of drinking water for the community. Well details are provided in the 2013 Lease Modification EA. The Ericson Sandstone aquifer is isolated from overlying aquifer units by a thick layer of Lewis Shale. In locations where mined coal seams are in the Fort Union Formation, the Lewis Shale can be as thick as 1,000 feet (WDEQ 2014b).

3.6.2. Direct and Indirect Effects

3.6.2.1. No Action Alternative

Under the No Action Alternative, BLM would reject the application for a second federal coal lease modification to WYW154595 and would not allow extraction of the additional recoverable coal in the 120.02-acre project area. As such, no new coal mining activity would occur in the project area under this alternative. Surface and groundwater resources would not change as a function of coal mining in the project area. Existing land uses with the potential to impact water resources would continue (e.g., mining and road use).

3.6.2.2. Proposed Action Alternative

3.6.2.2.1. Surface Water Resources

The Proposed Action would not result in new surface disturbance, and no depletion of surface water resources would occur. Neither Black Rock Creek nor Deadman Wash would be impacted by the proposed lease modification because of their distance from the project area. Subsidence could impact up to 1,410 feet of the unnamed, intermittent stream that crosses the north half of the project area. Subsidence effects on surface water can range from no discernable impact to appreciable ponding, capture, and retention of runoff. It could also result in cracks and depressions near surface water features that could lead to complete or partial loss of water due to leakage to the underlying strata (WDEQ 2014b). In addition, changes in surface slope of streams could affect channel hydraulics. Water quality could also be affected by sediment load changes. The potential for material damage to surface water resources from the Bridger Mine Complex was examined in the 2014 CHIA (WDEQ 2014b). Material damage is defined as “significant long-term or permanent adverse change to the hydrologic regime” (WDEQ 2014b). The CHIA states the following with regard to subsidence at the Bridger Mine Complex:

Underground mining at the Jim Bridger Mine is not expected to cause significant subsidence features on the surface. A significant subsidence feature would be any feature that poses a hazard to human and animals and/or disrupts the pre-existing hydrologic regime, including changes in water quantity. Due to the longwall method of coal mining, any surface expression of subsidence should occur quickly. The land surface will be periodically monitored for subsidence features, and features will be mitigated accordingly. (WDEQ 2014b)

Based on this information, subsidence of the unnamed intermittent stream would not disrupt its pre-existing hydrologic regime.

The CHIA concludes that there is low potential for coal mining to cause material damage to surface water quantity, surface water rights, and surface water quality in the CHIA cumulative impact area. It also states that current mining at the Bridger Mine Complex is not expected to cause long-term or permanent damage to surface water quantity or quality in the CHIA cumulative impact area. Although the proposed lease modification is just outside the CHIA surface water cumulative impact area, the proposed lease modification has similar characteristics as the cumulative impact area and would undergo similar mining; therefore, the results of the CHIA are expected to be applicable.

All surface water leaving areas affected by mining in the Jim Bridger Mine Complex is treated and released in accordance with BCC's existing Wyoming Pollutant Discharge Elimination System program discharge permit. Any surface water leaving the project area would be handled in the same manner. The permit establishes water quality effluent limits and best management practices. Any water that passes through the Bridger Mine Complex's treatment facility typically has higher water quality than water in native, undisturbed drainages (WDEQ 2014b).

3.6.2.2.2. Groundwater Resources

Two primary groundwater impacts typically result from underground coal mining: the decline of groundwater levels and the degradation of groundwater quality. It is anticipated that mining operations in the project area would intercept groundwater contained in the Fort Union Formation. In general, coal mining at the Bridger Mine Complex and other nearby coal mines (e.g., Black Butte) is expected to lower the groundwater level to some extent (WDEQ 2014b). Drawdown within the Bridger Mine Complex and changes to Fort Union Formation aquifers are described in the 2013 Lease Modification EA. The 2013 Lease Modification EA indicates that drawdown of the coal aquifer would occur throughout the life of the mine. The drawdown limit of the Deadman coal zone in the Fort Union Formation would likely continue to extend west of the existing surface mining operation. A limited amount of drawdown would also occur in the Lance Formation and Fort Union Formation overburden. The drawdown amount would depend on a variety of hydrogeologic factors, including the amount of hydraulic connectivity between the different formations (BLM 2013a). Expected changes to groundwater quality are also described in the 2013 Lease Modification EA. The 2013 Lease Modification EA indicates that groundwater quality in the post-mining subsidence aquifer would likely contain higher levels of calcium, sulfate, magnesium, manganese, and TDS than pre-mining waters, because infiltrating water would flow across fresh-cut rock faces where newly exposed minerals would easily be dissolved. Post-mining groundwater quality would be similar to pre-mining groundwater quality but could, in some cases, change from Class II (agricultural uses) to Class III (livestock uses) (BLM 2013a). The data from the 2013 Lease Modification EA are expected to be applicable to the Proposed Action, because both lease modification areas are in close proximity and because mining under the Proposed Action would occur in a similar manner. However, the proposed lease modification is anticipated to have less recoverable coal than the 2013 lease modification (738,000 tons compared to 5.7 million tons; 12.9% fewer tons) and the resulting impacts to groundwater would be of a lesser degree.

