

**United States Department of the Interior  
Office of Surface Mining Reclamation and Enforcement**

**Environmental Assessment  
Belle Ayr Mine  
Campbell County, Wyoming  
Mining Plan Modification  
for  
Federal Coal Lease WYWI61248**

**June 2017**



Prepared by:

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## **1.0 Purpose and Need**

### **1.1 Introduction**

The Environmental Assessment (EA) for the Belle Ayr Mine Federal Coal Lease WYWI61248 Mining Plan Modification (Project) has been prepared by the U.S. Department of the Interior (DOI) Office of Surface Mining Reclamation and Enforcement (OSMRE), Western Region. OSMRE is the lead federal agency responsible for development of this EA because, under the Surface Mining Control and Reclamation Act of 1977 (SMCRA), OSMRE has the authority to make a recommendation to the Assistant Secretary, Lands and Minerals Management (ASLM) regarding federal mining plan modifications (OSMRE 1999). Using criteria outlined in OSMRE's Handbook for Implementing the National Environmental Policy Act (NEPA) (OSMRE 1989), the DOI's Departmental Manual (DM) Part 516 (DOI 2004), and the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 Code of Federal Regulations [CFR] 1500-1508), OSMRE determined that this EA could tier to and incorporate by reference analyses included in the Final Environmental Impact Statement prepared by the Bureau of Land Management (BLM) for the 2009 SGAC EIS (hereafter 2009 SGAC EIS).

This EA describes the environmental impacts that are anticipated to result from the current and future mining operations at the Belle Ayr Mine (BAM) from January 1, 2016, through the life of the mine (2027) within a tract of land known as Belle Ayr North (BAN) that lies within the approved Wyoming Department of Environmental Quality (WDEQ)-Land Quality Division (LQD) permit area.

This EA review has been conducted in accordance with the NEPA and the CEQ regulations for implementing NEPA (40 Code of Federal Regulations (CFR) 1500-1508); the DOI's regulations for implementation of NEPA (43 CFR Part 46); the DOI's Departmental Manual Part 516; and OSMRE's Directive REG-1, Handbook on Procedures for Implementing the National Environmental Policy Act of 1969 (OSMRE 1989). Information gathered from federal, state, and local agencies, Contura Coal West LLC (CCW), publicly available literature, and in-house OSMRE sources, such as the BAM Permit Application Package (PAP), was used in the preparation of this EA.

NEPA requires federal agencies to disclose to the public the potential environmental impacts of projects they authorize and to make a determination as to whether the analyzed actions would "significantly" impact the environment. The term "significantly" is defined in 40 CFR 1508.27. If OSMRE determines that the Project would have significant impacts following the analysis in this EA, then an Environmental Impact Statement (EIS) would be prepared for the Project. If OSMRE determines that the potential impacts would not be "significant," OSMRE would prepare a Finding of No Significant Impact (FONSI) to document this finding, and, accordingly, would not prepare an EIS.

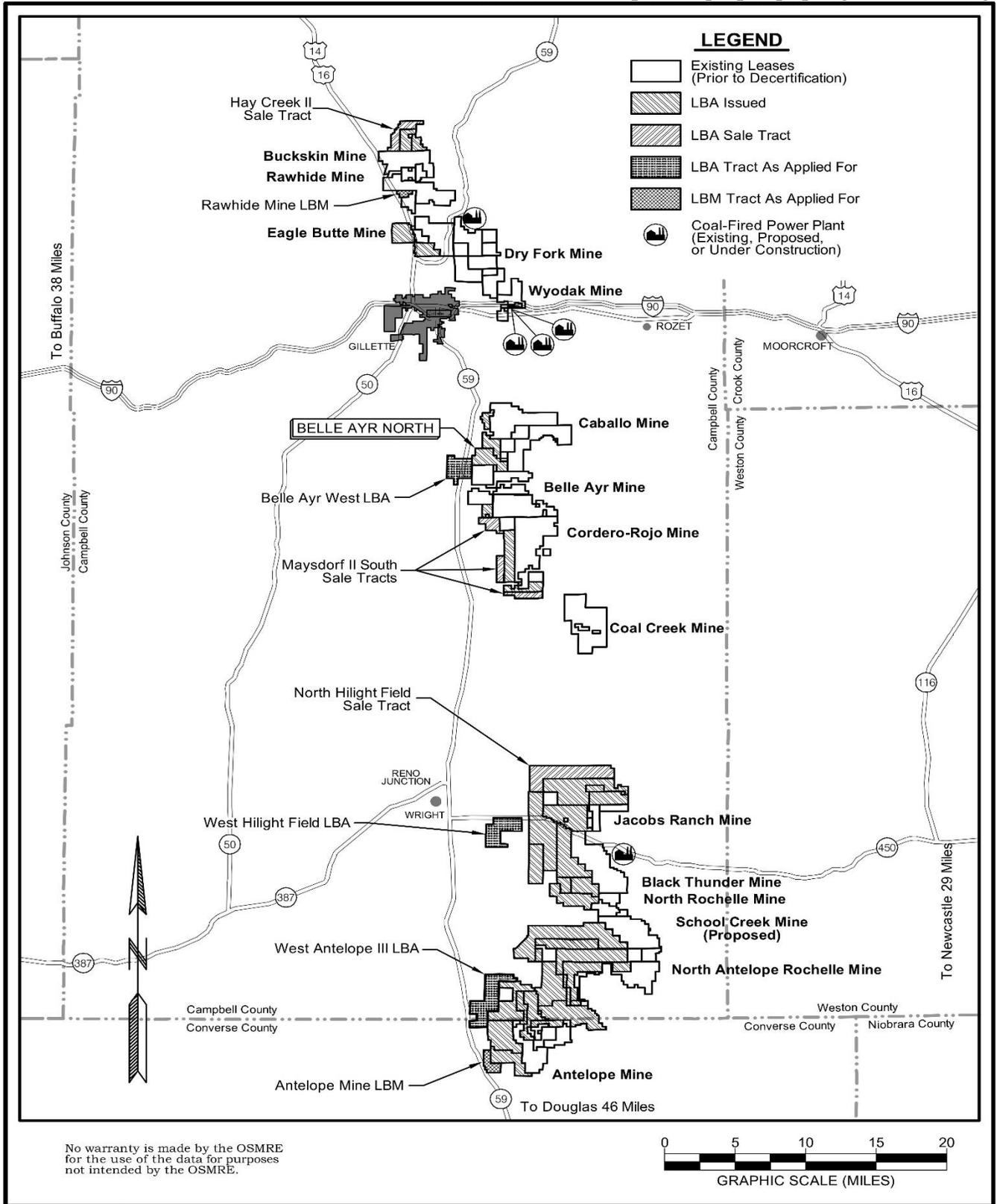
### **1.2 Background**

#### **1.2.1 Site History**

CCW owns and operates the BAM, which is located in Campbell County, Wyoming, approximately 10 miles south-southeast of Gillette (**map I-1**). The BAM was formerly owned by Foundation Coal West (FCW), and is currently a directly held subsidiary of Contura Energy, Inc. (CEI). WDEQ-LQD originally approved coal mining operations under Permit No. PT0214,

Chapter I - Purpose and Need

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Map I-1. General Location Map with Federal Coal Leases

issued in 1974. According to information provided by CCW (CCW 2016), the BAM is currently recovering coal under four distinct state or federal coal leases, as indicated below and shown on **map I-2**:

1. State Coal Lease 0-26954A,
2. Federal Coal Lease WYW78629,
3. Federal Coal Lease WYW80954, and
4. Federal Coal Lease WYW0317682,

The BAM is currently seeking approval from the ASLM to recover coal associated with Federal Coal Lease WYWI61248, which was leased to BTU Western Resources Inc. on November 1, 2011. The lease was subsequently transferred from BTU Western Resources to Alpha Wyoming Land Company. The lease was then transferred to CEI following the purchase of the BAM by CEI.

The BAM is located in the middle of the Wyoming Powder River Basin (PRB) region, a coal basin that spans from northeast Wyoming to southeast Montana. The PRB produces 80 percent of the coal mined from federal government owned coal leases in the U.S. The region has also been heavily developed for oil and gas recovery, most recently for coal bed natural gas (CBNG) recovery. All of the land surrounding the BAN tract is currently leased for coal mining. The BAM permit area has overlapping coal permit areas with two other approved mining operations (Cordero Rojo and Caballo), and abuts mine permit areas on three sides. The Bishop Road currently runs through a portion of the BAN tract (**map I-2**).

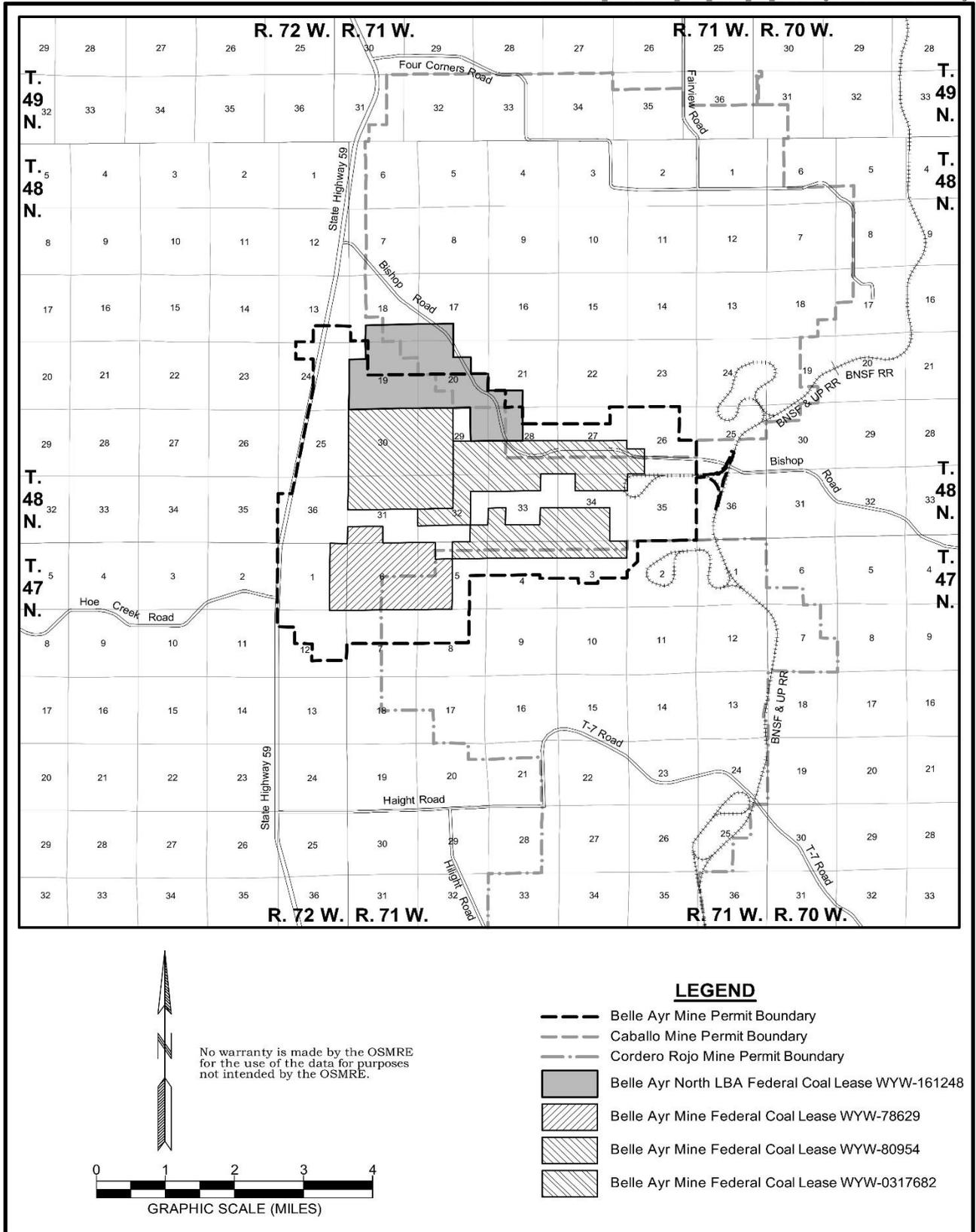
Coal is mined using conventional surface-mining methods and shipped from an onsite railroad loading facility to electric utilities and industrial customers in the west, midwest, and southern United States. In 2016, 100 percent of coal from the BAM was shipped to U.S. markets. The ASLM initially approved the mining of the federal coal associated with WYWI61248 in 2012 (OSMRE 2012). As approved in the 2012 federal mining plan modification, BAM could continue mining operations (mining, processing, and shipping coal) through approximately 2018. Mining operations are described in detail in **chapter 2**.

CCW operates the BAM under WDEQ-LQD Permit No. PT0214, issued by WDEQ-LQD, in accordance with the approved Wyoming State Coal Regulatory Program (30 CFR Part 950). The currently approved permit boundary includes the entire BAN tract. WDEQ-LQD approved the most recent version of Permit No. PT0214 with the condition that the BAM may not mine coal from any federal coal lease prior to receiving approval from the ASLM. Although WDEQ-LQD permits are issued based on the life-of-mine (LOM) plans for the mining operation, under the Wyoming Environmental Quality Act of 1973 (WEQA), permits must be renewed every five years (Wyo. Stat. § 35-11-405 (c), Wyoming Revised Statutes [WRS] 1973 as amended). This EA considers potential effects from mining the BAN tract and does not reevaluate existing federal mining areas and operations, except in terms of cumulative effects.

The Resource Recovery and Protection Plan (R2P2) for the BAM is sequenced to concurrently operate two mining pits. The BLM Casper Field Office (CFO) approved the R2P2 for the BAM in December 2014. This sequencing is necessary to ensure proper blending of the coal to meet coal contract stipulations. It is also necessary to lessen the risk of interrupted coal delivery in case an emergency (i.e., pit flooding) disrupts operations in one of the pits. The mine also has specific bench lengths and bench orientations. These specific pit lengths, orientations, and other mine design factors are done to optimize the coal haul distances and to improve coal drying at the benches. This mine plan design has been approved by the BLM in the R2P2 and is needed to

# Chapter I - Purpose and Need

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**Map I-2. Belle Ayr Mine's Federal Coal Leases**

ensure maximum recovery of the coal resource. As explained in the R2P2, interruptions to the mine plan sequence will disrupt these strategic decisions, resulting in illogical sequences, more overburden rehandle, longer haul distance, delayed reclamation, and lower coal recovery.

### **I.2.2 Project Background**

On January 28, 2015, CCW submitted an application to amend Mine Permit No. PT0214-T8 to include the remainder (approximately 695.0 acres) of the BAN tract (TFN 5 3/160). WDEQ-LQD has not yet approved the permit amendment application so coal recovery associated with this federal mining plan modification will not be allowed within the tract until the permit amendment is approved. If approved by the WDEQ-LQD, the permit revision will contain the following conditions:

1. The BAM may not mine coal from any federal coal lease prior to receiving approval from the Secretary of the DOI.
2. The BAM will report any unanticipated discovery of cultural or paleontological resources to the WDEQ-LQD within 5 days. The BAM will protect the site from further disturbance and consult with the WDEQ-LQD District III Field Office to insure that the resource is properly evaluated. Identified sites will be protected from any disturbance until they have been evaluated and salvaged, if necessary.
3. Within 90 days of the permit term renewal approval, BAM will contact the U.S. Fish and Wildlife (USFWS) for guidance on conducting surveys for mountain plovers, a proposed threatened species. If a survey is carried out and identifies suitable habitat for mountain plovers, the BAM must submit a mitigation plan and document approved by the USFWS. The plan must be formatted as a Non-Significant Revision for inclusion in the permit.
4. Within 90 days of each LQD revision approval for Permit No. PT0433 (Caballo Mine) and Permit No. PT0237 (Cordero Rojo Mine), which affects the “Dual Permitted Areas” between Permit Nos. PT0214 and PT0433, and Permit Nos. PT0214 and PT0237, BAM will submit a revision to Permit No. PT0214. This revision application will update and revise all text and maps associated with the “Dual Permitted Area” in order to bring Permit No. PT0214 into accord with the revised Permit No. PT0433 and Permit No. PT0237. The WDEQ-LQD District III Office will notify BAM of the need to submit any such revisions.

Standard Conditions of WDEQ-LQD State Decision Document (SDD):

1. All operations shall be conducted in accordance with the approved mining and reclamation plan and any conditions of the permit or license;
2. The rights of entry shall be provided as described by the Act and any regulations promulgated pursuant thereto;
3. The operations shall be conducted in a manner which prevents violation of any other applicable State or federal law, and
4. All possible steps shall be taken to minimize any adverse impact to the environmental or public health and safety resulting in noncompliance with this approved mining and reclamation plan and other terms and conditions of any permit or license, including

monitoring to define the nature of the noncompliance and warning of any potentially dangerous condition.

5. All reclamation fee shall be paid as required by Title IV, P.L. 95087, for coal produced under the permit for sale, transfer or use.

As seen on **map I-2**, the BAN tract is within the current BAM permit boundary. Until the federal mining plan modification request to include mining the federal coal within the BAN tract is approved, the BAM is continuing to mine federal coal from the portions of federal coal leases WYW78629, WYW80954, and WYW0317682, approved in prior ASLM federal mining plan modifications in accordance with conditions to WDEQ-LQD Permit No. PT0214.

### **I.2.3 Statutory and Regulatory Background**

For new mining plans, OSMRE prepares a mining plan decision document (MPDD) in support of its recommendation to the ASLM (30 CFR Chapter VII, Subchapter D). For existing approved mining plans that are proposed to be modified, as is the case with this project, OSMRE prepares a MPDD for a mining plan modification request. The ASLM reviews the MPDD and decides whether or not to approve the mining plan modification, and, if approved, what, if any, conditions may be needed. Pursuant to 30 CFR 746.13, OSMRE's recommendation to the ASLM is based, at a minimum, upon

1. the PAP;
2. information prepared in compliance with NEPA, including this EA;
3. documentation illustrating compliance with the applicable requirements of federal laws, regulations and Executive Orders (EOs) other than NEPA;
4. comments and recommendations or concurrence from other federal agencies and the public;
5. findings and recommendations of the BLM with respect to the R2P2, federal lease requirements, and the Mineral Leasing Act of 1920 (MLA);
6. findings and recommendations of the WDEQ with respect to the mine permit application and the Wyoming State Coal Regulatory Program; and
7. the findings and recommendations of the OSMRE with respect to the additional requirements of 30 CFR Chapter VII, Subchapter D.

In compliance with other federal laws, regulations and EOs, OSMRE also conducts consultation with other agencies before it makes its recommendation to the ASLM. This consultation includes the USFWS Section 7 consultation for threatened and endangered species potentially affected by the proposed mining plan under the Endangered Species Act of 1973 (ESA), the Clean Air Act, as amended (CAA), the Safe Drinking Water Act (SDWA), the Migratory Bird Treaty Act (MBTA), the National Historic Preservation Act (NHPA), and the Wyoming State Historic Preservation Office (SHPO) under the NHPA Section 106 consultation for the affected area. Although not specifically mentioned in the document, the 2009 SGAC EIS was also evaluated under the authority of the American Indian Religious Freedom Act of 1978 (AIRFA) to ensure that traditional religious rights and cultural practices were protected.

The BAN portion of the 2009 SGAC EIS analyzed the potential impacts associated with leasing a tract of federal coal that would allow the BAM to continue producing coal at the current rate instead of ceasing production as recoverable coal reserves are exhausted. The 2009 SGAC EIS evaluated the BAN tract under a Proposed Action, a No Action Alternative (Alternative 1), and an Alternative 2. Under the Proposed Action, the federal coal within the 1,578.74-acre BAN tract would be offered for lease at a sealed-bid, competitive lease sale, subject to standard and special lease stipulations developed for the PRB. Under the No Action Alternative, current and future mining activities approved by the Wyoming Department of Environmental Quality (WDEQ) and OSMRE would have continued on private lands and appropriate mitigation measures would have been implemented to reduce or eliminate effects of mining on the environment. BLM selected Alternative 2, which reconfigured the tract to 1,671.0 acres of federal coal, and recommended holding a sealed-bid, competitive sale for the coal within the lease tract.

The Federal Coal Leasing Act (FCLAA) requires that lands considered for leasing be included in a comprehensive land use plan and that leasing decisions be compatible with that plan (U.S. Government Publishing Office (GPO) 1976). The BLM Approved Resource Management Plan for Public Lands Administered by the Bureau of Land Management Buffalo Field Office (BLM 2001), an update of the Buffalo Resource Area Resource Management Plan (BLM 1985), governs and addresses the leasing of federal coal in Campbell County. The major land use planning decision that BLM must make concerning federal coal resources is a determination of which federal coal lands are acceptable for further consideration for leasing. BLM uses four screening procedures to identify these coal lands. These screening procedures require BLM to

1. estimate the development potential of the coal lands,
2. apply the unsuitability criteria listed in the regulations at 43 CFR Subpart 3461,
3. make multiple land use decisions that eliminate federal coal deposits from consideration for leasing to protect other resource values, and
4. consult with surface owners who meet the criteria defined in the regulations at 43 CFR 3400.0-5(gg)(1) and (2).

Based on a review of the 2009 SGAC EIS, BLM's Wyoming High Plains District Office issued a Record of Decision (ROD) on July 22, 2010 for the BAN tract, recommending the lease sale be held for 1,671.0 acres including 221.7 million tons (Mt) of mineable federal coal associated with Alternative 2 (BLM 2010). It should be noted that the estimated amount of mineable coal within the tract included in the 2009 SGAC EIS (217.6 Mt) was revised upward to 221.7 Mt of mineable in the BAN ROD. The coal included in the BAN Lease by Application (LBA) (WYW161248) was offered for sale in a sealed-bid, competitive lease process on July 13, 2011. Following determination by BLM that the highest bid at the sale met or exceeded the fair market value (FMV) of the coal within the tract, the bid submitted by BTU Western Resources Inc. was accepted (BLM 2012). The lease was subsequently transferred from BTU Western Resources to Alpha Wyoming Land Company (now CEI) in July of 2012.

Prior to mining the leased coal, CCW must receive authorization from WDEQ-LQD and OSMRE. The authorization is granted when the amendment of the existing surface mining permit is approved by WDEQ-LQD and the mining plan to mine leased federal coal is approved by the Assistant Secretary of Land and Mineral Management (ASLM).

On January 15, 2016, DOI announced that it will launch a comprehensive review to identify and evaluate potential reforms to the federal coal program to ensure that it is properly structured to provide a fair return to taxpayers and reflect its impacts on the environment, while continuing to help meet our energy needs (DOI 2016). DOI will also institute a pause on issuing new coal leases while the review is underway. However, pending leases that have already completed an environmental analysis under NEPA and have received a final ROD or Decision Order by a federal agency under the existing regulations will be allowed to complete the final procedural steps to secure a lease or lease modification (DOI 2016). Since BLM issued a ROD approving the sale of the federal coal associated with WYWI61248 and since the coal has been sold through the competitive lease sale process, this DOI action will not affect OSMRE's authority to make a recommendation to the ASLM regarding the proposed mining plan modification.

The BAN tract and associated federal coal as approved for lease by the BLM in relation to the BAM are shown on **map 1-2**. As approved, this tract consists of a single block of federal coal and includes 1,671.0 surface acres. Not all of the coal included in the BAN tract is considered mineable at this time. Campbell County Road 12, the Bishop Road, overlies a portion of the coal included in the tract. SMCRA prohibits mining within 100 feet on either side of the right-of-way (ROW) of any public road unless the appropriate public authority allows the road to be relocated or closed after public notice, an opportunity for a public hearing, and a finding that the interests of the affected public and landowners will be protected [30 CFR 761.11(d)]. CCW estimated that the BAN tract contains approximately 221.7 Mt of mineable coal reserves if the Bishop Road is moved. CCW estimated that if the Bishop Road is not relocated, approximately 58 Mt of coal would be bypassed. The potential impacts related to this EA are evaluated assuming that the Bishop Road is moved to recover coal under the existing 200-foot buffer (100 feet on either side of the ROW) as well as coal that would be isolated east of the Bishop Road.

OSMRE is the lead federal agency responsible for development of this NEPA analysis because under SMCRA it has the authority to make a recommendation to the ASLM regarding the proposed mining plan modification. Using criteria outlined in OSMRE's NEPA Handbook and the CEQ regulations implementing NEPA (OSMRE 1989 and CEQ 2005), OSMRE determined that an EA that tiers to and incorporates by reference analysis conducted for the 2009 SGAC EIS whenever possible would fulfill OSMRE's responsibilities under NEPA for evaluating potential impacts resulting from mining the BAN tract. As such, this EA follows guidance in DOI 516 Departmental Manual (516 DM) (DOI 2004), which is the DOI manual guiding the implementation of the NEPA process.

OSMRE will not reevaluate all potential impacts previously analyzed as part of the 2009 SGAC EIS, which included analysis of all federal coal lands identified in the proposed mining plan modification. Rather, this EA considers potential changes to the extent or nature of those impacts based on information included in WDEQ-LQD Mine Permit No. PT0214-T8 and new information specific to this action. Because the 2009 SGAC EIS thoroughly described the environmental setting of the Belle Ayr Mine operations, it tiers to and is incorporated by reference in this EA. The 2009 SGAC EIS can be accessed on line at:

<http://www.blm.gov/wy/st/en/info/NEPA/documents/hpd/SouthGillette.html>.

In the 2010 ROD for the BAN portion of the 2009 SGAC EIS, BLM determined that maximum economic recovery of the federal coal would be achieved by mining as described in accordance

with BLM's preferred alternative and stipulated that the R2P2 must be approved prior to the approval of the MLA mining plan (BLM 2012).

On June 11, 2014, WDEQ-LQD approved CCW's application to amend the Mine Permit No. PT0214-T8 to include approximately 976 acres of the federal coal lease area within the existing and approved Belle Ayr Mine permit boundary (Temporary Filing Number [TFN] 6 1/057). On January 28, 2015, CCW submitted an application to amend Mine Permit No. PT0214-T8 to include the remainder (approximately 695.0 acres) of the BAN tract (TFN 5 3/160). WDEQ-LQD has not yet approved the permit amendment application so coal recovery associated with this federal mining plan modification will not be allowed within the tract until the permit amendment is approved.

Following review of OSMRE's recommendation and supporting documentation, including this EA, the ASLM will issue a decision document approving, approving with conditions, or denying the mining plan modification request. An approval would supplement the prior federal mining plan document for the BAM.

### **1.3 Purpose and Need**

As described at 40 CFR 1502.13, the purpose and need statement will briefly specify the underlying purpose and need to which the agency is responding in proposed the alternatives including the proposed action.

#### **1.3.1 Purpose**

The purpose of the action is established by the MLA and the SMCRA, which requires the evaluation of CCW's PAP before CCW may conduct underground mining and reclamation operations to develop the Belle Ayr North Tract Federal Coal Lease WYWI61248. OSMRE is the agency responsible for making a recommendation to the ASLM to approve, disapprove, or approve with conditions the proposed mining plan modification. The ASLM will decide whether the mining plan modification is approved, disapproved, or approved with conditions.

#### **1.3.2 Need**

The need for this action is to provide CCW the opportunity to exercise its valid existing rights (VER) granted by the BLM under Federal Coal Lease WYWI61248 to access and mine these federal coal reserves located in the tract. ASLM approval of the federal mining plan modification is necessary to mine the reserves.

As discussed in more detail in **chapter 2**, mine operations at the BAM will not be solely dedicated to the BAN tract. CCW estimates that mining in East Pit will first recover a portion of the coal from the BAN tract beginning in 2017, with mining associated with the BAN tract continuing through 2027.

### **1.4 Relationship to Statutes, Regulations, and Other Agency Plans**

#### **1.4.1 Statutes and Regulations**

The following key laws, as amended, relate to the primary authorities, responsibilities, and requirements for developing federal coal resources:

- I. MLA,

2. NEPA,
3. Mining and Minerals Policy Act of 1970 (MMPA),
4. Federal Coal Leasing Act Amendment, 1976 (FCLAA),
5. Federal Land Policy Management Act of 1976 (FLPMA),
6. SMCRA,
7. Multiple-Use Sustained Yield Act of 1960,
8. ESA,
9. CAA,
10. Clean Water Act (CWA),
11. SDWA,
12. NHPA,
13. AIRFA,
14. Paleontological Resources Preservation Act of 2009 (PRPA), and
15. MBTA.

In addition, this EA follows guidance in DOI 516 DM (DOI 2004), which, as outlined in 43 CFR Part 46 (U.S. Government Publishing Office [GPO] 2011), is the DOI manual guiding the implementation of the NEPA process. An MPDD will be prepared and submitted to the ASLM for the considered federal mining plan modification request.

The MLA and FCLAA provide the legal foundation for the leasing and development of federal coal resources. BLM is the federal agency delegated the authority to offer federal coal resources for leasing and to issue leases. The MMPA declares that it is the continuing policy of the federal government to foster and encourage the orderly and economic development of domestic mineral resources. In that context, BLM complies with FLPMA to plan for multiple uses of public lands and determine those lands suitable and available for coal leasing and development. Through preparation of land use plans and/or in response to coal industry proposals to lease federal coal, BLM complies with NEPA to disclose to the public the potential impacts from coal leasing and development, and also complies with the NHPA, CAA, CWA, ESA, and other applicable environmental laws to ensure appropriate protection of other resources. BLM then makes the federal coal that is determined suitable for coal development available for leasing. BLM also is responsible for ensuring that the public receives fair market value for the leasing of federal coal. Once a lease is issued, BLM ensures that the maximum economic recovery of coal is achieved during the mining of those federal leases and ensures that waste of federal coal resources is minimized through review and approval of a mine's R2P2 as required under the MLA. BLM implements its responsibilities for leasing and oversight of coal exploration and development under its regulations at Public Lands, Subtitle B, Chapter II, BLM, DOI, Subchapter C – Minerals Management (43 CFR Parts 3400-3480).

SMCRA provides the legal framework for the federal government to regulate coal mining by balancing the need for continued domestic coal production with protection of the environment and ensuring the mined land is returned to beneficial use when mining is finished. OSMRE was created

in 1977 under SMCRA to carry out and oversee those federal responsibilities. OSMRE implements its MLA and SMCRA responsibilities under regulations at Mineral Resources, Chapter VII – OSMRE, DOI (30 CFR Parts 700-End).

As provided for under SMCRA, OSMRE works with coal producing states and tribes to develop their own regulatory programs to permit coal mining. Once a regulatory program is approved for a state or tribe, OSMRE steps into an oversight role. OSMRE approved the State of Wyoming's coal regulatory program on November 26, 1980 (30 CFR 950.10). As a result, the WDEQ-LQD manages its own program under the Wyoming Environmental Quality Act (Sections 35-11-101 through 35-11-1104, Wyoming Statutes, 1977, as amended). LQD has the authority and responsibility to make decisions to approve surface coal mining permits and regulate coal mining in Wyoming under Regulations of the Environmental Quality Council (EQC) and the Administrator of the WDEQ-LQD with oversight from OSMRE. The Cooperative Agreement between OSMRE and LQD allows the LQD to regulate surface coal mining on federal lands or leases while OSMRE continues to carry out its obligations under the MLA, NEPA and other public laws (30 CFR 950.30) which includes the recommendations related to mining plans and mining plan modifications.

#### **1.4.2 Other Agency Plans**

The Project is within the Buffalo Field Office (BFO), which manages 780,291 acres of public lands and 4,731,140 acres of mineral estate within Campbell, Johnson and Sheridan counties in north-central Wyoming, including BLM-managed mineral estate in the project area. As required by FLPMA, BLM periodically prepares and revises land use plans to determine those uses that are suitable and compatible on specific portions of public lands, and under what conditions those uses would be authorized to mitigate potential impacts on other resource values and protect human health and safety. The BLM Casper Field Office (CFO) approved the R2P2 for the BAM in December 2014. The 2014 R2P2 approval did not include mining all the reserves in the BAN tract.

#### **1.5 Authorizing Actions**

A state permit approved by the WDEQ-LQD and a federal mining plan or mining plan modification approved by the ASLM are needed for a coal mine operator to conduct mining operations on lands containing leased federal coal in Wyoming. Conditions of mining within the tract are described in **section 1.2.2**. The WDEQ-LQD approval must include the requirement that the ASLM approve the mining plan modification before mining of federally leased coal within the tract can begin.

In accordance with 30 CFR 746.13, OSMRE will prepare and submit an MPDD to the ASLM recommending approval, approval with conditions, or disapproval of the federal mining plan modification. The MPDD will include this EA, which includes consultation with federal and state agencies, Native American tribes, local governments, and the public; the consideration of alternatives and the potential effect of the Project on the environment and the public; the determination of whether the potential effects of the Project and alternatives considered are significant; and the determination that the proposed action complies with other applicable federal laws and executive orders.

## 1.6 Outreach and Issues

During review of the mining plan modification application and the prior environmental analyses including the 2009 SGAC EIS, OSMRE determined that further analysis was necessary to satisfy NEPA requirements to include new information and changes that have occurred since the 2009 analysis. A scoping process was conducted during which public comments were solicited. OSMRE published legal notices in the Gillette News Record on September 10 and 24, 2015 (**appendix A**). The notices described the Project in summary form and informed the public that scoping comments would be accepted until October 10, 2015. Public outreach letters describing the EA and soliciting scoping comments were mailed on September 10, 2015 to city governments, adjacent landowners, and other interested parties. The legal notices and letters invited the public to comment on issues of concern related to the EA. OSMRE also sent letters of notification to tribes/tribal representatives. These tribal notification letters were mailed on September 10, 2015. OSMRE made a project website available that provided project information and comment opportunities.

Substantive issues identified during the public scoping period (September 10, 2015 through October 10, 2015) were considered when determining the resources to be included in this NEPA analysis. The public scoping comment letters are summarized in **appendix B**, and the issues (with number of comments per issue) included:

- Level of NEPA/ NEPA Process (3,323\*),
- Air Quality (3,221\*),
- Wildlife (3,220\*),
- Climate Change/Global Warming (3,320\*),
- Water Quality (3,218\*),
- Pro Mining (9),
- Negative Effects on Economy (6),
- Reclamation/Self Bonding (4),
- Bankruptcy (3), and
- Noise (1),

An asterisk indicates the number of comments includes the form comment

## 1.7 Crosswalk of Resource Areas

**Table I-1** identifies the location of resource discussions presented in the 2009 SGAC EIS and lists their location in this EA, where present. While all of the resources have been considered, not all of the resources have been brought forward for analysis in this EA. OSMRE determined that those resources and potential impacts not brought forward for analysis were sufficiently documented in the 2009 SGAC EIS and ROD and that new information would not affect the decision-making process. Information presented in the 2009 SGAC EIS that adequately described the affected environment for specific resources are incorporated by reference into this EA in their entirety and are not reiterated.

## 1.8 Public Involvement

Public involvement for the original 2009 SGAC EIS, which forms the foundation for this NEPA analysis, was extensive and is described below.

BLM received the Belle Ayr North coal lease application on July 6, 2004. A notice announcing the receipt of the Belle Ayr North coal lease application was published in the Federal Register on

**Table I-1. Crosswalk of Resources Analyzed in the SGAC EIS and the BAN EA.**

Resource	SGAC EIS		Mining Plan Modification EA	
	Affected Environment	Environmental Consequences	Affected Environment	Environmental Consequences
General Setting	3.1	3.1	Not carried forward	Not carried forward
Topography and Physiography	3.2.1	3.2.2	Not carried forward	4.1.1 4.2.1
Geology, Minerals, and Paleontology	3.3.1.1 3.3.2.1 3.3.3.1	3.3.1.2 3.3.2.2 3.3.3.2	Not carried forward	4.1.2 4.2.2
Air Quality (This section includes greenhouse gas discussions)	3.4.1 3.4.2.1 3.4.3.1 3.4.4.1	3.4.2.2 3.4.3.2 3.4.4.2	3.1	4.1.3 4.2.3
Water Resources	3.5.1.1 3.5.2.1 3.5.3.1	3.5.1.2 3.5.2.2 3.5.3.2	3.2 3.2	4.1.4 4.2.4
Alluvial Valley Floors	3.6.1	3.6.2	Not carried forward	4.1.5 4.2.5
Aquatic Resources (Wetlands)	3.7.1	3.7.2	Not carried forward	4.1.6 4.2.6
Soils	3.8.1	3.8.2	Not carried forward	4.1.7 4.2.7
Vegetation	3.9.1 Appendix E	3.9.2 Appendix E	Not carried forward	4.1.8 4.2.8
Wildlife (Including Threatened and Endangered and Special Status Species)	3.10.1.1 3.10.2.1 3.10.3.1 3.10.4.1 3.10.5.1 3.10.6.1 3.10.7.1 3.10.8.1 Appendix E	3.10.1.2 3.10.2.2 3.10.3.2 3.10.4.2 3.10.5.2 3.10.6.2 3.10.7.2 Appendix E	3.3.1 3.3.2 3.3.3	4.1.9 4.2.9
Land Use and Recreation	3.11.1	3.11.2	Not carried forward	4.1.10 4.2.10
Cultural Resources	3.12.1 3.12.1.1 3.12.3	3.12.2 3.12.3	Not carried forward	4.1.11 4.2.11
Visual Resources	3.13.1	3.13.2	Not carried forward	4.1.12 4.2.12
Noise	3.14.1	3.14.2	Not carried forward	4.1.13 4.2.13
Transportation	3.15.1	3.15.2	3.4.1 3.4.2	4.1.14 4.2.14
Hazardous and Solid Waste	3.16.1	3.16.2	Not carried forward	4.1.15 4.2.15
Socio-Economics	3.17.1.1 3.17.2.1 3.17.3.1 3.17.4.1 3.17.5.1 3.17.6.1 3.17.7.1	3.17.1.2 3.17.2.2 3.17.3.2 3.17.4.2 3.17.5.2 3.17.6.2 3.17.7.2	3.5.1 3.5.2 3.5.3 3.5.4 3.5.6	4.1.16 4.2.16
The Relationship Between Local Short-Term Uses of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity	3.18.1 3.18.2	3.18.1 3.18.2	Not carried forward	4.1.17 4.2.17

<sup>1</sup> SGAC– South Gillette Coal EIS (BLM 2009)

March 8, 2005 (GPO 2005). The Powder River Regional Coal Team (PRRCT) was notified that ACW (now CCW) had filed an application for the Belle Ayr North coal lease and presented with the Belle Ayr North LBA for review on April 27, 2005. At the April 27, 2005 public meeting, the PRRCT reviewed the Belle Ayr North coal lease application and the PRRCT recommended at that time that BLM process the application. On March 14, 2007, BLM notified the Governor of Wyoming that FCW (now CCW) had filed a lease application with BLM for the BAN tract.