The proposed lease modification is within the CHIA groundwater cumulative impact area. The CHIA concludes that groundwater migrating to native aquifers outside mine permit boundaries is expected to have “minimal effect and would not affect the ability of the existing wells to supply for their intended use” (WDEQ 2014b). It also states that although coal mining will have impacts within mine permit boundaries, the potential for material damage outside the permit boundaries to groundwater quantity and quality is limited. Based on an analysis of a previously proposed amendment to the Bridger Mine Complex in the CHIA, the proposed lease modification is not expected to change hydrologic conditions such that material damage would occur.

The proposed lease modification is not expected to impact groundwater in the Ericson Sandstone aquifer (which is used by Superior for drinking water), because the Ericson Sandstone aquifer is isolated from overlying units by thick Lewis Shale. The CHIA indicates that “the groundwater quantity or quality impacts on the Ericson Sandstone aquifer would be minimal with no discernible effects that can be attributed to mining” (WDEQ 2014b).

4. CUMULATIVE IMPACTS ANALYSIS

As defined in 40 CFR 1508.7 (Council on Environmental Quality regulations for implementing NEPA), a cumulative impact is an impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions (RFFAs), regardless of which agency (federal or non-federal) or person undertakes such actions. Cumulative impacts may result from individually minor but collectively significant actions occurring over a period of time.

4.1. Analysis Areas

The geographic extent of cumulative impacts may vary by the type of resource and resource issues and by the type of potential impact. The time frames, or temporal boundaries, for those impacts may also vary by resource and resource issue. Spatial and temporal cumulative impact analysis areas (CIAAs) have been developed for each resource and are listed in Table 4-1. A temporal boundary for each resource was chosen because it is a reasonable timeframe within which to predict RFFAs.

Table 4-1. Cumulative Impacts Analysis Areas by Resource

Resource	CIAA	Rationale	Total CIAA Acreage	Temporal Boundary
Air quality and climate change	Sweetwater County	This CIAA was chosen because it is a typical spatial boundary used to determine compliance with NAAQS.	6,672,640	Life of the mine.
	Globe	This CIAA was chosen because climate change is a global phenomenon.	Globe	Life of the mine.
Cultural resources	Middle Black Rock Creek watershed	Much of human cultural and behavioral variation is conditioned by the natural environment. Accordingly, archaeological, historical, and cultural sites within a defined natural habitat are often the product of a singular settlement system. This CIAA was chosen because it is a defined natural habitat, and impacts to cultural resources in one part of that habitat can affect a broader understanding of the interrelationships between sites in the habitat area as a whole.	35,390	Subsidence effects on cultural resources could be permanent.
Geology and minerals	Middle Black Rock Creek watershed	This CIAA was chosen because it is a natural watershed boundary (hydrologic unit code 12, sixth-level subwatershed) that provides context for potential cumulative impacts on geology and mineral resources.	35,390	Subsidence effects on geology could be permanent.
Lands and access	Sweetwater County	This CIAA was chosen because the Proposed Action would impact a county road, and the county provides context for potential cumulative impacts on the county road system.	6,672,640	Life of the mine.
Socioeconomics	Sweetwater County	This CIAA was chosen because the economic and demographic effects of the mine and surrounding mines would likely be experienced by communities in the county.	6,672,640	Life of the mine.