BLM published a notice of intent (NOI) to prepare an EIS and the notice of a public scoping meeting in the Federal Register on March 29, 2007 (GPO 2007) and in the Gillette News Record on April 4, 2007. The publications announced the time and location of a public scoping meeting and requested public comment on all four of the applications, including the Belle Ayr North lease by application. Letters requesting public comment and announcing the time and location of the public scoping meeting were also mailed to all parties on the distribution list on March 26, 2007. A public scoping meeting was held on April 11, 2007 in Gillette, Wyoming. The scoping period extended from March 29 through June 10, 2007, during which time BLM received written, emailed, and telephoned comments from six entities.

A notice announcing the availability of the SGAC Draft EIS was published in the Federal Register by the EPA on October 24, 2008 (GPO 2008a). Parties on the distribution list were sent copies of the Draft EIS at that time and the Draft EIS became available on the Wyoming BLM webpage. A 60-day comment period on the Draft EIS commenced with publication of the EPA's NOA and ended on December 24, 2008. BLM published a NOA/Notice of Public Hearing in the Federal Register on October 17, 2008 (GPO 2008b). BLM's Federal Register notice announced the date and time of the formal public hearing, which was held on November 19, 2008 in Gillette, Wyoming. The purpose of the public hearing was to solicit public comment on the Draft EIS, fair market value, maximum economic recovery, and the proposed competitive sale of federal coal from the LBA tract. One individual presented statements on the Draft EIS during the hearing and written comments were received from 18 individuals, agencies, or organizations during the comment period.

The comments received were included in Appendix I of the 2009 SGAC Final EIS. The issues of greatest concern included

1. power plant greenhouse gas emissions from Powder River Basin coal combustion,
2. Powder River Basin air quality and wanting greater emphasis on renewable energy development from the BLM,
3. concern about the success of the mining reclamation process,
4. concern about water resources in the Powder River Basin, and
5. concern for adequate protection of plant and animal species.

Comments that BLM received on the Draft EIS were reviewed and evaluated and all comments that were received were considered in the preparation of the Final EIS and the ROD. During WDEQ-LQD review of the Belle Ayr Mine permit amendment TFN 6 I/57, public notice of the proposed amendment was published from April 18 through May 9, 2014 in the Gillette News Record, with a 30-day comment period. No comments or objections were received (King 2016).

On September 10 and 24, 2015 OSMRE published in the Gillette News Record an NOI to prepare a NEPA evaluation in the form of an EA and solicited public comments on the Project to help determine the issues and alternatives to be evaluated in the environmental analysis. A 30-day comment period on the NOI to prepare the EA extended from September 10 through October Belle Ayr North Federal Mining Plan Modification EA for Permit No. PT0214

10, 2015, during which time OSMRE received written and e-mailed comments from 3,232 entities. A form letter comment generated by WildEarth Guardians accounted for 3,217 comments. Public comments were reviewed and new substantive concerns were considered during the issues identification process.

## 2.0 Proposed Action & Alternatives

Under the requirements of NEPA, an EA must evaluate the environmental impacts of a reasonable range of alternatives that meet the project’s purpose and need. The DOI’s NEPA implementing regulations define reasonable alternatives as those that are “technically and economically practical or feasible and meet the purpose and need of the proposed action” 43 CFR 46.420).

Therefore, this chapter describes the Proposed Action and the No Action Alternative considered and analyzed in detail in this EA. In addition, it identifies alternatives considered but eliminated from detailed analysis.

### 2.1 Belle Ayr Mine WDEQ-LQD Permit

A more complete description of BAM’s existing mining and reclamation methods can be found in the PAP. On June 11, 2014, WDEQ-LQD approved CCW’s application to amend the Mine Permit No. PT0214-T8 to include approximately 976 acres of the federal coal lease area within the existing and approved Belle Ayr Mine permit boundary (Temporary Filing Number [TFN] 6 1/057). On January 28, 2015, CCW submitted an application to amend Mine Permit No. PT0214-T8 to include the remainder (approximately 695.0 acres) of the BAN tract (TFN 5 3/160). WDEQ-LQD has not yet approved the permit amendment application. The state permit renewal documents are available at the BAM Office at 2273 Bishop Rd, Gillette, WY 82718; WDEQ-LQD at 200 West 17th Street, Suite 10, Cheyenne, Wyoming, 82002; and the OSMRE Western Region Office located at 1999 Broadway, Suite 3320, Denver, Colorado, 80202.

### 2.2 Project Area

The project area for this EA is identified as the BAN tract and is located within federal coal leases WYWI61248 that lies within the north/central portion of the BAM permit boundary (**map I-2**). As determined from the 2010 ROD for the BAN portion of the SGAC EIS, the project area is approximately 1,671.0 acres (BLM 2010). The affected area with the tract is estimated to be 1,481.8, of which, approximated 786.8 acres have been approved for disturbance from mining activities unrelated to the Proposed Action (recovery of coal from adjacent lands). Effects evaluations in this EA will be based on the remaining 695.0 acres of disturbance within the tract.

This EA includes OSMRE’s assessment of the environmental impacts of CCW’s request to modify the BAM federal mining plan to include mining the federal coal in the BAN tract. The analysis considers the full extent of disturbance contemplated over the LOM. **Chapter I** provides a detailed discussion regarding the status of current coal leases associated with the BAM permit area, including the status of leases within the project area.

Prior to ownership by CCW, the project area was homesteaded and was leased at various times for oil and gas recovery and associated pipelines and power lines. There are no active oil or gas wells on the property. There is one livestock pond. Further, some of the fields were dryland farmed and inter-seeded with cropland species. As presented on **map I-2**, the Bishop Road (County Road 12) bisects the BAN tract.

### 2.3 Description of Existing Mining and Reclamation Operations

The 2009 SGAC EIS presented a thorough description of the existing condition to support the analysis presented therein. The following summary of updated existing condition, including ongoing permitted mining operations, are the most notable changes since the 2009 SGAC EIS

was prepared. This update is provided to support the evaluation of potential impacts contained in **chapter 4** of this EA.

Mining and reclamation activities have continued as approved by BAM Permit PT0214-T8 since the 2009 SGAC EIS was prepared and Federal Coal Lease WYWI61248 was issued. The federal mining plan approval associated with coal lease WYWI61248 would allow mining of 1,671.0 acres containing approximately 221.7 Mt of mineable federal coal. Operations at the BAM are conducted in accordance with applicable laws and regulations including SMCRA, the Wyoming Environmental Quality Act (WEQA), WDEQ-LQD rules and regulations, and the WDEQ-LQD approved PAP. The PAP, including approved revisions, provides the most complete descriptions of mining, environmental protection measures, and reclamation activities within the project area for the LOM and, as such, is used and referenced for the purpose of this EA.

CCW currently employs 259 people at the BAM and between 2009 and 2016 the mine produced an average of 21.3 Mt of coal per year (CCW 2016). In future years, CCW anticipates mining up to 20 Mt annually, which is under the 35 Mt of coal per year permitted by Wyoming Department of Environmental Quality (WDEQ)/Air Quality Division (AQD) air quality permit P0014896 and is consistent with the 2009 through 2016 average annual production. Approximately 43.0 Mt remain to be recovered in the federal mining plan area after January 1, 2017, excluding the federal coal identified in Proposed Action. CCW continues to use conventional surface-coal mining techniques described in section 2.1.1 of the 2009 SGAC EIS. CCW estimates that the BAM currently recovers approximately 94 percent of mineable coal. Coal is shipped from an onsite railroad loading facility to electric utilities and industrial customers in the United States (CCW 2016).

In 1975, in response to the requirements set forth in SMCRA and in the 1973 Wyoming Environmental Quality Act, WDEQ-LQD published a set of rules and regulations that required coal mine permittees to restore the land to a condition equal to or greater than its highest previous use and required permittees to restore wildlife habitat commensurate with or superior to premining habitat (WDEQ-LQD 2012). Reclamation activities under the Proposed Action would be consistent with those currently in use at the BAM. Mined-out areas would be reclaimed according to an approved postmine plan and would be reclaimed to follow premine drainage patterns. In-channel stockponds and playas (shallow topographic depressions that are internally drained) would be replaced to provide livestock and wildlife watering sources. All postmining topography, including reconstructed drainages, must be approved by the WDEQ-LQD. After mining, the land is reclaimed to support the premining uses.

### **2.3.1 Current Bonding and Bond Release Status**

SMCRA provides that, as a prerequisite for obtaining a coal mining permit, permittees must post a reclamation bond to ensure that the regulatory authority will have sufficient funds to reclaim the site if the permittee fails to complete the reclamation plan approved in the permit. There are three major types of reclamation bonds: corporate surety bonds, collateral bonds (cash; certificates of deposit; first-lien interests in real estate; letters of credit; federal, state, or municipal bonds; and investment-grade securities), and self bonds (legally binding corporate promises without separate surety or collateral, available only to permittees who meet certain financial tests) (OSMRE 2015). Wyoming rules and regulations currently include provisions for self-bond (WDEQ-LQD 2015).

Under WDEQ-LQD Mine Permit 214-T8, the BAM reclamation was bonded through Self-Bond No. SBC 128. As a result of April 2015 correspondence from ACW (now CCW) to WDEQ-LQD that suggested that corporate guarantor regulatory requirements for self-bonding may not be met, WDEQ-LQD determined ACW no longer qualified under the self-bonding program, and that the self-bonds failed to provide the protection consistent with the objectives and purposes of the WDEQ-LQD Rules and Regulations for Coal. WDEQ-LQD ordered ACW to obtain a replacement bond of approximately \$411 million to cover reclamation costs at the Eagle Butte and Belle Ayr mines (WDEQ-LQD 2015). ACW filed for Chapter 11 bankruptcy protection in Federal Bankruptcy Court on August 3, 2015. WDEQ-LQD and ACW subsequently entered into a voluntary agreement where WDEQ-LQD would gain a \$61 million "Superpriority" claim in case of liquidation in exchange for WDEQ-LQD's promise to stay any enforcement action regarding self-bonding until reorganization of ACW's debts could be finalized (Office of the Governor 2105). On January 21, 2016, OSMRE issued a ten-day notice (TDN) to WDEQ-LQD regarding a possible violation of ACW's self-bonding Wyoming approved state program (OSMRE 2016). The TDN required that WDEQ-LQD take appropriate action within 10 business days of receipt to cause the possible violation to be corrected or to show good cause for such failure. WDEQ-LQD responded to the TDN on February 12 and again on July 15, 2015, requesting that OSMRE reverse its decision.

On July 7, 2016, a bankruptcy judge in Virginia approved an agreement between the DOI and other U.S. regulatory agencies and Alpha Natural Resources to replace its self-bonds with surety bonds (guaranteed by a corporation licensed to do business as a surety) for the company's Eagle Butte and Belle Ayr mines in the Powder River Basin of Wyoming (U.S. District Court for the Eastern District of Virginia 2016). CEI acquired the Eagle Butte and Belle Ayr mines on July 26, 2016 and the current BAM bond amount is set at \$125.5 million, which is supported by third-party surety bonds.

There are four types of bond release for areas disturbed and coal removed after May 1978 that mine operators may apply for to reduce their reclamation bond. As outlined in WDEQ-LQD Guideline 20 (Bond Release Categories and Submittal Procedures for Coal Mines [WDEQ-LQD 2014]), the four bond release types for lands disturbed and coal mined since 1978 are

1. Area Bond Release – backfilling and rough grading;
2. Phase 1 – partial incremental, which involves finishing of grading;
3. Phase 2 – partial incremental, which addresses species composition of vegetation, sediment control, and soil productivity; and
4. Phase 3 - full incremental or final release, which means that reclamation meets the postmining land use and has passed verifications for surface and ground water, wetlands, vegetation, trees, shrubs, wildlife, and final surface stability.

All reclaimed areas are monitored for a minimum of 10 years to evaluate the success of vegetation growth and the establishment of a variety of native plant species prior to the Phase 3 final bond release of the reclamation bond. It is important not to equate contemporaneous reclamation with final bond release. There is a difference between lands that are in various stages of reclamation and those that have been reclaimed and released from final bonding requirements. Final bond release on reclaimed lands indicates that the reclamation meeting permit standards has been in place in accordance with permit standards for at least 10 years and that an application

for final bond release was submitted to the WDEQ. In 2014, the OSMRE Denver Field Division (DFD) evaluated reclamation plans of six approved permits in Wyoming during oversight inspections and determined that all permits evaluated were in compliance with contemporaneous reclamation requirements, as defined within the approved permits (OSMRE 2014). According to BAM's 2016 Annual Report, the mine has disturbed approximately 7,304 acres, of which approximately 2,750 acres are considered land not available for reclamation (needed for long-term mining activities). The mine has backfilled and graded approximately 3,575 acres of the remaining 4,554 acres. Thus, the mine has backfilled and graded approximately 49.0 percent of the total disturbance and approximately 78.5 percent of land available for reclamation.

A summary of phased bond release acreages in the project area is included in **table 2-1**.

**Table 2-1. Summary of Phased Bond Release Acreages<sup>1</sup> in the Project Area**

Phased Bond Releases Status	Mine Wide	Percent
Total Areas Disturbed	7,304	--
Acres of Long-term Mining or Facilities and Percent of Total Disturbance	2,750	37.7%
Acres Available for Backfilling or Reclamation and Percent of Total Disturbance	4,554	62.4%
Acres of Active Mining and Percent of Available Acres	979	21.5%
Acres Backfilled and Graded and Percent of Available Acres	3,575	78.5%
Total Areas Reclaimed (Soiled and Seeded/Planted) and Percent of Backfilled and Graded	3,040	85.0%
Areas Which Have Achieved Phase 1 Bond Release and Percent of Reclaimed Acres	2,176	71.6%
Areas Which Have Achieved Phase 2 Bond Release and Percent of Reclaimed Acres	921	30.3%
Areas Which Have Achieved Phase 3 Bond Release and Percent of Reclaimed Acres	921	30.3%

<sup>1</sup> As of January 7, 2016

Source: CCW 2016

### 2.3.2 BAM Support Facilities

Mining activities are supported by existing, permitted facilities located within the BAM permit boundary and include facilities buildings, coal handling facilities, and ancillary facilities. Other facilities not considered as the main facilities described above include the train loadout, railroad loop, explosives storage area, scoria pits, landfarm, sediment control ponds and diversions, the access road and miscellaneous haul roads and light use roads.

### 2.3.3 Power Plants Supplied by the BAM

The power plants supplied by the BAM are listed in **table 2-2**. Not all power plants utilized BAM-produced coal each year, between 2009 and 2016.

## 2.4 Description of Alternatives

A description of the alternatives analyzed by this EA are included in this section and summarized in **table 2-3**. The description of environmental impacts associated with the Proposed Action assumes that the Bishop Road would be relocated and the coal under the road and potentially isolated coal north of the current road location would be recovered. All alternatives reflect the BLM-approved modification to CCW's WYWI61248 coal lease. Therefore, quantities (acres and tonnages) incorporated into table 2-3 include those added to WYWI61248 by the approved BAN federal coal lease.

**Table 2-2. Power Plants Supplied by Coal Recovered from the BAM.**

Power Plant	Location	Rail Distance (miles)	Carrier	Type
Allen S King Generating Plant	Stillwater, MN	1,028	UP	Cyclone
Baldwin Energy Complex	Baldwin, IL	1,255	BNSF	Cyclone
Boardman Plant	Boardman, OR	1,428	BNSF	Wall Fired
Coffeen Power Station	Coffeen, IL	1,135	BNSF	Cyclone
Columbia	Richland, WA	1,452	BNSF	Tangential
Comanche Station	Pueblo, CO	501	BNSF	Tangential
Dan E Karn	Essexville, MI	1,528	BNSF	Tangential
Edgewater Generating Station	Sheboygan, WI	1,263	BNSF	Cyclone
Flint Creek Plant	Gentry, AR	1,009	UP	Wall Fired
George Neal North	Sergeant Bluff, IA	726	UP	Cyclone
George Neal South	Salix, IA	719	UP	Cyclone
Gerald Gentleman Station	Sutherland, NE	375	UP	Dry Bottom
Havana Power Station	Havana, IL	1,216	BNSF	Wall Fired
Hawthorn Generating Facility	Kansas City, MO	812	BNSF	Wall Fired
Western Farmers Electric Coop	Hugo, OK	1,249	BNSF	Wall Fired
Iatan Generating Station	Weston, MO	776	BNSF	Tangential
J H Campbell Generating Plant	West Olive, MI	1,292	BNSF	Tangential
James H Miller Steam Plant	Quinton, AL	1,629	BNSF	Wall Fired
John W Turk Jr Plant	Fulton, AR	1,400	UP	Spiral Wound
Joppa	Joppa, IL	1,257	UP	Tangential
La Cygne Generating Station	La Cygne, KS	875	BNSF	Wall Fired
Louisa Generating Station	Muscatine, IA	1,068	BNSF	Wall Fired
Montrose Generating Station	Clinton, MO	940	UP	Tangential
Nelson	Mossville, LA	1,654	UP	
Muscatine Power & Water Generation	Muscatine, IA	1,071	BNSF	Wall Fired
Oologah	Oologah, OK	1,028	UP	Tangential
Ottumwa Generating Station	Ottumwa, IA	887	BNSF	Tangential
Platte Generating Station	Grand Island, NE	528	UP	Tangential
Prairie Creek Generating Station	Cedar Rapids, IA	917	BNSF	Wall Fired
Shady Point LLC	Panama, OK	1,334	BNSF	Fluidized Bed
Sheldon Station	Hallam, NE	909	UP	Cyclone
Sherburne County Generating Plant	Becker, MN	1,066	BNSF	Cyclone
Walter Scott Jr Energy Center	Council Bluffs, IA	662	BNSF	Wall Fired
Welsh Plant	Pittsburg, TX	1,420	UP	Wall Fired
White Bluff Generating Plant	Redfield, AR	1,295	UP	Tangential

Source: CCW 2017

### 2.4.1 Proposed Action

Under the Proposed Action Alternative, OSMRE would recommend and ASLM would approve CCW's federal mining plan modification to conduct coal mining on 1,481.8 acres of federal coal lands within the 1,671.0 acre tract to recover an estimated 208.4 Mt of federal coal related to WYW161248. CCW estimates that at the projected average annual coal production rate of 20 Mt, mining this coal would extend the mine's life by about 10.4 years.

**Table 2-3. Summary Comparison of Coal Production, Surface Disturbance, Mine Life, and Employees for the No Action Alternative and Proposed Action, as of January 1, 2017.**

	<b>No Action (Existing Mine)</b>	<b>Added to the Federal Mine Plan Resulting from Approval of the Proposed Action</b>
Mineable Federal Coal (Mt)	45.6	221.7
Recoverable Federal Coal (Mt) <sup>1</sup>	43.0	208.4
Coal Lease Area - Federal Leases Only (acres)	6,616.5 <sup>2</sup>	1,671.0 <sup>3</sup>
Total Affected Area (acres)	11,776.1 <sup>4</sup>	1,481.8 <sup>5</sup>
Approved Permit Area (acres)	12,090.6 <sup>4</sup>	1,457.7 <sup>5</sup>
Average Annual Post-2016 Coal Production (Mt)	20.0	No change in production
Life of Mine from Federal Coal	2.2 yrs.	10.4 yrs.
Average Number of Employees	259	No change in employee number

<sup>1</sup> Assumes a 94 percent recovery factor of mineable coal.

<sup>2</sup> This number includes federal coal lease acres associate with BLM's approval of the modification to WYW161248.

<sup>3</sup> These acres are included in the adjacent column because the federal coal within the tract has been leased.

<sup>4</sup> This number is from the currently approved WDEQ-LQD Permit No. PT0214-T8.

<sup>5</sup> The affected area increase is larger than the permit area increase because there is additional disturbance within the current permit boundary.

The BAN tract would be mined as an integral part of the BAM under the Proposed Action (**map I-2**). Because the BAN tract would be an extension of the existing BAM, the facilities and infrastructure would be the same as those identified in the proposed WDEQ-LQD Mine Permit 214-T8 amendment, which is currently under review by WDEQ-LQD, and the BLM Resource Recovery and Protection Plan (R2P2), which was approved in December of 2014.

#### **2.4.2 No Action Alternative**

Under the No Action Alternative, OSMRE would not recommend, and the ASLM would not approve CCW's proposed mining plan modification and 208.4 Mt of federal coal related to WYW161248 would not be recovered. Under this alternative, the BAM would mine its remaining 43.0 Mt of recoverable coal reserves on the existing Belle Ayr leases in approximately 2 years, at an average annual production rate of approximately 20 Mt.

To compare the environmental and economic consequences of mining these lands versus not mining them, this EA has been prepared under the assumption that the coal within Federal Coal Lease WYW161248 tract would not be mined in the foreseeable future if the No Action alternative was selected. However, selection of the No Action alternative would not preclude approval of a mining plan modification to include this tract in the future.

#### **2.4.3 Alternatives Considered but Eliminated**

If an alternative is considered during the NEPA process, but the agency decides not to analyze the alternative in detail, the agency must identify those alternatives and briefly explain why those alternatives were eliminated from detailed study (40 CFR 1502.14). An action alternative may be eliminated from detailed study for the following of reasons:

- I. It is ineffective (does not respond to the purpose and need).

2. It is technically or economically infeasible (consider whether implementation of the alternative is likely given past and current practice and technology).
3. It is inconsistent with the basic policy objectives for the management of the area (such as, not in conformance with the land use plan (LUP)).
4. Its implementation is remote or speculative.
5. It is substantially similar in design to an alternative that is analyzed.
6. It would have substantially similar effects to an alternative that is analyzed.

OSMRE considered public and agency comments when selecting alternative scenarios for this EA to evaluate the consequences of the approval or denial of the mining plan modification request. However, OSMRE's decision is limited to recommending approval, approval with conditions, or denial of the requested mining plan modification.

#### 2.4.3.1 *Underground Mining Alternative*

An alternative to require BAM to use underground mining methods to extract the coal was identified in public comments received during the outreach period, considered by OSMRE and eliminated from detailed study because WDEQ-LQD has approved a surface mining permit for this project using surface mining techniques and underground mining is inconsistent with the approved permit. The Purpose and Need for this EA is predicated upon review of a surface mining plan included as part of the approved surface mining permit. An Underground Mining alternative would, thus, be inconsistent with the purpose and need for this action.

Also, Federal Coal Lease WYWI61248 is a surface reserve lease only. The lease was sold by the federal government and is currently held by CCW, with the clear understanding by all parties concerned that the lease would be mined by surface mining methods only.

This alternative is also economically infeasible at current permitted production rates, and the economics of initiating an underground longwall mining operation in the BAM are not cost effective. The facilities and equipment needed for underground mining are different from surface mining. Because the infrastructure for underground mining is not in place at the BAM, new infrastructure for underground mining would need to be constructed. The capital expenditure to develop an underground mine would be prohibitive. In addition, all new surface facilities would need to be constructed, including, but not limited to, conveyors, coal stock piles, a wash plant, and maintenance and support facilities. In addition, all new underground mining equipment would need to be purchased such as, but not limited to, a long wall mining system, conveyor systems/drives/power stations, vehicles for transporting men and supplies, several continuous miners, shuttle cars, large and small ventilation fans, and roof bolters.

In addition, approval by WDEQ-LQD of an application for a permit revision would be required to authorize underground mining. The process for BAM to design and engineer a new underground mine and for WDEQ-LQD to process a new permit application would take a number of years. These factors would also result in this being an economically unreasonable alternative to consider.

In summary, this alternative was not brought forward for analysis because underground mining does not respond to the purpose and need for this action and in addition, the economic burden to shift to underground mining would be prohibitive.

#### 2.4.3.2 *Air Quality Mitigation Alternatives*

Some public comments suggested that OSMRE consider alternatives that mitigate air quality impacts, specifically by imposing more stringent emission limits at power plants fueled by the BAM and by requiring oil and gas operators in the region to reduce their emissions. These proposals are not alternatives to the mining plan being considered. The effects of coal combustion are analyzed in the Proposed Action as well as in the No Action alternative because they are considered to be indirect effects. CEQ regulations at 40 CFR 1508 (b) define “indirect effects” as those which are caused by the proposed action and are later in time or farther removed in distance, but are still reasonably foreseeable (CEQ 2005). These indirect effects would occur as a result of burning the coal that is mined. Any mitigation measure proposed by OSMRE imposing more stringent emission limits at generating stations and upon oil and gas operators is beyond OSMRE’s authority and its implementation would be highly remote and speculative.

Public comments also suggested considering an alternative that required reduced air emissions at the mine by changing or modifying mining related equipment to equipment that would produce lower air emissions. The BAM is a relatively small contributor of the emissions related to engine combustion (primarily carbon dioxide [CO<sub>2</sub>] and oxides of nitrogen [NO<sub>x</sub>]) in the region. Currently, there are five coal-fired power plants in the Wyoming PRB study area. Black Hills Power Corporation owns and operates the Neal Simpson Unit 2 (120-megawatts [MW]), Wygen I, II, III and (88-MW, 90-MW, and 100-MW, respectively), and Wyodak (335-MW) power plants, all of which are located approximately five miles east of Gillette, Wyoming. Pacific Power and Light’s Dave Johnston Power Plant is located near Glenrock, Wyoming, outside of the study area. There are also three separate interconnected gas-fired power plants (Hartzog, Arvada, and Barber Creek) located near Gillette, Wyoming. Each contains three separate 5-MW-rated turbines that provide electric power to Basin Electric and its customers. In winter, the maximum capacity can reach 22.5-MW from each site. Black Hills Power Corporation also owns and operates the 40 KW Neil Simpson Gas Turbine #2 power plant. All electricity generation units discussed above are in operating condition, although they do not operate at maximum capacity.

The cost to make the switch to equipment powered by a different fuel (such as natural gas or solar powered equipment) for approximately 1,671 acres of federal coal would be cost prohibitive for the minimal benefit to the regional air quality. In addition, the use of natural gas powered engines in mining equipment is relatively new and some types of equipment would not be available for replacement with natural gas powered engines. The use of solar power to run large equipment has not been tested and is not considered technologically feasible at this time. Similarly, retrofitting existing equipment with additional emissions control devices would be expensive with limited effect on regional air emissions.

OSMRE has not brought forward this alternative for full analysis because requiring natural gas and solar powered engine technology and retrofitting existing equipment is not economically or technically feasible for all equipment at the BAM, and would likely have substantially similar effects to alternatives that are analyzed.

#### 2.4.3.3 *Mining Plan with Reduced Disturbance Alternatives*

Alternatives that would reduce the disturbance area were considered; however, OSMRE did not carry these forward for analysis because these alternatives were thoroughly analyzed in the 2009 SGAC EIS. In issuing its ROD for the BAN portion of the 2009 SGAC EIS, BLM determined that

the selected alternative provided for maximum economic recovery of the coal resource and was in conformance with BLM's land use plan decisions covering the BAN area. In addition, alternatives reducing disturbance area were substantially similar in design to the Proposed Action and would have substantially similar effects and therefore were not carried forward for analysis.

#### **2.4.4 Project Environmental Protection and Mitigation Features**

The surface mining permitting process under WDEQ-LQD coal regulatory program requires applicants to obtain approvals from various agencies, including the Wyoming Game and Fish Department (WGFD), SHPO, and the USFWS. The applicant is then required to incorporate agency approved design features into their mining proposals that are intended to protect or minimize impacts to environmental resources. Each PAP submitted to WDEQ-LQD for review and approval contains resource-specific plans, design features, and associated performance standards. The resource-specific plans describe the design features for reducing or eliminating the potential impacts to various resources or how those resources would be restored to approved post-mining conditions after mining is complete. WDEQ-LQD approval commits the applicant to implementing the design features contained in the PAP. It is important to note that the design features of the original permit also apply to a newly revised permit, unless WDEQ-LQD approves changes.

The following is a summary of the environmental commitments for environmental protection and mitigation, by resource, included in the PAP. More detailed descriptions of these environmental commitments are included in the PAP (CCW 2016).

##### *2.4.4.1 Topography*

- Reclaim the area to the WDEQ-LQD approved post-mining topography.
- Grade backfilled mining areas to establish a stable post-mine topography that blends into the undisturbed areas outside the mining limits.

##### *2.4.4.2 Air Quality*

- Water roads and apply chemical dust suppressants as necessary to control fugitive dust emissions.
- Operate in compliance with the WDEQ-AQD Permit No. P0014896.
- Revegetate long-term topsoil stockpiles.

##### *2.4.4.3 Water Resources*

- Route all runoff from disturbed areas through one or more sediment ponds or approved alternative sediment control measures (ASCMs).
- Construct new sedimentation structures and diversion ditches prior to topsoil removal to control runoff, avoid erosion and an increased contribution of sediment load to runoff, and protect surface water and groundwater quality.
- Give new-hire training to employees regarding sediment control requirements and construction techniques.
- Maintain temporary sediment ponds and ASCMs until vegetative establishment is complete and acceptable runoff water quality is achieved.

- Monitor performance of diversion ditches and sediment control structures and maintain or upgrade as needed.
- Control and monitor the quantity and quality of any discharges from the permit area in compliance with the Wyoming Pollutant Discharge Elimination System (WYPDES) Permit Number WY-0032964 issued by the WDEQ-WQD under the National Pollutant Discharge Elimination System (NPDES) program.
- Revegetate permanent drainage ditches unless approved by WDEQ-LQD and install other erosion control measures where necessary based on the approved design.
- Seed disturbance related to sediment pond construction, including embankments and surrounding areas, after the pond construction is completed.
- Design sediment ponds to contain the water and settleable sediment load from a 10-year, 24-hour storm event.
- Construct ASCMs in small drainage basins, where sediment ponds are inappropriate, to provide secondary sediment controls for precipitation and snowmelt events in disturbed areas of the mine site. ASCMs are typically dozer sumps and ditches to the dozer sumps or a series of straw wattles (permeable barriers used to detain surface runoff long enough to reduce flow velocity).
- Size haul road culverts to maintain proper drainage during high snowmelt or other exceptional runoff events.

#### 2.4.4.4 *Vegetation*

- Revegetate to achieve the approved post-mining land uses.
- Reclaim the postmine disturbed land with shrubs in accordance with approved permit commitments.
- Eliminate livestock grazing during vegetation establishment.
- Once vegetation is established, manage livestock usage to protect the established vegetative cover.
- Evaluate revegetation success in accordance with the standards approved by the WDEQ-LQD.

#### 2.4.4.5 *Terrestrial Wildlife*

- Re-establish appropriate and suitable forage, shrubs, and trees on reclaimed areas in accordance with approved permit commitments.
- Construct permanent stock and wildlife watering ponds.
- Leave undisturbed islands throughout the disturbed area to provide habitat for wildlife.
- Provide training to employees on WGFD topics for protecting wildlife, and inform them of wildlife prone locations.
- Set and post the maximum speed of 45 mph on the mine access road to limit collisions with wildlife.

- Manage livestock grazing to ensure that adequate forage is left for wildlife use and that the range is not over used.
- Control pesticide and herbicide use to protect livestock and wildlife.
- Provide rock piles and varying topographic design in the reclamation to provide habitat diversity for wildlife habitat.
- Limit soil salvage activities near active Greater sage-grouse (GRSG - *Centrocercus urophasianus*) leks during the breeding and rearing season, mid-March – mid-July.
- Install fencing in accordance with PAP requirements for wildlife protection.

#### 2.4.4.6 *Threatened and Endangered Species*

- Construct power lines to Suggested Practices for Raptor Protection on Power lines - The State of the Art in 2006.
- Conduct annual wildlife surveys of raptors and migratory birds of high federal (MBHFI), and prepare/submit annual reports.
- If a nest develops within 0.25 mile (or line of sight) of the active mining area, consult with USFWS before continuing activities near the nest. Implement site specific protections and mitigation measures as required.
- Prepare raptor mitigation plans as required by USFWS and comply with the requirements in the plans, such as installing raptor platforms.
- Conduct surveys and develop mitigation plans for newly listed T&E species that are present in the mine area as they are newly listed.

#### 2.4.4.7 *Cultural Resources*

- Perform pre-disturbance field surveys.
- If an unidentified cultural or historical resource is discovered within or adjacent to the project area, halt activities that may damage the resource and report the findings to the responsible regulatory agency.
- Complete required mitigation for cultural and historic resources.

#### 2.4.4.8 *Visual Resources*

- Reclaim disturbed areas to the approved post-mining topography.

#### 2.4.4.9 *Soils*

- Live-handle topsoil where possible.
- Locate topsoil stockpiles to avoid erosion from wind and water and additional compaction or contamination.
- Regrade topsoil stockpiles with outside slopes no steeper than 3H:1V and protect topsoil stockpiles by revegetating as soon as conditions allow.
- Clearly label topsoil stockpiles.
- Reserve adequate topsoil for reclamation of wetlands, bottomlands and croplands.

- Periodically recalculate the mine-wide soil balance and adjust the replacement depth as necessary.
- Sample the regraded spoil in accordance with the PAP before applying topsoil to ensure it is not toxic to vegetation.
- Control weeds on topsoil stockpiles by monitoring and treating with an herbicide as needed.
- If soil compaction occurs after topsoil replacement, rip the soil to minimize compaction, promote stability and assist in revegetation.
- Leave reapplied topsoil in a rough condition to help control wind and water erosion prior to seeding.
- Monitor topsoil removal and maintain replacement balances to ensure adequate topsoil is available for reclamation.

#### 2.4.4.10 *Post-mining Land Use*

- Reclaim affected areas to land uses as high as or higher than those in effect prior to mining.
- Establish vegetation to support livestock grazing.
- Establish adequate forage and cover to support year-round wildlife usage.
- Establish permanent stock and wildlife watering ponds.
- Establish the post-mining hydrologic conditions in accordance with the approved hydrologic reclamation plan.

### 3.0 Affected Environment

This chapter discusses the existing conditions of the physical, biological, cultural, and human resources that could be affected by implementation of the alternatives described in **chapter 2**, as they relate to the mine plan decision document for the federal mining plan modification for the BAM. For the purpose of this analysis, the project area is considered the BAN tract and, where appropriate, a surrounding buffer. Buffers vary by resource and are described below. Elements of the environment specified by statute, regulation, executive order, or the standards for public land health are described and analyzed in this section except where the 2009 SGAC EIS evaluation and conclusions have been deemed adequate for effects determinations related to this EA.

**Table I-1** in **chapter I** is a crosswalk table that indicates resource discussions presented in the 2009 SGAC EIS and those carried forward for this EA. The determination of adequacy of the baseline conditions described in the 2009 SGAC EIS as related to the BAN tract was based on the fact that conditions have not substantively changed, no new data are available, or the resource conditions have only been minimally affected as a result of current mining operations and further presentation of information would not affect the decision-making process. Baseline information presented in the 2009 SGAC EIS that has not substantively changed is incorporated by reference. Resource discussions for general siting; topography and physiography; geology, minerals, and paleontology; alluvial valley floors; aquatic resources; soils; vegetation; land use and recreation, cultural resources; noise; hazardous and solid waste; and the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity are incorporated by reference. The 2009 SGAC EIS can be accessed online here:

<https://www.blm.gov/publish/content/wy/en/info/NEPA/documents/hpd/SouthGillette.html>.

Updated information pertaining to the baseline data is presented in this chapter when applicable.

**Figure 3-1** presents a wind rose from the neighboring Cordero Rojo Mine (the site used for air quality modeling for the Middle Group mines) (McVehil-Monnett 2014). The wind directions are predominately from the west through north-northwest and from the southeast through south.

#### 3.1 Air Quality

Air quality regulations applicable to surface coal mining include the National Ambient Air Quality Standards (NAAQS), Wyoming Ambient Air Quality Standards (WAAQS), Prevention of Significant Deterioration (PSD), National Source Performance Standards (NSPS), and the Federal Operating Permit Program (Title V). These regulatory programs are described in detail in appendix H of the 2009 SGAC EIS.

Air quality information specific to the BAM is included in CCW's P0014896 (WDEQ-AQD 2015). **Section 3.4** and appendix H of the 2009 SGAC EIS include detailed discussions of air quality issues related to the leasing and mining of coal within the BAN tract. The analysis presented herein includes discussion of attainment/non-attainment areas; updates to recent air quality monitoring findings; revises air quality modeling results; and updates discussions on fine particulate matter (PM<sub>2.5</sub>), nitrogen dioxide (NO<sub>2</sub>), ozone (O<sub>3</sub>), air quality related values (AQRVs), and hazardous air pollutants (HAPs).



Since the completion of the 2009 SGAC EIS, the BAM permit has been revised to reduce the boundary of the Lands Necessary to Conduct Mining (LNCM) and to reduce the maximum permitted production level from 45 Mt to 35 Mt per year. Both of these changes required new air quality modeling. The results of this modeling are presented in **section 4.3.1**. According to EPA (EPA 2017a), the burning of fossil fuels such as coal and oil, deforestation, land-use changes, and other sources have caused the concentrations of heat-trapping GHGs to increase significantly in the atmosphere. GHGs are not currently regulated pollutants (not subject to NAAQS or WAAQS regulations). GHG discussions are included in **sections 3.1.4.4** and **4.3.1**.

### **3.1.1 National and Wyoming Ambient Air Quality Standards**

The CAA requires the EPA to establish NAAQS to protect public health and welfare. These standards define the maximum level of air pollution allowed in the ambient air. The CAA established NAAQS for six pollutants, known as “criteria” pollutants, which “... cause or contribute to air pollution which may be reasonably anticipated to endanger public health or welfare and the presence of which in the ambient air results from numerous or diverse mobile or stationary sources.” The six, present-day criteria pollutants are lead (Pb); nitrogen dioxide (NO<sub>2</sub>); sulfur dioxide (SO<sub>2</sub>); carbon monoxide (CO); ozone (O<sub>3</sub>); and particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>), where PM<sub>10</sub> is coarse particulate with mean aerodynamic diameters less than 10 microns and PM<sub>2.5</sub> is fine particulate with a diameter of 2.5 microns or less.