Table 4-1. Cumulative Impacts Analysis Areas by Resource

Resource	CIAA	Rationale	Total CIAA Acreage	Temporal Boundary
Water resources	Middle Black Rock Creek watershed	This CIAA was chosen because it is a natural watershed boundary (hydrologic unit code 12, sixth-level subwatershed) that provides context for potential cumulative impacts on water resources.	35,390	Effects on water resources are expected to be short term after the closure of the mine.

4.2. Past, Present, and Reasonably Foreseeable Future Actions

4.2.1. Past and Present Actions Summary

Past and present actions that would affect the resources analyzed in this EA are cattle and sheep grazing; hunting and dispersed recreation; exploratory drilling for coal in support of the Bridger Mine Complex and other coal mining in the area; coal mining at the Bridger Mine Complex, Black Butte Mine, and Leucite Hills Mine (currently undergoing reclamation); roads; operation of the Jim Bridger Power Plant; and oil and gas exploration and development activity. Of this list, the three coal mines and oil and gas activity are considered the primary past and present actions. Surface disturbance approved at the three mines through 2014 totals 32,300 acres (WDEQ 2014b). Past and present long-term disturbance from oil and gas development is estimated to be 5,069 acres on all lands within the RSFO Planning Area (BLM 2013d).

4.2.2. Reasonably Foreseeable Future Actions Summary

RFFAs are decisions, funding, or formal proposals that are either existing or are highly probable, based on known opportunities or trends. The BLM has identified the following RFFAs: continuing operation of the Bridger Mine Complex, expansion of the Black Butte Mine, oil and gas development, and the Gateway West transmission line project.

Mining operations at the Bridger Mine Complex are expected to continue through at least 2037 for surface production and 2024 for underground mining (including the Proposed Action).

The Black Butte Mine is currently applying for a 449-acre lease modification to its existing federal coal lease for its surface coal mine. Black Butte Mine would also need to initiate modifications to its current mine permit area to allow for future mining.

Future long-term oil and gas surface disturbance is projected to be 12,571 acres on all lands within the RSFO Planning Area (BLM 2013d).

The Gateway West transmission line project would build and operate approximately 1,000 miles of new high-voltage transmission lines between Glenrock, Wyoming, and Melba, Idaho. The project would include approximately 150 miles of 230-kilovolt (kV) lines in Wyoming and approximately 850 miles of 500-kV lines in Wyoming and Idaho. The BLM-authorized route from the Wamsutter area to Anticline/Jim Bridger (Segment 3) would run east to west in a transmission corridor generally following Interstate 80 and an existing utility corridor. The route includes Segment 3A, a new 345-kV line between the Anticline substation and the Jim Bridger Power Plant (Idaho Power and Rocky Mountain Power

2015). The transmission line project would be located only in the air quality, lands and access, and socioeconomic CIAAs.

4.2.3. Cumulative Impacts by Resource Issue Category

Cumulative impacts organized by resource issue category are described below. A choice of No Action would not contribute incrementally to the impacts of past, present, and RFFAs, because under the No Action Alternative, BLM would reject the application for a second federal coal lease modification to WYW154595 and would not allow extraction of the additional recoverable coal in the 120.02-acre project area. As a result, a No Action Alternative cumulative impacts analysis is not included below.

4.2.3.1. Air Quality and Climate Change

Past and present actions in the air quality and climate change CIAAs are described in section 4.2.1. Most past and present action emissions (that are still occurring) likely consist of fugitive dust and emissions associated with mining activities, the Jim Bridger Power Plant, and oil and gas wells. Emissions from the Bridger Power Plant are summarized in Table 3-5. RFFAs in the air quality and climate change CIAAs are described in section 4.2.2 and include the Gateway West transmission line project.

The Proposed Action would not increase emissions currently occurring from the Bridger Mine Complex; rather, it would extend operations at current production and emission levels for approximately 1.5 years. Because the proposed lease modification would allow the mine to operate and emit air pollutants for a longer period of time, it would add cumulatively to air emissions in the CIAA. However, the proportion of those emissions (see Table 3-3) that would be directly from the proposed lease modification mining is unknown.

The human and natural causes of climate change, and the impacts of climate change, are global. GHG emissions, which have been shown to contribute to climate change, do not remain localized, but become mixed with the general composition of the Earth's atmosphere. Therefore, this analysis cannot separate the particular contribution of GHG emissions from the project area to global climate change (and its regional implications) from the multitude of other past, present, and RFFAs that have produced or would produce or mitigate GHG emissions.