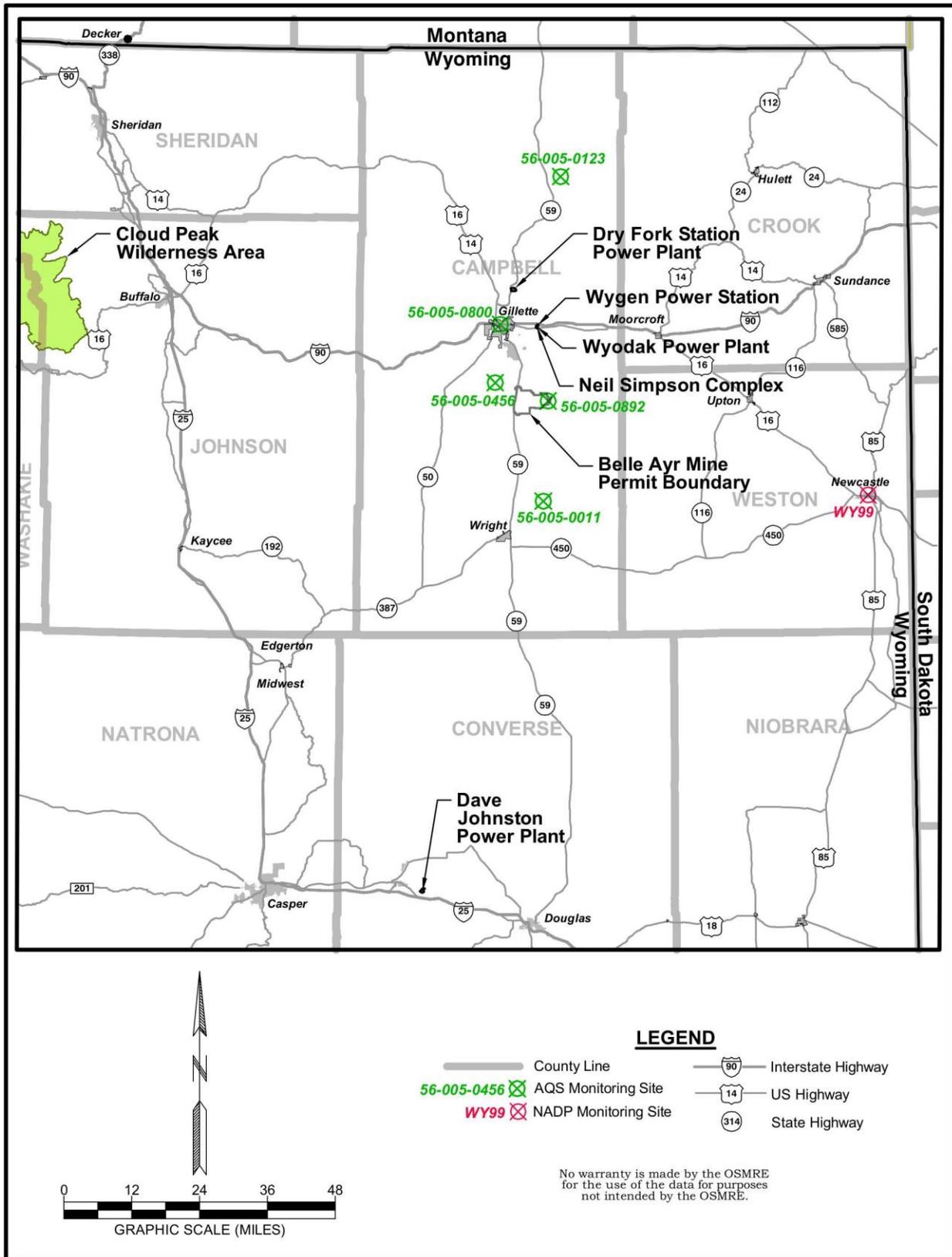
The CAA and its amendments allow states to promulgate additional ambient air standards that are at least as stringent, or more stringent, than the NAAQS. The NAAQS and WAAQS, established by the WDEQ-AQD, are listed in **table 3-1**. WAAQS values also include hydrogen sulfide (H<sub>2</sub>S).

### **3.1.2 Attainment/Non-Attainment Area Designations**

Pursuant to the CAA, EPA developed a method for classifying existing air quality in distinct geographic regions, known as air basins, air quality control regions, and/or metropolitan statistical areas. For each federal criteria pollutant, each air basin (or portion of a basin or statistical area) is classified as in “attainment” if the area has complied with the adopted NAAQS for that pollutant, as “non-attainment” if the levels of ambient air pollution exceed the NAAQS for that pollutant, or as “unclassifiable” if the area cannot be classified on the basis of available information as meeting or not meeting the national primary or secondary ambient air quality standard for the pollutant.

Through the State Implementation Plan (SIP) process, which is approved by EPA, states use the EPA method to designate areas within their borders as being in “attainment”, “non-attainment”, or “unclassifiable” with the NAAQS. The BAN tract is in an area that is designated an attainment area for all pollutants (EPA 2017b). However, the town of Sheridan, Wyoming, located approximately 87 miles northwest of the project area (**map 3-1**), is a non-attainment area for PM<sub>10</sub>.

It should be noted that WDEQ/AQD has requested that the Wyoming Air Quality Advisory Board consider a request to review the State of Wyoming’s Request for Redesignation and Limited Maintenance Plan for the Attainment in the Particulate Matter (PM<sub>10</sub>) Moderate Nonattainment Area in Sheridan (WDEQ-AQD 2016b). The request is based on the fact that WDEQ-AQD has submitted over 25 years of monitoring data demonstrating that the Sheridan nonattainment area has attained the PM<sub>10</sub> NAAQS for over 25 years. Upon review and



**Map 3-1. Regional Air Quality Monitoring Sites**

**Table 3-1. Federal and Wyoming Ambient Air Quality Standards**

Emissions	Averaging Period	Wyoming Standard (WAAQS)	Federal Standard (NAAQS)
Carbon Monoxide (CO)	1-hour 8-hour	35 ppm <sup>a</sup> 9 ppm <sup>a</sup>	35 ppm <sup>a</sup> 9 ppm <sup>a</sup>
Sulfur Dioxide (SO <sub>2</sub> ) <sup>1</sup>	1-Hour 3-hour	75 ppb <sup>d</sup> 0.50 ppm <sup>a</sup>	75 ppb <sup>d</sup> 0.50 ppm <sup>a</sup>
Nitrogen Dioxide (NO <sub>2</sub> ) <sup>2</sup>	1-Hour annual	100 ppb <sup>a</sup> 53 ppb <sup>b</sup>	100 ppb <sup>i</sup> 53 ppb <sup>f</sup>
Ozone (O <sub>3</sub> ) <sup>3</sup>	8-hour	0.075 ppm <sup>e</sup>	0.070 ppm <sup>e</sup>
PM <sub>10</sub>	24-hour annual	150 µg/m <sup>3a</sup> 50 µg/m <sup>3f</sup>	150 µg/m <sup>3c</sup> --
PM <sub>2.5</sub>	24-hour annual	35 µg/m <sup>3g</sup> 15 µg/m <sup>3f</sup>	35 µg/m <sup>3g</sup> 12 µg/m <sup>3h</sup>
Lead (Pb) <sup>4</sup>	90-Day	0.15 µg/m <sup>3h</sup>	0.15 µg/m <sup>3b</sup>
Hydrogen Sulfide (H <sub>2</sub> S)	1-Hour	70/40 µg/m <sup>3j</sup>	--

<sup>a</sup> Not to exceeded more than once per calendar year

<sup>b</sup> Not to be exceeded

<sup>c</sup> Not to exceed more than once per calendar year on averaged over 3 years

<sup>d</sup> 99th percentile of 1-hour daily maximum concentrations, averaged over 3 years

<sup>e</sup> Annual 4th-highest daily maximum 8-hour concentration, averaged over 3 years

<sup>f</sup> Annual mean

<sup>g</sup> 98th percentile of 24-hour daily average concentration, averaged over 3 years

<sup>h</sup> Annual mean, averaged over 3 years

<sup>i</sup> 98<sup>th</sup> percentile 1-hour daily maximum, averaged over 3 years

<sup>j</sup> ½-hour average not to be exceeded more than 2 times per year/½-hour average not to be exceeded more than 2 times in any five consecutive days

<sup>1</sup> The previous SO<sub>2</sub> standards (0.14 ppm 24-hour and 0.03 ppm annual) will additionally remain in effect in certain areas: (1) any area for which it is not yet 1 year since the effective date of designation under the current (2010) standards, and (2) any area for which an implementation plan providing for attainment of the current (2010) standard has not been submitted and approved and which is designated nonattainment under the previous SO<sub>2</sub> standards or is not meeting the requirements of a SIP call under the previous SO<sub>2</sub> standards (40 CFR 50.4(3)). A SIP call is an EPA action requiring a state to resubmit all or part of its State Implementation Plan to demonstrate attainment of the required NAAQS.

<sup>2</sup> The level of the annual NO<sub>2</sub> standard is 0.053 ppm. It is shown here in terms of ppb for the purposes of clearer comparison to the 1-hour standard level.

<sup>3</sup> Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O<sub>3</sub> standards additionally remain in effect in some areas. Revocation of the previous (2008) O<sub>3</sub> standards and transitioning to the current (2015) standards will be addressed in the implementation rule for the current standards.

<sup>4</sup> In areas designated nonattainment for the Pb standards prior to the promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 µg/m<sup>3</sup> as a calendar quarter average) also remain in effect.

-- Values not included in NAAQS and were not calculated.

Source: EPA 2016a and WDEQ-AQD 2016a

completion of a finalized draft, the request will be submitted to EPA. The final determination has not been made at this time.

### 3.1.3 Background

The most recent WDEQ-AQD air quality permit (P0014896) for the BAM was issued on June 3, 2015. This air quality permit was approved based on an analysis using emission factors, estimation methods, and model selection consistent with WDEQ-AQD policy and limits annual production to 35 Mt (WDEQ-AQD 2015).

An inventory of all point sources, controls, and emissions for air quality permit P0014896 showed a maximum potential to emit 37.9 tons per year (tpy); therefore, as determined by a comparison with values presented in Chapter 6, Section 3 of the Wyoming Air Quality Standards and

Regulations (WAQSR), a PSD increment consumption analysis was not necessary. Also, as determined by a comparison with values presented in WAQSR, the BAM is not subject to the Title V Operating Permit program due to the low (below 100 tpy) potential to emit (WDEQ-AQD 2015). Regulated air pollutants associated with coal extraction and processing activities and coal combustion include:

1. Particulates (fugitive dust) generated from mining activities such as blasting, excavating, loading and hauling of overburden and coal, and wind erosion of disturbed and unreclaimed mining areas;
2. NO<sub>2</sub> produced from overburden and coal blasting;
3. CO, NO<sub>x</sub>, particulates (PM<sub>10</sub> and PM<sub>2.5</sub>), SO<sub>2</sub>, and volatile organic compounds (VOCs) from gasoline and diesel vehicle tailpipe emissions;
4. CO, SO<sub>2</sub>, VOCs, NO<sub>2</sub> and PM<sub>10</sub> emissions from diesel railroad locomotives used to haul coal; and
5. SO<sub>2</sub>, NO<sub>x</sub>, CO, and VOCs produced from power plants. The closest coal-fired power plants to the BAN tract are the Wyodak/Wygen/Neil Simpson complex located approximately 12 miles north-northeast of the BAN tract, the Dry Fork Station plant located approximately 17 miles north of the BAN tract, and the Dave Johnston plant located approximately 90 miles south-southwest of the BAN tract; however, they are not supplied by BAM produced coal. The closest BAM-supplied power plant is the Gerald Gentleman Station, located in Sutherland, Nebraska, approximately 375 miles from the mine. Power plants supplied by the BAM are listed in **table 2-2**.

### 3.1.4 Existing Belle Ayr Mine Air Quality Summary

Baseline air quality data for the surface facilities area at the BAM are found in the **section 3.4** of the 2009 SGAC EIS. The air quality of any region is controlled primarily by the magnitude and distribution of pollutant emissions and the regional climate. The transport of pollutants from specific source areas is strongly affected by local topography. In the mountainous western U.S., topography is particularly important in channeling pollutants along valleys, creating upslope and downslope circulations that may entrain airborne pollutants, and blocking the flow of pollutants toward certain areas. In general, local effects are superimposed on the general weather regime and are most important when the large-scale wind flow is weak.

The BAM is located in the east-central portion of the PRB, a part of the Northern Great Plains that includes most of northeastern Wyoming. The topography is primarily rolling plains and tablelands of moderate relief (with occasional valleys and buttes). Elevations range from about 4,520 ft to 4,885 ft above sea level. The climate in the general area is semiarid with relatively short warm summers and longer cold winters. Evaporation exceeds annual precipitation.

The following discussions include updated (2009-2016) air quality monitoring results. Observed 24-hour PM10 concentrations as maximum high values were selected to compare to applicable NAAQS/WAAQS.

#### 3.1.4.1 Air Quality-Monitoring Values

Particulate matter levels have been monitored around the mine throughout the life of the operation. The mine expressed particulate matter utilizing total suspended particles (TSP)

concentrations until 1987. This measurement included all particulates generally less than 100 microns in diameter. In 1987, the form of the standard was changed from TSP to  $PM_{10}$  to better reflect human health effects. While  $PM_{2.5}$  monitoring at the BAM is not required by WDEQ-LQD, it is conducted at this time. Currently, air monitoring consists of four samplers that monitor concentrations of  $PM_{10}$  and a meteorological site (**map 3-2**). In 1997, EPA set separate standards for fine particles ( $PM_{2.5}$ ) based on their link to health problems. EPA adopted an interim  $PM_{2.5}$  standard in April 2005, and that standard was later modified in September 2006.

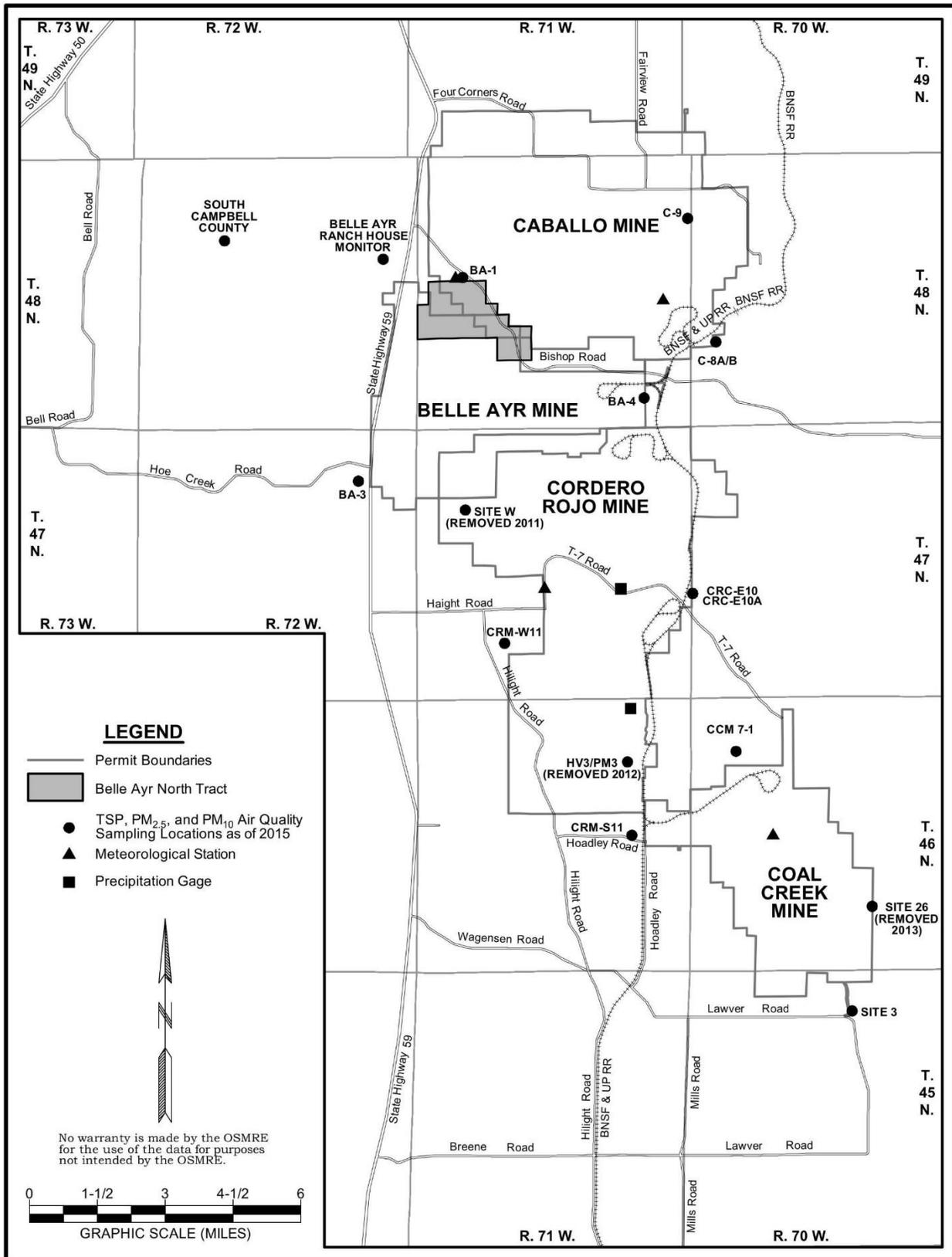
That year, EPA again revised the air quality standards for particulate matter by tightening the 24-hour  $PM_{2.5}$  standard from the previous level of 65 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) to 35  $\mu\text{g}/\text{m}^3$  and vacating the annual  $PM_{10}$  standard of 50  $\mu\text{g}/\text{m}^3$ . The current  $PM_{10}$  standard is 150  $\mu\text{g}/\text{m}^3$ . In 2012, EPA lowered the primary annual  $PM_{2.5}$  standard to 12  $\mu\text{g}/\text{m}^3$ .

**Tables 3-2 and 3-3** respectively list the BAM current annual mean and annual high  $PM_{10}$  concentrations. The average annual  $PM_{10}$  concentrations for the 2009 through 2016-time period ranged between 7.6 and 21.2  $\mu\text{g}/\text{m}^3$ . These concentrations ranged from about 15 to 42 percent of the annual standard of 50  $\mu\text{g}/\text{m}^3$ . During the same time period, the 24-hour high  $PM_{10}$  values ranged between 23 and 69  $\mu\text{g}/\text{m}^3$ . Thus, these maximum concentrations have ranged from approximately 15 to 46 percent of federal and WDEQ-AQD 24-hour standards of 150  $\mu\text{g}/\text{m}^3$ .

While  $PM_{2.5}$  monitoring is not required by WDEQ-AQD, data were gathered at the BAM.  $PM_{2.5}$  data from BA-4 (#56-005-0892) gathered between 2009 and 2016 are shown in **table 3-4**. Exceptional events (if observed) are noted in the data acquired from the EPA database. Exceptional events are defined as occasional instances where a natural and exceptional occurring event impacts monitoring, causing a reading that is in exceedance with the NAAQS (GPO 1998). In the case that this occurs, the Final “Treatment of Data Influenced by Exceptional Events” Rule (40 CFR §50.14) allows the state to request a data flag and justify the flag by submitting documentation showing that NAAQS exceedance would not have occurred in the absence of a natural/exceptional event. According to WDEQ-AQD, on July 4, 2012, smoke from the Fontenelle Fire, Ask Creek Fire, Arapahoe Fire, and several smaller eastern Wyoming wildfires converged on monitors in eastern Wyoming, including BA-4 at the Belle Ayr Mine (WDEQ-AQD 2012b). The maximum  $PM_{2.5}$  reading of 55  $\mu\text{g}/\text{m}^3$  recorded at BA-4 on that day was flagged as an exceptional event. While WDEQ-AQD elected not to certify the 2012 data from the Belle Ayr Mine BA-4 because of difficulties with the monitor, WDEQ-AQD does believe that data from July 4, 2012 are valid and it was an exceptional event (WDEQ-AQD 2012b). Regardless of the exceptional event that exceeded the threshold of 35  $\mu\text{g}/\text{m}^3$ , the 3-year  $PM_{2.5}$  average was still below the standard, which kept the monitor in attainment of the 24-hour  $PM_{2.5}$  NAAQS.