Emissions of GHGs resulting from the Proposed Action would increase the atmosphere's concentration of GHGs, and in combination with past and future emissions from all other sources, they would contribute incrementally to the global warming that produces the adverse effects of climate change described previously (section 3.1.2.2). As discussed in section 3.1.2.2.2, combustion of the coal produced under the Proposed Action would comprise approximately 0.004% of 2012's global fossil fuel emissions and 0.03% of the 2012 United States fossil fuel emissions from combustion. NO_x emissions from the burning of coal produced under the Proposed Action would represent approximately 0.8% of the 2013 United States energy sector CO₂e NO_x emissions, and methane venting would comprise approximately 0.0006% of the 2013 CO₂e methane emissions from coal mining. At present, however, the climate change research community has not yet developed tools specifically intended for evaluating or quantifying end-point impacts attributable to the emissions of GHGs from a single source. The current tools for simulating climate change generally focus on global and regional-scale modeling. Global and regional-scale models lack the capability to represent many important small-scale processes. As a result, confidence in regional- and subregional-scale projections is lower than at the global scale. Therefore, there is no methodology that would allow BLM to estimate the specific impacts (if any) that this increment of warming or climate change would produce in the CIAA or elsewhere.

4.2.3.2. Cultural Resources

Cultural resources tend to degrade over time from natural forces; however, many survive for hundreds or thousands of years. Any land-disturbing activity can disturb or damage cultural resources. Impacts to cultural resources in the CIAA would primarily result from past, present, and RFFAs associated with surface and subsurface disturbance. Impacts would depend on the amount, placement, and type of disturbance, and could be beneficial (if the identification of new cultural resources during surface disturbance contributes cumulatively to an increase in the knowledge of cultural properties in the area) or adverse (if widespread disturbance activities cover a large portion of the landscape when viewed as a whole and lead to an increase in the potential for destruction or damage of cultural resources).

No NRHP-eligible sites exist in the project area; therefore, the Proposed Action would not contribute to cumulative impacts in the cultural resources CIAA.

4.2.3.3. Geology and Minerals

Under the Proposed Action, an estimated additional 738,000 tons of economically recoverable coal reserves would be added to the existing, permitted in-place minable coal reserves. This would extend the overall life of the mine by approximately 1.5 years. Once BCC's coal reserves in the project area are mined, they would no longer be available for future use.

Surface disturbance in the RSFO Planning Area from past, present, and reasonably foreseeable oil and gas development activity is approximately 17,640 acres (5,069 acres of past and present and 12,571 acres of RFFA) (BLM 2013d). Assuming that the geology and minerals CIAA (35,390 acres) is approximately 1/102 of the RSFO Planning Area (3.6 million acres) and that oil and gas development is spread evenly across the RSFO Planning Area, oil and gas surface disturbance in the geology and minerals CIAA is estimated at 173 acres. Table 4-2 shows the oil and gas surface disturbance, along with other past, present, and reasonably foreseeable surface disturbance, in the geology and minerals CIAA.

Table 4-2. Acres of Estimated Past, Present, and Reasonably Foreseeable Surface Disturbance in the Geology and Minerals CIAA

Type	Past and Present	Reasonably Foreseeable	Total Past, Present, and Reasonably Foreseeable
Coal mining*	32,300	449	32,749
Oil and gas	–	–	173
Total	–	–	32,922

* Coal mining areas previously approved for disturbance at Black Butte Mine, Leucite Hills Mine, and the Bridger Mine Complex total 32,300 acres. RFFAs at the Black Butte Mine consist of 449 acres (WDEQ 2014b).

Based on Table 4-2, the total past, present and reasonably foreseeable surface disturbance from oil and gas and coal mining activities consists of 32,922 acres. The Proposed Action would add 120.02 acres of mine lease area, which comprises 0.3% of the CIAA. This constitutes a 0.4% addition to the past, present, and reasonably foreseeable surface disturbance (32,922 acres) in the geology and minerals CIAA.

The Gateway West transmission line project is not located in the geology and minerals CIAA.

4.2.3.4. Lands and Access

Past and present actions in the lands and access CIAA are described in section 4.2.1. RFFAs are described in section 4.2.2.