Excluding the exceptional event that occurred on July 4, 2012, monitoring during the period of 2009-2016 demonstrated that ambient concentrations of  $PM_{2.5}$ , as determined by the 98th Percentile 24-hour standard and annual weighted average values, were within established short-term (24-hour) and long-term (annual) NAAQS and WAAQS values indicated in **table 3-1**.

Gases that contain nitrogen and oxygen in varying amounts are referred to as nitrogen oxides, or  $NO_x$ . One type of  $NO_x$  is  $NO_2$ , which is a highly reactive, reddish-brown gas that is heavier than air and has a pungent odor that is a product of incomplete combustion of gasoline or diesel fuel.  $NO_2$  is by far the most toxic of several species of  $NO_x$ .  $NO_2$  can combine with atmospheric moisture to form nitric acid and nitric oxide. Because several  $NO_x$  species can be chemically



**Map 3-2. Coal Mine Subregion 2 (Middle Group of Mines) Air Quality Monitoring Sites**

**Table 3-2. Average Annual PM<sub>10</sub> Concentrations<sup>1</sup> (µg/m<sup>3</sup>) for the BAM, 2010-2016**

Site Name/AQS <sup>2</sup> Site ID	2009	2010	2011	2012	2013	2014	2015	2016
Belle Ayr Ranch House Monitor/56-005-	-- <sup>3</sup>	--	--	--	8.9	11.4	9.4	8.2
BA-1/56-005-0802	8.2	10.1	10.1	9.9	8.1	9.7	10.7	9.3
BA-3/56-005-0893	7.6	8.9	9.5	9.7	8.4	8.4	9.8	7.9
BA-4/56-005-0892	15.0	15.9	21.2	17.5	14.0	12.8	15.1	13.0
Coal Production (Mtpy)	28.7	25.8	24.6	24.2	18.3	15.8	18.3	14.8
Overburden Removed (Mbcy <sup>4</sup> )	97.1	88.6	90.3	91.7	81.6	67.9	79.3	53.9

<sup>1</sup> Weighted mean<sup>2</sup> AQS - Air Quality System<sup>3</sup> Site activated in 2013<sup>4</sup> Mbcy = million bank cubic yards

Source: EPA 2017c

**Table 3-3. Maximum 24-hour PM<sub>10</sub> Concentrations<sup>1</sup> (µg/m<sup>3</sup>) for the BAM, 2010-2016**

Site Name/AQS <sup>2</sup> Site ID	2009	2010	2011	2012	2013	2014	2015	2016
Belle Ayr Ranch House Monitor/56-005-0898	-- <sup>3</sup>	--	--	--	23.0	43.0	49.0	31.0
BA-1/56-005-0802	28.0	29.0	51.0	45.0	27.0	28.0	49.0	44.0
BA-3/56-005-0893	25.0	31.0	46.0	48.0	34.0	38.0	52.0	27.0
BA-4/56-005-0892	50.0	55.0	69.0	56.0	39.0	43.0	66.0	38.0
Coal Production (Mtpy)	28.7	25.8	24.6	24.2	18.3	15.8	18.3	14.8
Overburden Removed (Mbcy <sup>4</sup> )	97.1	88.6	90.3	91.7	81.6	67.9	79.3	53.9

<sup>1</sup> First maximum value<sup>2</sup> AQS - Air Quality System<sup>3</sup> Site activated in 2013<sup>4</sup> Mbcy = million bank cubic yards

Source: EPA 2017c

**Table 3-4. Measured PM<sub>2.5</sub> Concentrations (µg/m<sup>3</sup>) at Site BA-4 (56-005-0892), 2009-2016 (98th Percentile 24-hour Standard & Annual Average).**

	2009	2010	2011	2012	2013	2014	2015	2016
<b>24-hour<sup>1</sup></b>	11.6	16.5	20.4	55.3 <sup>2</sup> /24.4	13.5	10.1	17.5	13.8
<b>Annual<sup>1</sup></b>	5.1	6.6	5.3	7.9	6.4	5.2	5.0	4.6 <sup>3</sup>

The 24-hour standard is met when the 98th percentile 24-hour concentration, as determined by Appendix N of 40 CFR Part 50 is less than or equal to 35 µg/m<sup>3</sup>. The annual standard is met when the arithmetic mean concentration, as determined by Appendix N of 40 CFR Part 50, is less than or equal to 12 µg/m<sup>3</sup>.

<sup>2</sup> An exceptional event (defined above) was flagged on July 4, 2012. The second number indicates the second highest reading for the year.<sup>3</sup> Indicates the mean does not satisfy minimum data completeness criteria.

Source: EPA 2017c

converted to NO<sub>2</sub> in the atmosphere, NO<sub>2</sub> emissions control is focused on all NO<sub>x</sub> species, while the ambient standard is expressed in terms of NO<sub>2</sub>. Ozone (O<sub>3</sub>) has been included in discussions on emissions of NO<sub>x</sub> since NO<sub>x</sub> is one of the main ingredients involved in the formation of ground-level O<sub>3</sub>. Ground-level O<sub>3</sub> is not emitted directly into the air, but is created by chemical reactions between NO<sub>x</sub> and VOCs in the presence of sunlight.

Annual mean NO<sub>2</sub> concentrations have been measured periodically in the PRB since 1975 and short-term, 1-hour concentrations have been measured since the promulgation of the 1-hour NAAQS. WDEQ-AQD relies on monitoring data from a network of samplers set up by industry, in cooperation with the State of Wyoming, in lieu of modeling to establish compliance with the 1-hour NO<sub>2</sub> NAAQS. All data collected in the PRB (**table 3-5**) were well below the relevant

**Table 3-5. Measured NO<sub>2</sub> Concentrations<sup>1</sup> in the PRB, 2009-2016**

AQS Site ID <sup>3</sup>	Site Name	2009	2010	2011	2012	2013	2014	2015	2016 <sup>4</sup>
56-005-0123	Thunder Basin Grassland	11	11	11	11	9	10	8	6
56-005-0800	Gillette	No data <sup>2</sup>	No data	39	32	No data	No data	No data	No data
56-005-0892	Belle Ayr BA-4	24	34	36	34	35	35	32	26
56-005-0011	Hilight-Reno Junction Gas Plant	No data	No data	No data	46	52	55	41	No data
56-005-0456	South Campbell County	29	32	33	32	32	32	32	28

<sup>1</sup> 98<sup>th</sup> Percentile 1-Hour NO<sub>2</sub> Concentrations (ppb)

<sup>2</sup> No Data - Less than 75 percent data available for the year

<sup>3</sup> See **map 3-2** for site locations

<sup>4</sup> Annual statistics for 2016 are not final until May 1, 2017

Source: EPA (2017b)

NAAQS (98<sup>th</sup> percentile concentration) of 100 ppb and, therefore, in compliance with the NO<sub>2</sub> NAAQS and WAAQS.

Under the Clean Air Act, EPA has set protective health-based standards for O<sub>3</sub>. Prior to May 27, 2008, the NAAQS 8-hour standard for O<sub>3</sub> was 0.080 ppm. O<sub>3</sub> monitoring is not required by WDEQ-AQD at the mines evaluated in the 2009 SGAC EIS, but levels have been monitored at WDEQ-AQD operated and maintained ambient air quality monitor sites in the PRB since 2001. An exceedance of the current O<sub>3</sub> 8-hour standard occurs if the 4<sup>th</sup>-highest daily maximum value is above the level of the current NAAQS and WAAQS standard (0.075 ppm prior to December 2014, 0.070 ppm after December 2014).

**Table 3-6** shows that no violations of the NAAQS or WAAQS 8-hour O<sub>3</sub> standards at the Thunder Basin National Grassland (56-005-0123) site, north of I-90, or the South Campbell County monitoring site (56-005-0456) site, south of I-90, during the 2009-2016 monitoring period. These monitoring locations are shown on **map 3-2**.

**Table 3-6. Measured O<sub>3</sub> Concentrations<sup>1</sup> in the PRB, 2009-2016.**

Monitor Site <sup>2</sup>	2009	2010	2011	2012	2013	2014	2015	2016
Thunder Basin Grassland 56-005-0123	0.062	0.063	0.061	0.071	0.061	0.058	0.059	0.057
South Campbell County 56-005-0456	0.060	0.061	0.062	0.069	0.061	0.059	0.062	0.060

<sup>1</sup> 4<sup>th</sup>-highest daily maximum value. The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm (235 µg/m<sup>3</sup>) is equal to or less than 1, as determined by Appendix H of 40 CFR Part 50.

<sup>2</sup> See **map 3-2** for site locations

Source: EPA (2017b)

SO<sub>2</sub> concentrations (99<sup>th</sup> percentile, 1-hour) are currently being monitored in Campbell County at one AQS monitoring site (**table 3-7**). This monitoring site is approximately 11 miles north the BAN tract (**map 3-1**). As shown in **table 3-7**, all monitored SO<sub>2</sub> values are well below the NAAQS and WAAQS of 75 ppb.

Annual mercury (Hg) (a HAP), Pb (a criteria pollutant), and CO (an indirect GHG) monitoring values are not collected specifically for the BAM. **Table 3-8** shows the Hg emissions from three coal fired power plants in Campbell County.

**Table 3-7. Measured SO<sub>2</sub> Concentrations in Campbell County, Wyoming, 2011-2016, 99th Percentile 1-Hour NO<sub>2</sub> Concentrations (µg/m<sup>3</sup>)**

AQS <sup>1</sup> Site ID <sup>2</sup>	Sampler ID	2011	2012	2013	2014	2015	2016
56-005-0857	Wyodak Site 4	37	39	37	32	16	14

<sup>1</sup> [AQS-Air Quality System](#)

<sup>2</sup> See [map 3-1](#) for location

Source: EPA (2017b)

**Table 3-8. Measured Annual Hg Stack (Air) Emissions from Power Stations in Campbell County (Pounds)**

Power Station	2011	2012	2013	2014	2015
<b>Wyodak Plant</b>					
Total Emissions	197.9	426.0	338.3	347.2	319.0
Stack (Air) Emission's	159.8	250.9	204.3	301.1	111.2
Percent of Total Emission Emitted to Air	81%	59%	60%	87%	35%
<b>Dry Fork Station</b>					
Total Emissions	71.0	84.0	86.0	69.0	66.7
Stack (Air) Emission's	63.0	67.0	67.0	50.0	38.3
Percent of Total Emission Emitted to Air	89%	80%	78%	72%	57%
<b>Neil Simpson Complex</b>					
Total Emissions	578.0	681.0	13,086.0 <sup>1</sup>	653.0	711.0
Stack (Air) Emission's	379.0	357.0	378.0	354.0	351.0
Percent of Total Emission Emitted to Air	66%	52%	3% <sup>1</sup>	54%	49%
<b>Total of Three Campbell County Power Stations</b>					
Total Emissions	846.9	1,191.0	13,510.3 <sup>1</sup>	1,069.2	1,096.7
Stack (Air) Emission's	601.8	674.9	649.3	705.1	500.5
Percent of Total Emission Emitted to Air	71%	57%	5% <sup>1</sup>	66%	46%

<sup>1</sup> 2013 Neil Simpson *total* emissions value on the EPA website appears to be incorrect given the significantly lower values in 2011, 2012, 2014, and 2015, so the percent of stack emissions compared to total emissions for 2013 calculations appears to be invalid

Source: EPA 2016b

**Table 3-9** shows the Pb emissions from three coal fired power plants, one mine, and one AQS monitoring site in Campbell County. As shown in **table 3-9**, the Pb values from the Thunder Basin site (the only station reporting in µg/m<sup>3</sup>) are well below the NAAQS and WAAQS of 0.15 µg/m<sup>3</sup>.

**Table 3-9. Measured Annual Pb Air Emissions from Three Campbell County Power Stations and One Campbell County Coal Mine<sup>1</sup>**

Power Station	2011	2012	2013	2014	2015
Wyodak Plant (pounds)	20.5	42.6	43.1	35.3	33.2
Dry Fork Station (pounds)	32.0	9.0	9.0	21.0	8.6
Neil Simpson Complex (pounds)	63.0	62.0	60.0	31.0	24.0
Buckskin Mining Co (pounds)	18.0	15.9	8.1	9.2	6.6
Thunder Basin (560050123) (µg/m <sup>3</sup> ) <sup>2</sup>	0.005	0.002	0.002	0.001	0.002

<sup>1</sup> No other Campbell County Coal mines are monitoring for Pb

<sup>2</sup> Pb monitoring at the Thunder Basin AQS site is presented as annual 1st maximum value

Source: EPA 2017c

CO is created when carbon-containing fuels are burned incompletely. Through natural processes in the atmosphere, it is eventually oxidized to CO<sub>2</sub>. Carbon monoxide concentrations are both

short-lived in the atmosphere and spatially variable (EPA 2017a). CO is not monitored in Campbell County.

#### 3.1.4.2 Air Quality Related Values (AQRVs)

AQRVs are evaluated by the land management agency responsible for a Class I area, according to the agency's level of acceptable change (LAC). These AQRVs include potential air pollutant effects on visibility and the acidification of lakes and streams. The AQRVs, and the associated LAC, are applied to PSD Class I and sensitive Class II areas and are the land management agency's policy and are not legally enforceable standards. The AQRVs associated with this action include visibility and acidification of lakes. The environmental effects to BAN tract associated with AQRVs were thoroughly discussed in **section 3.4.4** of the 2009 SGAC EIS. As determined by air quality modeling, the potential to emit (PTE) for the BAM for PM<sub>10</sub> is 37.9 tons per year based on emissions from coal truck dumps and stationary emission units, while the PTE for NO<sub>x</sub> is 6.8 tons per year. Because these values are each below the 100 ton per year major source threshold limit specified in Chapter 6, Section 3 of the Wyoming Air Quality Standards and Regulations, the BAM is not subject to the Title V operating permit program, and it is a minor source for purposes of Chapter 6, Section 4 applicability (McVehil-Monnett 2014). The potential for impacts has decreased because the annual mining activity levels evaluated in the 2009 SGAC EIS (mining at a 30 Mtpy rate) are now being evaluated at lower mining rate (20 Mtpy). The locations of activities described in **chapter 2** remain the same as those described in the 2009 SGAC EIS. From 2009 through 2016, the annual coal recovery at the BAM ranged from 28.7 Mt in 2009 to 14.9 Mt in 2016, averaging 22.2 Mtpy over that time period (CCW 2016). Therefore, the affected environment discussions for AQRVs are not carried forward.

#### 3.1.4.3 Hazardous Air Pollutants (HAPs)

Hazardous air pollutants (HAPs) are those pollutants that are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects or adverse environmental effects. Hg is the most significant HAP emitted from coal-fueled power plants (Center for Climate and Energy Solutions 2017). Other common HAPs include xylene, n-hexane, acetaldehyde, acrolein, benzene, 1,3 butadiene, formaldehyde, Ethylbenzene, Toluene; however, these would likely be emitted in very small quantities and not exceed the 25 tpy threshold established by the Mercury and Air Toxics Standard. Hg is a naturally occurring element that enters the environment as a result of natural sources and through human activities, such as industrial combustion and mining (EPA 2006). It is estimated that 50 percent of the Hg entering the atmosphere in the U.S. is emitted from coal-burning utility power plants (Kolker et al. 2012). Discussions of this subject are included in **sections 4.1.17** and **4.2.17**, as related to the environmental impacts from the Proposed Action and No Action Alternative.

Annual Hg monitoring values are not collected specifically for the BAM. No Campbell County or Wyoming power plants are supplied by the BAM. The closest BAM supplied power plant is the Gerald Gentleman Station, located in Sutherland, Nebraska, approximately 375 miles from the mine. In 2015, the mine supplied coal to 34 coal-fired power plants **Table 3-10**, which also shows the Hg emissions from these 34 coal fired power plants.

**Table 3-10. Measured 2015 Hg Air Emissions from Power Stations Receiving Coal From the BAM (Pounds)**

FACILITY NAME	CITY	ON-SITE RELEASE TOTAL	OFF-SITE RELEASE TOTAL	TOTAL RELEASES	% of Coal From BAM	Releases Attributed to BAM
Allen S King Generating Plant	Bayport, MN	20.6	210.3	230.9	9.2%	21.2
Baldwin Energy Complex	Baldwin, IL	236.9	10.3	247.2	21.6%	53.4
Boardman Plant	Boardman, OR	119.2	0.0	119.2	78.5%	93.6
Coffeen Power Station	Coffeen, IL	186.8	0.0	186.8	27.6%	51.6
Columbia Energy Center	Pardeeville, WI	254.6	0.0	254.6	13.1%	33.5
Comanche Station	Pueblo, CO	459.0	0.0	459.0	2.6%	12.0
Dan E Karn	Essexville, MI	213.2	0.0	213.2	43.7%	93.1
Edgewater Generating Station	Sheboygan, WI	27.8	79.2	107.1	3.1%	3.3
Flint Creek Plant	Gentry, AR	184.0	9.4	193.4	5.6%	10.8
George Neal North	Sergeant Bluff, IA	122.0	0.0	122.0	13.8%	16.9
George Neal South	Salix, IA	85.0	0.0	85.0	48.9%	41.5
Gerald Gentleman Station	Sutherland, NE	630.0	0.0	630.0	41.7%	262.7
Havana Power Station	Havana, IL	23.3	8.0	31.3	26.0%	8.2
Hawthorn Generating Facility	Kansas City, MO	190.0	1,659.0	1,849.0	13.1%	242.2
Iatan Generating Station	Weston, MO	433.0	0.0	433.0	26.4%	114.4
J H Campbell Generating Plant	West Olive, MI	477.3	0.0	477.3	34.5%	164.4
James H Miller Steam Plant	Quinton, AL	681.0	0.0	681.0	2.2%	14.8
John W Turk Jr Plant	Fulton, AR	212.0	1.0	213.0	1.3%	2.8
Joppa	Joppa, IL	198.4	0.0	198.4	0.6%	1.2
La Cygne Generating Station	La Cygne, KS	362.0	0.0	362.0	9.0%	32.4
Louisa Generating Station	Muscatine, IA	161.0	0.0	161.0	25.7%	41.3
Montrose Generating Station	Clinton, MO	111.0	0.0	111.0	7.2%	8.0
Muscatine Power & Water Generation	Muscatine, IA	30.0	12.4	42.4	33.1%	14.0
Oologah	Oologah, OK	413.2	1.5	414.7	2.5%	10.4
Ottumwa Generating Station	Ottumwa, IA	50.6	406.6	457.1	49.2%	224.8
Platte Generating Station	Grand Island, NE	21.4	3.8	25.2	91.8%	23.1
Prairie Creek Generating Station	Cedar Rapids, IA	6.9	3.3	10.2	74.7%	7.6
Shady Point LLC	Panama, OK	2.0	367.0	369.0	2.3%	8.6
Sheldon Station	Hallam, NE	74.0	0.0	74.0	3.8%	2.8
Sherburne County Generating Plant	Becker, MN	974.5	0.0	974.5	1.3%	12.4
Walter Scott Jr Energy Center	Council Bluffs, IA	578.0	0.0	578.0	12.0%	69.5
Welsh Plant	Pittsburg, TX	296.1	1,874.0	2,170.1	7.5%	163.8
Western Farmers Electric Coop	Hugo, OK	72.4	0.0	72.4	1.5%	1.1
White Bluff Generating Plant	Redfield, AR	311.1	0.0	311.1	41.4%	128.8

Source: EPA (2017)

### 3.1.4.4 Greenhouse Gases (GHGs) and Climate Change

Following publication of the draft EA, OSMRE has determined that a revised GHG and climate change assessment would provide useful information to the decision maker and the public. The direct, indirect, and cumulative impacts (**chapters 4**) were revised, which required revising the affected environment.

This document assesses the effects of the proposed action on climate change and the effect of climate change on the proposed action and its environmental impacts through assessment of direct and indirect GHG emissions as a proxy for the assessment of potential climate change effects.

Executive Order 13693 defines GHGs as carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), and fluorinated gases (hydrofluorocarbons, perfluorocarbons, nitrogen trifluoride, and sulfur hexafluoride). These constituents are referred to as GHGs throughout the analysis. For consistency between projects, OSMRE describe GHG emissions in terms of “CO<sub>2</sub>-equivalents” (CO<sub>2</sub>e). For climate, climate change, and GHG analysis, there is no specific analysis area, and project emissions are used as a proxy.

CO<sub>2</sub> is emitted from the combustion of fossil fuels, including coal. CH<sub>4</sub> can be emitted during the production and transport of coal. N<sub>2</sub>O is emitted during agricultural and industrial activities as well as during combustion of fossil fuels and solid waste. Fluorinated gases are synthetic, powerful greenhouse gases that are emitted from a variety of industrial processes. CO<sub>2</sub> and other GHGs are naturally occurring gases in the atmosphere; their status as a pollutant is not related to their toxicity, but instead is due to the added long-term impacts they may have on climate because of their increased incremental levels in the earth’s atmosphere. Because they are non-toxic and non-hazardous at normal ambient concentrations, CO<sub>2</sub> and other naturally occurring GHGs do not have applicable ambient standards or emission limits under the major environmental regulatory programs. Each GHG has a different lifetime in the atmosphere and a different ability to trap heat in the atmosphere. To allow different gases to be compared and added together, emissions can be converted into carbon dioxide equivalent (CO<sub>2</sub>e) emissions. This measure is used to compare the capacity of each GHG to trap heat (Global Warming Potential, or GWP) in the atmosphere relative to that of CO<sub>2</sub>, which is used as a reference gas. The CO<sub>2</sub>e for a gas is derived by multiplying the amount of gas emitted by its 100-year GWP conversion factor (CEC 2011). The GWP conversion factor for the three primary GHGs are provided in **table 3-11**.

**Table 3-11. Global Warming Potential (as CO<sub>2</sub>e) Conversion Factors for Selected GHGs**

GHG	Conversion Factor
Carbon dioxide CO <sub>2</sub>	1
Methane CH <sub>4</sub>	28
Nitrous oxide N <sub>2</sub> O	265

Estimates related to mining include emissions from all sources, including all types of carbon fuels used in the mining operations, electricity used on site (i.e., lighting for facilities, roads, and operations and electrically powered equipment and conveyors), the mining processes (i.e., blasting, coal fires caused by spontaneous combustion, and methane released [vented] from exposed coal seams), and coal combustion. Direct CO<sub>2</sub>e emissions include emissions directly related to the recovery of coal and indirect emission result from the transportation of the coal to and combustion of the coal at power plants. Although the BAM has not completed CO<sub>2</sub>e

emissions inventories resulting from current coal recovery, these emissions were estimated by applying CO<sub>2</sub>e emission ratios (CO<sub>2</sub>e per Mt of coal produced, per mmbcy of overburden moved, and CO<sub>2</sub>e per acre of disturbance) from adjacent mines to recent BAM production (tonnages). This assumes that since mining methods and circumstances are similar, the estimated CO<sub>2</sub>e emission ratios for the BAM would be similar to the calculated ratios at adjacent mines. Annual direct CO<sub>2</sub>e emissions estimates for the BAM between 2009 and 2016 are included in **table 3-12**. The emissions estimates in **table 3-12** show that from 2009 through 2016 the estimated amount of direct CO<sub>2</sub>e emissions ranged between 105,093 and 203,019 metric tons per year, averaging approximately 150,939 metric tons per year from mining an annual average of 21.3 Mt of coal.

The amount of CO<sub>2</sub>e emitted from transporting and combustion of the coal was calculated using an emission factor that considered the carbon content and heating value of the fuel used (EPA 2017a). **Table 3-12** shows that the estimated amount of BAM indirect CO<sub>2</sub>e emissions between 2009 and 2016 ranged between 25,380,042 and 49,089,300 metric tons, averaging 36,459,839 metric tons per year.

Total CO<sub>2</sub>e emissions from coal mined at the BAM from 2009 through 2016 ranged between 25,485,134 and 49,292,319 metric tons, averaging 36,610,779 metric tons per year. Therefore, combustion of coal from the BAM used for electricity generation accounted for approximately 99.6 percent of the total CO<sub>2</sub>e emissions from coal mined between 2009 and 2016.

The potential for emissions of dust can be an environmental concern for coal use/transport project due to the large volumes of coal transported to large generating stations (Ramboll Environ 2016). Coal dust and fines blowing or sifting from moving, loaded rail cars has been linked to railroad track stability problems resulting in train derailments and to rangeland fires caused by spontaneous combustion of accumulated coal dust (BLM 2009). While no specific studies of coal dust impacts have been conducted in the PRB, BNSF has been involved in research regarding the impacts of coal dust escaping from loaded coal cars on rail lines in the PRB. BNSF has determined that coal dust poses a serious threat to the stability of the track structure and the operational integrity of rail lines in, and close to, the mines in the PRB.

## **3.2 Water Resources**

Section 3.5 and Section 3.5.2.1 (Surface Water-Affected Environment) of the 2009 SGAC EIS and section SI-5 of the supplementary information volume of the 2009 SGAC EIS included detailed discussions of water resources related to the leasing and mining of coal within the BAN tract. The analyses included herein serve to update discussions with recent groundwater and surface water quality monitoring findings and update groundwater and surface water rights discussions.

### **3.2.1 Groundwater**

Section 3.5.1.1 (Groundwater-Affected Environment) of the 2009 SGAC EIS provides a detailed discussion of the groundwater resources within the 2009 SGAC EIS, including the BAM. The BAN analysis area contains three water-bearing geologic units that have been directly affected by existing mining activities and would be directly affected by mining the BAN tract. In descending order, these units are the recent alluvium, the Wasatch Formation overburden, and the mineable coal seam in the Tongue River Member of the Fort Union Formation, referred to as the Wyodak

**Table 3-12. Estimated 2009-2016 Direct and Indirect CO<sub>2</sub>e Emissions<sup>1</sup> at the Belle Ayr Mine from Coal Combustion**

	2009	2010	2011	2012	2013	2014	2015	2016	Average
<b>General</b>									
Mt of Coal Recovered	28.7	25.8	24.6	24.2	18.3	15.8	18.3	14.8	21.3
Average Transport Miles (One Way)	1,090	1,090	999	1,009	1,003	1,073	1,009	1,030	1,038
Number of Train Trips (One Way)	1,852	1,666	1,589	1,566	1,180	1,021	1,184	959	1,377
<b>Direct Emissions Sources</b>									
Fuel	93,616	84,175	80,307	79,150	59,650	51,606	59,845	48,460	69,601
Electricity Consumed in Mining Process	76,514	68,798	65,636	64,691	48,753	42,178	48,913	39,608	56,886
Mining Process	32,888	29,572	28,213	27,806	20,956	18,130	21,024	17,025	24,452
<b>Total Direct Emissions</b>	<b>203,019</b>	<b>182,545</b>	<b>174,156</b>	<b>171,647</b>	<b>129,359</b>	<b>111,914</b>	<b>129,782</b>	<b>105,093</b>	<b>150,939</b>
<b>Indirect Emissions Sources</b>									
Rail Transport <sup>2</sup>	1,090,579	980,595	857,430	853,535	639,428	591,804	645,357	533,463	774,024
From Coal Combustion	47,998,721	43,158,092	41,174,862	40,581,642	30,583,694	26,459,231	30,683,704	24,846,578	35,685,816
<b>Total Indirect Emissions</b>	<b>49,089,300</b>	<b>44,138,687</b>	<b>42,032,291</b>	<b>41,435,178</b>	<b>31,223,122</b>	<b>27,051,035</b>	<b>31,329,060</b>	<b>25,380,042</b>	<b>36,459,839</b>
<b>Total Estimated CO<sub>2</sub>e Emissions</b>	<b>49,292,319</b>	<b>44,321,231</b>	<b>42,206,447</b>	<b>41,606,825</b>	<b>31,352,481</b>	<b>27,162,949</b>	<b>31,458,842</b>	<b>25,485,134</b>	<b>36,610,779</b>

<sup>1</sup> In metric tons<sup>2</sup> Coal haulage emissions based on 130-car trains with four locomotives, train trips per year; 488.2 kg CO<sub>2</sub>e per mile per loaded train, 96.1 Kg CO<sub>2</sub>e per mile per empty train; and one-way mileage to power plants. Coal haulage emissions calculations includes a loaded train and a returning empty train, per train trip.Source: WWC (2017), calculations are provided in **appendix E**

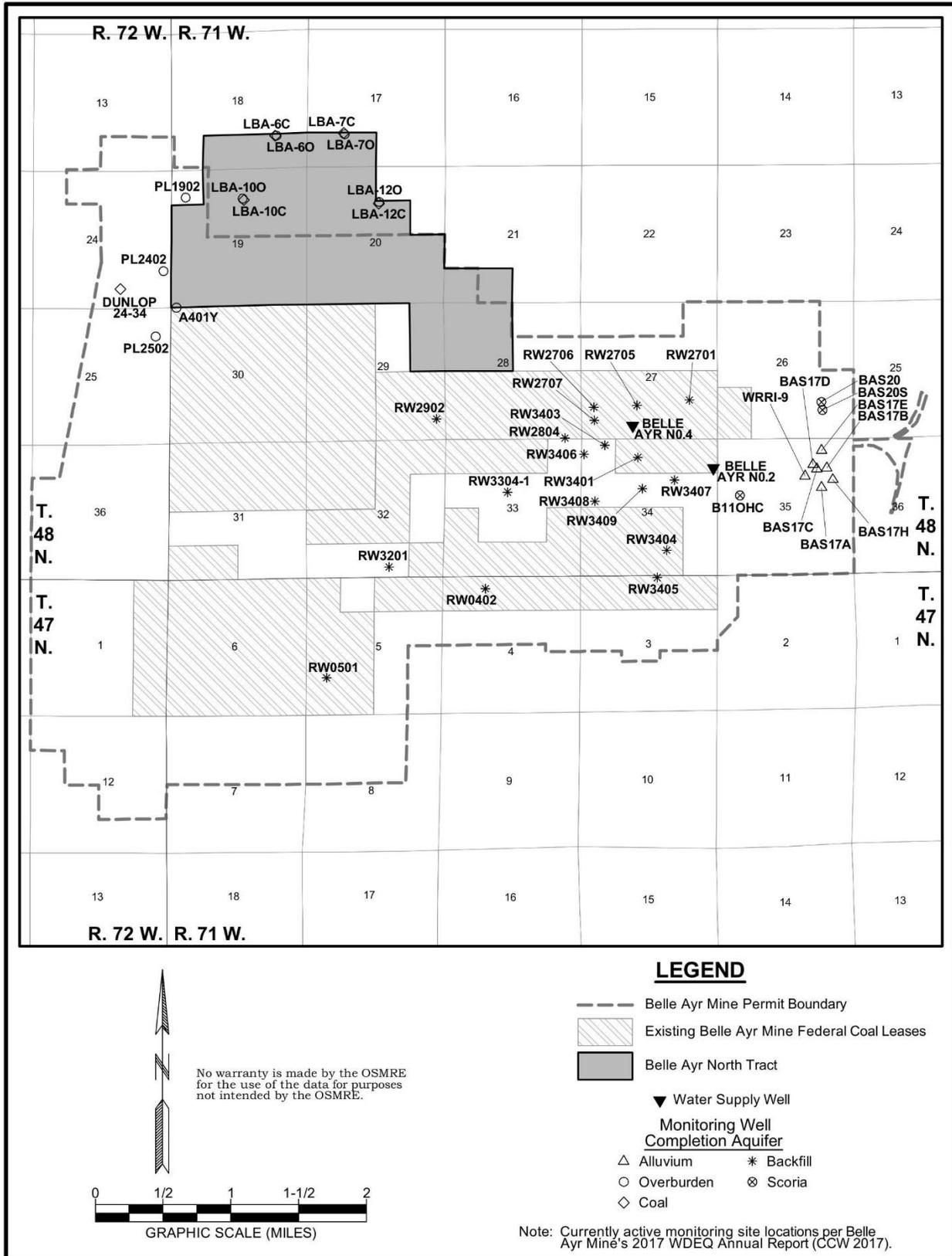
or Wyodak-Anderson. The underlying, sub-coal Fort Union Formation, the Lance Formation, and the Fox Hills Sandstone are used for water supply at local coal mines within the general BAN analysis area, but these units are not physically disturbed by mining activities and will not be addressed in this EA. New and previously discussed groundwater monitoring well locations are indicated on **map 3-3**. Monitoring wells are identified by well number and completion aquifer, such as recent alluvium, Wasatch Formation overburden, Wyodak/Wyodak-Anderson coal, backfill, or scoria.

Since the publication of the 2009 SGAC EIS, one new backfill monitoring well has been completed within the BAM permit boundary and added to the WDEQ-WQD approved groundwater-monitoring network for the BAM. Eleven monitoring wells (four overburden, one coal, and six alluvial) have been removed from the WDEQ-WQD monitoring network since the publication of the 2009 SGAC EIS. The removal of all of these wells resulted from pit advancement and their removal from the monitoring network was approved by WDEQ-WQD.

Following the removal of coal through the mining process, backfilled spoils create a backfill aquifer. These backfill aquifers will spatially lie between the clinker recharge area and the remaining coal that is too deep to be mined (Ogle et al. 2011). Studies described in the 2011 Cumulative Hydrological Impact Assessment (CHIA) indicate that permeability of the backfill may initially be greater than that for pre-mine strata; however, with time, the backfill may settle and the permeability decrease. These differences between the pre-mine and reclaimed aquifer characteristics may alter the groundwater flow system and may locally alter the location and amount of groundwater discharging to the surface (Ogle et al. 2011). According to recent monitoring data from 18 backfill wells, water levels in the backfill are increasing or stable (BAM 2017).

As stated in the 2009 SGAC EIS, groundwater quality varies according to the source aquifer. Alluvial, overburden and coal aquifer water quality is generally poor with uses limited to livestock and wildlife. The water quality from subcoal formations (Fort Union and Lance) is generally good, with livestock, wildlife, and domestic uses indicated (BLM 2009). According to groundwater-quality monitoring results included in the BAM 2016 Annual Report, groundwater quality analyzed during the January 8, 2015 through January 7, 2016 reporting period was similar to the previous reporting period (ACW 2016). Backfill water quality monitoring from 15 backfill wells show that total dissolved solids (TDS) levels ranged between 740 milligrams per liter (mg/L) and 5,850 mg/L, with an average of 3,005 mg/L. Three of the 15 wells had TDS concentrations over 5,000 mg/l, which is the maximum recommended level for livestock use (ACW 2016). The field pH in the backfill wells ranged from 5.9 to 8.4 standard units. Overall, the field pH in these backfill wells were generally within the 6.5 to 8.5 range recommended for livestock use. These water quality values are consistent with premine water quality discussions presented in Section 3.5.1.1 of the 2009 SGAC EIS (BLM 2009).

Groundwater level monitoring data collected by the BAM and the other three mines located in the general South Gillette Coal Lease Applications EIS analysis area and presented in the Gillette Area Groundwater Monitoring Organization (GAGMO) 35-Year Report indicate that the CBNG discharges have caused the coal potentiometric surface and flow patterns to change (Hydro-Engineering 2016). Groundwater level declines observed near active mining areas before 1997 were likely due to mine dewatering alone. The groundwater flow direction within the coal aquifer was typically toward the mine where it would drain by gravity into the open pits. By 2000,



**Map 3-3. Locations of Currently Active Groundwater Monitoring and Water Supply Wells at the BAM**

groundwater level decline rates had dramatically increased because drawdown caused by widespread CBNG development west of the mines was overlapping with drawdown caused by mining operations. A continuous cone of depression currently exists around the Belle Ayr, Coal Creek, Caballo, and Cordero Rojo mines due to their closeness to each other and the cumulative drawdown effects from pit dewatering and nearby CBNG discharges (Hydro-Engineering 2011). The extent of drawdown west of the mines that is specifically attributable to mine dewatering can no longer be defined due to much greater and areally extensive drawdown caused by CBNG development. However, current records of the Wyoming Oil and Gas Conservation Commission (WOGCC 2017) indicate that most, if not all, of the CBNG wells in the Duck Nest Creek watershed are no longer producing so the effects of CBNG production on groundwater levels are diminishing. Groundwater level monitoring is currently ongoing at the BAM, with data from 18 backfill wells providing information on water level changes.

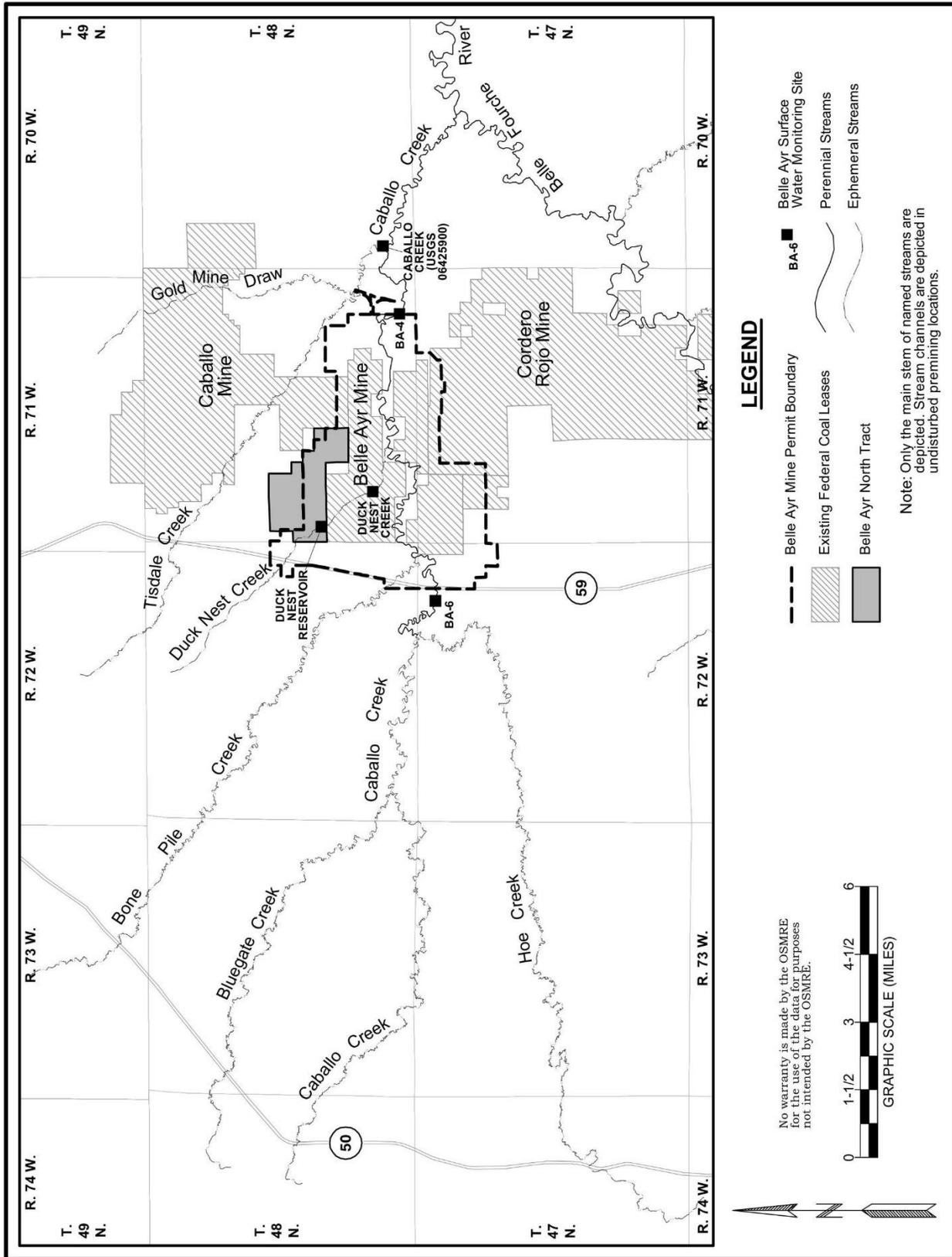
Coal seam water level data presented in the GAGMO 30-year report (Hydro-Engineering 2011) indicate that the greatest drawdown near the BAN tract is occurring near the western edge of the BAN LBA tract, while less drawdown is occurring near the tract's eastern edge. The 2010 coal seam water level contours in the area of the four mines depict the groundwater flow direction to be entirely to the west, away from the open pits. Roughly 39 years of surface mining and CBNG development resulted in nearly complete dewatering of the coal seams in localized areas, particularly near mine pits and where the coal seams are structurally highest.