Surface disturbance in the RSFO Planning Area from past, present, and reasonably foreseeable oil and gas development activity is approximately 17,640 acres (5,069 acres of past and present and 12,571 acres of RFFA) (BLM 2013d). Assuming that the lands and access CIAA (6,672,640 acres) is approximately 1.9 times the size of the RSFO Planning Area (3.6 million acres) and that oil and gas development is spread evenly across the RSFO Planning Area, oil and gas surface disturbance in the lands and access CIAA is estimated at 33,516 acres. Table 4-3 shows the oil and gas surface disturbance, along with other past, present, and reasonably foreseeable surface disturbance, in the lands and access CIAA.

Table 4-3. Acres of Estimated Past, Present, and Reasonably Foreseeable Surface Disturbance in the Lands and Access CIAA

Type	Past and Present	Reasonably Foreseeable	Total Past, Present, and Reasonably Foreseeable
Coal mining*	32,300	449	32,749
Oil and gas	–	–	33,516
Gateway West transmission line project†	–	–	4,242
Total			70,507

* Coal mining areas previously approved for disturbance at Black Butte Mine, Leucite Hills Mine, and the Bridger Mine Complex total 32,300 acres. RFFAs at the Black Butte Mine consist of 449 acres (WDEQ 2014b).

† Assuming 140 miles of transmission line in the CIAA with a right-of-way of 250 feet.

Based on Table 4-3, the total past, present, and reasonably foreseeable surface disturbance from oil and gas and coal mining activities and the Gateway West transmission line project consists of 70,507 acres. The Proposed Action would add 120.02 acres of mine lease area, which comprises 0.002% of the CIAA. This constitutes a 0.2% addition to the past, present, and reasonably foreseeable surface disturbance (66,265 acres) in the lands and access CIAA.

4.2.3.5. Socioeconomics

Cumulative impacts to socioeconomics may be beneficial or adverse. Potential cumulative impacts from past, present, and reasonably foreseeable actions in the socioeconomics CIAA include changes in population and employment, housing demands, effects on the local economy through the purchase and use of goods and services, and demands on government services, school districts, and local infrastructure.

Past and present actions in the socioeconomics CIAA are described in section 4.2.1. RFFAs within the CIAA, including proposed mining and oil and gas development and the Gateway West transmission line project, would add cumulatively to the economic output of the county. These actions include approximately 12,571 acres of oil and gas wells.

The Proposed Action would add cumulatively to the coal mining jobs created by past, present, and RFFAs. Approval of the proposed lease modification would allow the Bridger Mine Complex to continue employment in the underground mine for approximately 302 workers for an additional 1.5 years, and would continue generating related secondary employment in the local economy (538 additional jobs; see section 3.5.2.2). In addition, revenue generation from taxes and mine royalties on the mined coal would be extended for an additional 1.5 years.

4.2.3.6. Water Resources

Past and present actions affecting resources in the water resources CIAA are described in section 4.2.1. RFFAs are described in section 4.2.2. These include ground disturbance from mining activities, road construction, oil and gas wells, and exploratory drilling. Such actions could cause subsidence that may affect water resources, discharges that may affect water quality and quantity, and impacts to groundwater levels.

Surface disturbance in the RSFO Planning Area from past, present, and reasonably foreseeable oil and gas development activity is approximately 17,640 acres (5,069 acres of past and present and 12,571 acres of RFFA) (BLM 2013d). Assuming that the water resources CIAA (35,390 acres) is approximately 1/102 of the RSFO Planning Area (3.6 million acres) and that oil and gas development is spread evenly across the RSFO Planning Area, oil and gas surface disturbance in the water resources CIAA is estimated at 173 acres. Table 4-4 shows the oil and gas surface disturbance, along with other past, present, and reasonably foreseeable surface disturbance, in the water resources CIAA.

Table 4-4. Acres of Estimated Past, Present, and Reasonably Foreseeable Surface Disturbance in the Water Resources CIAA

Type	Past and Present	Reasonably Foreseeable	Total Past, Present, and Reasonably Foreseeable
Coal mining*	32,300	449	32,749
Oil and gas	–	–	173
Total	–	–	32,922

* Coal mining areas previously approved for disturbance at Black Butte Mine, Leucite Hills Mine, and the Bridger Mine Complex total 32,300 acres. RFFAs at the Black Butte Mine consist of 449 acres (WDEQ 2014b).

Based on Table 4-4, the total past, present, and reasonably foreseeable surface disturbance from oil and gas and coal mining activities consists of 32,922 acres. The Proposed Action would add 120.02 acres of mine lease area, which comprises 0.3% of the CIAA. This constitutes a 0.4% addition to the past, present, and reasonably foreseeable surface disturbance (32,922 acres) in the water resources CIAA. The Proposed Action has a low potential to cause material damage to water resources in the CIAA (see section 3.6.2.2).

The Gateway West transmission line project is not located in the water resources CIAA.

5. MITIGATION MEASURES

Mitigation includes specific means, measures, or practices that would reduce or eliminate the effects of the Proposed Action (BLM 2008). Mitigation measures can be applied to reduce or minimize adverse effects to biological, physical, or socioeconomic resources. No mitigation measures have been identified for the Proposed Action.

6. TRIBES, INDIVIDUALS, ORGANIZATIONS, OR AGENCIES CONSULTED

A cooperating agency is a federal agency that has jurisdiction by law or that has the authority to approve, veto, or finance all or part of a proposal (BLM 2008). In addition, any federal agency that has special expertise with respect to an environmental issue addressed by the NEPA analysis may participate as a cooperating agency (BLM 2008). For this EA, OSMRE and WDEQ are cooperating agencies.

Due to the size, scale, and underground location of the project, as well as previous consultation conducted in the general area, there was no need for the BLM to consult with other agencies, persons, or groups as part of completing this analysis.

Native American tribes have identified certain types of sites as being sensitive sites and that require tribal consultation if there are potential impacts from the Proposed Action. No sites of these types are known in the project area.

7. PREPARERS

Tables 7-1 and 7-2 identify BLM, cooperating agency, and consultant staff used in the preparation of the EA.

Table 7-1. Bureau of Land Management and Cooperating Agency Staff used to Prepare this Environmental Assessment

Name	Agency	Position
Bureau of Land Management Staff		
Kimberlee Foster	BLM RSFO	Field Manager
Ted Inman	BLM RSFO	Project Manager, Natural Resource Specialist
Joanna Nara-Kloepper	BLM RSFO	Assistant Field Manager, Minerals and Lands
Doug Linn	BLM RSFO	Supervisory Natural Resource Specialist
Charis Tuers	BLM, Wyoming State Office	Air Quality Specialist
Jo Foster	BLM RSFO	Outdoor Recreation Planner
Dennis Doncaster	BLM RSFO	Hydrologist
Jeff Clawson	BLM RSFO	Mining Engineer
Jim Glennon	BLM RSFO	Botanist
Patricia Hamilton	BLM RSFO	Realty Specialist
Gene Smith	BLM RSFO	Paleontologist
Mark Snyder	BLM RSFO	Wildlife Biologist
Jay D'Ewart	BLM RSFO	Wild Horse and Burro Specialist
Jessey Dowdy	BLM RSFO	Archaeologist
James Evans	BLM RSFO	Petroleum Engineer
Robert Price	BLM RSFO	Supervisory Range Management Specialist
Stephen Wiig	BLM RSFO	Geologist
Jessica Montag	BLM, Wyoming State Office	Socioeconomic Specialist
Brenda Van Neuman	BLM, Wyoming State Office	Supervisory Physical Scientist
Phillip Blundell	BLM RSFO	NEPA Coordinator
Angelina Pryich	BLM RSFO	Writer-Editor
Cooperating Agency Staff		
Marcelo Calle	OSMRE	Branch Manager, Hydrologist
Lauren Mitchell	OSMRE	Environmental Protection Specialist
Amy Boyle	WDEQ	Geologist

Table 7-2. SWCA Environmental Consultants Staff used to Prepare this Environmental Assessment

Name	Position	Role
Gretchen Semerad, M.S.	Lead NEPA Writer	All EA sections
David Steed	Project Manager, NEPA Oversight	Review of all EA sections
Rachel Johnson, B.S.	GIS Specialist	All maps and GIS data
Linda Tucker Burfitt, B.A.	Technical Editor	Technical editing and formatting

Reviewer: _____ Date: _____

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