### 3.2.2 Surface Water

A description of, and impacts to, surface water related to the BAN tract were thoroughly discussed in sections 3.5.2.1 and 3.5.2.2 of the 2009 SGAC EIS. The BAN analysis area and the existing BAM permit area are located in the Caballo Creek watershed. Duck Nest Creek, a southeasterly flowing ephemeral tributary of Caballo Creek, drains the southern and western portions of the BAN tract. Two small, first-order tributaries of Caballo Creek and two internally-confined playas drain or collect surface water from the remaining portion of the analysis area (**map 3-4**).

Streamflow and water quality in Caballo Creek are currently being monitored by the BAM at Sites BA-4 and BA-6 (**map 3-4**), which are located downstream and upstream of the mine operation, respectively, and the data are being reported to WDEQ in the mine's annual reports. Water quality is also being monitored at a site on Duck Nest Creek (**map 3-4**). No new surface water monitoring sites have been added to the WDEQ approved surface water monitoring network for the BAM since the publication of the 2009 SGAC EIS. Station BA-6 was moved from a temporary location to a permanent location upstream from the highway bridge on Caballo Creek.

A detailed analysis of flow conditions on Duck Nest Creek is not possible because the BAM has not established a continuous recording station along this drainage. The lower portion of the Duck Nest Creek drainage has been mined through and mining will continue to advance into the upper drainage (BAM 2015). The 2011 CHIA of coal mining in the middle Powder River Basin, Wyoming, indicated that CBNG activity occurring in the upper Duck Nest Creek watershed, could have potentially affected stream flows (Ogle et al. 2011). The current records of the Wyoming Oil and Gas Conservation Commission (WOGCC 2017) indicate that most, if not all, of the CBNG wells in the Duck Nest Creek watershed are no longer producing.



**Map 3-4. Surface Drainages and Belle Ayr Mine Surface Water Monitoring Sites Associated with the BAN Tract**

Surface water quality within the area depends highly on flow. Dissolved solids concentrations (TDS) and specific conductance have an inverse relationship with streamflow; thus, the highest concentrations occur during low flows and lowest concentrations occur during high flows. Total suspended solids (TSS) show a direct relationship with streamflow; TSS concentrations are typically high during high flow and low during low flows. Because vegetative cover is sparse and surface water runoff occurs infrequently in this semi-arid environment, high surface-water TSS concentrations can be expected, especially from runoff caused by thunderstorms.

Water quality within the area was also apparently affected by CBNG discharges in the upper watershed. The dominant water type of the Wyodak Anderson coal aquifer, which is the primary target for CBNG production, is mainly sodium-bicarbonate (Ogle et al. 2011). CBNG water and gas production in the Caballo Creek drainage peaked in 2000 and has been steadily declining over time and surface-water discharge related to CBNG production likely has less effect on surface-water quality within Caballo Creek, than in 2000.

Baseline (1977-1983) and current (2014-2016) analytical results for selected constituents from surface water samples at the BA-4, Duck Nest Creek, and U.S. Geological Survey (USGS) 06425900 (Caballo Creek at Mouth) sampling sites are included in **table 3-13**. As indicated in the 2011 CHIA of Coal Mining in the Middle Powder River Basin, Wyoming, the overall 2000 to 2010 water-quality data from the mouth of Caballo Creek indicated that class of use criteria was met during that time period and mining had not caused material damage to surface-water quality (Ogle et al. 2011).

A direct comparison between the baseline data and the recent data may not be appropriate due to the differences between the number of samples available for analysis. However, the sampling does show that, when sampled, the results of surface water quality in terms of TDS and TSS, do not exceed the maximum pre-mine conditions values.

### 3.2.3 Water Rights

The Wyoming State Engineer's Office (SEO) administers groundwater and surface-water rights in Wyoming. Before developing water resources associated with energy development, water appropriations in the PRB (either groundwater or surface water) were typically for livestock use. Currently, mining companies and CBNG development companies hold the majority of the water rights in the BAN analysis area.

SEO records were searched for groundwater and surface-water rights within a 3-mile radius of the BAN tract study area. This information is required for WDEQ permitting. The results of the most recent search are provided below for each tract.

For the BAN tract, SEO data indicate that as of September 2015, there were 1,188 permitted water wells within 3 miles of the tract, of which 771 are owned by coal mining companies. The other 417 non coal mine-related, permitted water wells, which include 327 wells permitted for uses related to CBNG development, are permitted for the following uses:

1. 189 CBNG
2. 128 CBNG, Livestock
3. 24 Livestock
4. 18 Domestic

**Table 3-13. Baseline and Recent (2014-2016) Water Quality for TDS and TSS at the Caballo Creek, BA-4, BA-6, and the Duck Nest Creek/Reservoir Sampling Sites**

Sample Site <sup>1</sup>	TSS Ave.	(mg/L) Max.	TDS Ave.	(mg/L) Max.
<b>Baseline<sup>2</sup></b>				
Caballo Creek (USGS 06425900)	1,422	14,500	1,816	4,600
Duck Nest Creek	57	401	829	4,100
<b>Recent</b>				
<b>2014</b>				
BA-4 (Three Samples)	44	132	1,178	1,520
BA-6 (Dry All Four Quarters)	--	--	--	--
Duck Nest Creek (Two Samples)	15	24	2,670	4,020
Duck Nest Reservoir (Not Sampled)	--	--	--	--
Caballo Creek (USGS 06425900) (Twelve Samples)	--	--	1,796	2,540
<b>2015</b>				
BA-4 (Four Samples)	10	38	1,353	1,650
BA-6 (Dry all Four Quarters)	13	13	2,820	2,820
Duck Nest Creek (Not Sampled) <sup>3</sup>	--	--	--	--
Duck Nest Reservoir (Two Samples)	21	36	2,540	2,800
Caballo Creek (USGS 06425900) (Twelve Samples)	29	29	2,076	2,930
<b>2016</b>				
BA-4 (Four Samples)	6	105	2,925	6,640
BA-6 (Dry all Four Quarters)	--	--	--	--
Duck Nest Creek (Not Sampled)	--	--	--	--
Duck Nest Reservoir	21	36	2,670	4,020
Caballo Creek (USGS 06425900) (Six Samples)	--	--	2,680	3,890

<sup>1</sup> See map 3-4 for sample site locations

<sup>2</sup> Caballo Creek: 1977-1983 (43 samples – TSS, 27 samples – TDS); Duck Nest Creek: 1990-2001 (22 samples – TSS, 21 samples – TDS)

<sup>3</sup> The Duck Nest Creek sampling site was mined out so sampling was moved to Duck Nest Reservoir, upstream of the original sampling site  
Source: USGS (2015) and BAM (2015, 2016, 2017)

5. 16 Monitor
6. 15 Domestic, Livestock
7. 8 Miscellaneous
8. 6 CBNG, Miscellaneous, Livestock
9. 5 Industrial
10. 4 CBNG, Miscellaneous
11. 1 Miscellaneous, Livestock
12. 1 Irrigation
13. 1 Irrigation, Livestock
14. 1 Domestic, Irrigation, Livestock

SEO records indicate that as of September 2015, there were 105 surface water rights within the 3-mile search area, of which 65 were owned by coal mining companies and were related to

industrial uses. The other 40 non-coal mine-related, permitted surface water rights are permitted for the following uses:

*Adjudicated (22)*

1. 9 Livestock
2. 6 Irrigation
3. 3 Domestic, Irrigation
4. 1 Domestic, Irrigation, Reservoir
5. 1 Irrigation, Reservoir
6. 1 Domestic, Livestock
7. 1 Irrigation, Livestock

*Unadjudicated (18)*

1. 6 Industrial
2. 5 Livestock
3. 2 Livestock, Wetlands
4. 1 Wetlands
5. 1 Industrial, Miscellaneous
6. 1 Irrigation
7. 1 Industrial, Other
8. 1 Fish Propagation, Livestock, Wildlife

### **3.3 Wildlife**

The initial wildlife baseline inventory for the BAM was conducted in 1974, with additional baseline monitoring conducted periodically since that time to accommodate permit expansions over the years. Biologists from ICF International (ICF, formerly Jones and Stokes and Thunderbird Wildlife Consulting) have conducted annual wildlife surveys at the BAM since 1984. Annual wildlife monitoring has been completed each year since the 2009 SGAC EIS was released in 2009 (ICF 2010 through 2016). An annual wildlife monitoring program was developed in 1983 for the BAM that included systematic and regular surveys for a variety of vertebrate species and aquatic invertebrates. Baseline wildlife conditions within the BAN tract were thoroughly discussed in section 3.10 of the 2009 SGAC EIS. As outlined in current annual wildlife reports, the use areas for big game, other mammals, upland game birds (excluding the GRSG), other birds, reptiles and amphibians, and aquatic species populations have not changed in recent years (ICF 2017). Since there have been no significant changes in use areas for these species, the discussion presented in the 2009 SGAC EIS are sufficient to address the current conditions. There have been changes in discussions related to raptor nest locations, GRSG, threatened, endangered, and candidate (T&E) species, BLM sensitive species. Therefore, discussions of these specific sensitive species have been updated in chapter 3.

### 3.3.1 Raptors

The 2016 wildlife annual report identified the location and annual status of raptor nests for 2016 (ICF 2017). Surveys conducted by ICF between 1984 and 2016 have documented eight raptor species (golden eagle [*Aquila chrysaetos*], ferruginous hawk [*Buteo regalis*], northern harrier [*Circus cyaneus*], red-tailed hawk [*Buteo jamaicensis*], Swainson's hawk [*Buteo swainsoni*], great horned owl [*Bubo virginianus*], burrowing owl [*Athene cunicularia*], and short-eared owl [*Asio flammeus*]) nesting at least once within the BAN tract raptor survey area. The raptor survey area is defined as a 2-mile radius around the BAN tract (**map 3-5**).

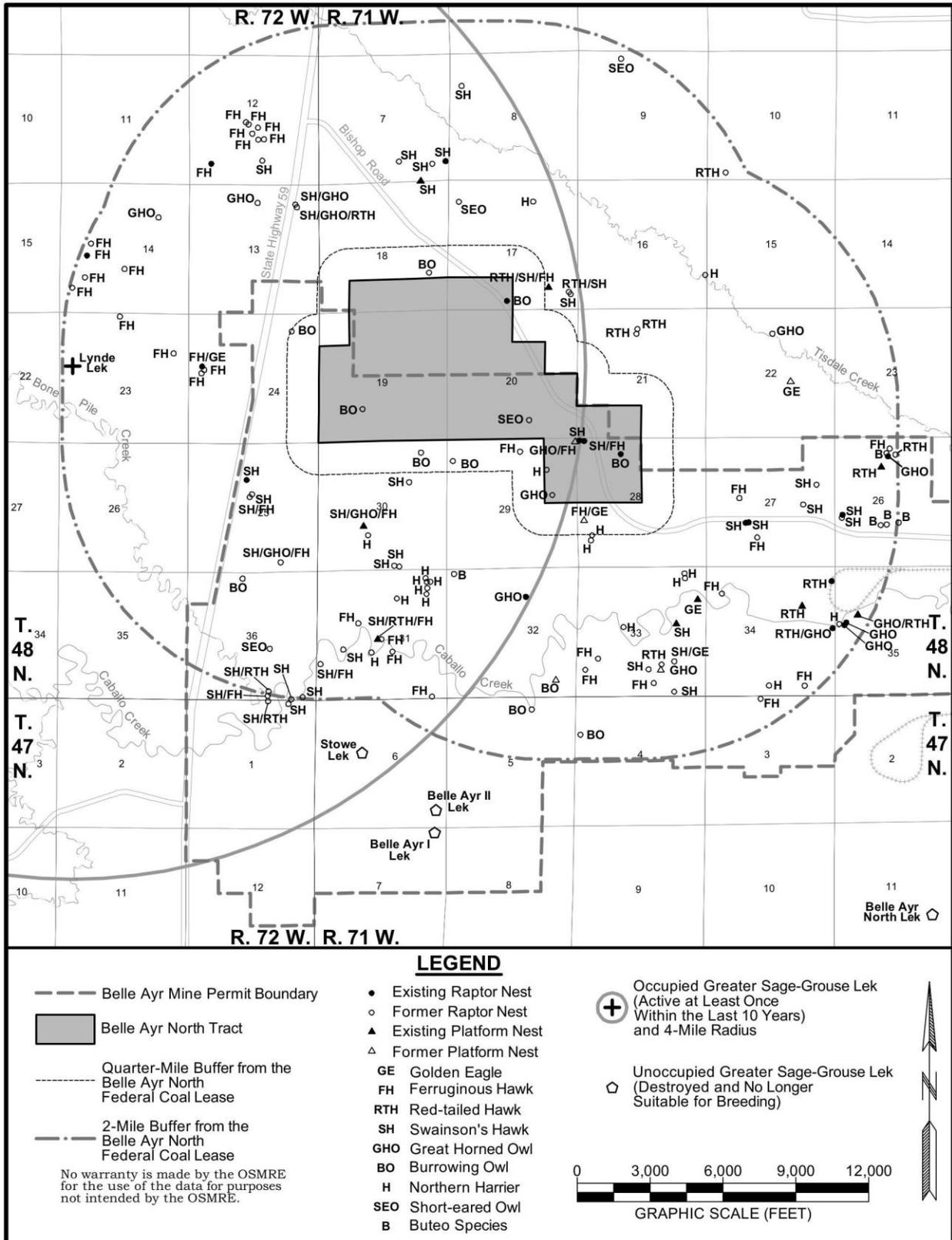
As detailed in the 2009 SGAC EIS, 38 intact raptor nests were located within the BAN tract raptor survey area; three of these nests were within the BAN tract. In 2016, 42 intact raptor nests were present within the raptor survey area. The three raptor nests present within the tract in 2008 were intact on the BAN tract in 2016. One additional burrowing owl nest location has been identified within the tract. A platform nest used in the past by ferruginous hawks and golden eagles within 0.25 mile of the BAN tract was removed in 2016. All intact raptor nests except the previously located burrowing owl nest site are already encompassed by the existing BAM permit area. The location and status of these nests as of 2016 are included on **map 3-5**.

### 3.3.2 Greater Sage-Grouse (GRSG)

On September 22, 2015, USFWS determined that listing the GRSG as an endangered or threatened species under the Endangered Species Act (Act) was not warranted (USFWS 2015a). Recent documents regarding GRSG include the Wyoming Greater Sage-Grouse Amendment (BLM 2015a), the Approved Resource Management Plan and Final Environmental Impact Statement for the Buffalo Field Office Planning Area (Buffalo RMP/FEIS) (BLM 2015b), and the 2015 State of Wyoming Executive Department Executive Order 2015-4 (State of Wyoming Executive Department 2015). These documents present management procedures to consolidate GRSG protection within the State of Wyoming in light of the federal government's recent decision not to list the GRSG under the ESA.

According to the Buffalo RMP/FEIS, the BAN tract is within an area classified as a general habitat management area (GHMA) for GRSG (BLM 2015a). This classification prohibits or restricts surface-disturbing and disruptive activities within 0.25 mile of the perimeter of occupied GRSG leks.

No GRSG leks occur within 0.25 mile of the BAN tract. Only one GRSG lek (Lynde) has been documented within 2 miles of the BAN tract during previous wildlife surveys conducted for the BAM and adjacent Caballo mines (**map 3-5**). The Lynde Lek was last confirmed active in 2009 and is currently classified by the WGFD as occupied (WGFD 2016a). One male GRSG was observed approximately 1-mile south of the Lynde Lek in 2009. No other occupied leks are located within 4 miles of the tract. The 4-mile radius of concern represents the area in which two-thirds of the hens that were bred at a lek would be expected to nest. Three additional GRSG leks are present approximately 2.5 miles south of the BAN tract: Belle Ayr I, Belle Ayr II, and Stowe (**map 3-5**). The proximity of the leks to one another indicates that they are within the same complex (Belle Ayr Complex). As of 2016, all three leks are classified as unoccupied/destroyed as all three leks have been inactive since at least 2005.



**Map 3-5. Raptor Nest Sites and Greater Sage-Grouse Leks within and Adjacent to the BAN Tract**

According to ICF personnel, no GRSG nests or broods have been encountered in the BAN tract study area incidental to surveys conducted for other species (ICF 2017). Additionally, no GRSG have been observed in that area during winter, although site visits occur less often at that time of year.

### 3.3.3 Threatened, Endangered, and Candidate Species, and Special Status Species

#### 3.3.3.1 Threatened, Endangered, and Candidate Species

The U.S. Fish and Wildlife Service (USFWS) provided an official list of T&E species, and designated critical habitats that could occur within the project area (USFWS 2017). The USFWS also provides the Information for Planning and Conservation (IPaC) system to evaluate the potential of encountering USFWS trust resources, including endangered and threatened species, in a proposed project area. The agency updates those species lists annually, or more frequently if any listing changes occur. According to the IPaC consultation letter, the species list fulfills the requirements of the USFWS under section 7(c) (Interagency Cooperation-Biological Assessment) of the ESA. The Wyoming Interagency Spatial Database & Online Management (WISDOM) System also provides a project specific evaluation of wildlife species. On September 22, 2015, USFWS determined that listing the GRSG as an endangered or threatened species under the ESA was not warranted (USFWS 2015a).

The official USFWS list of threatened and endangered species that may occur in proposed BAN tract, and/or may be affected by the proposed project indicated that two T&E species could occur within the project area (**table 3-14**). The black-footed ferret (*Mustela nigripes*) and the northern long-eared bat (*Myotis septentrionalis*) are the only ESA vertebrate species that could potentially occur in the BAN tract study area. The Ute ladies'-tresses (*Spiranthes diluvialis*) (ULT) is the only ESA plant species that could potentially occur in the BAN tract study area. The USFWS has not designated any “critical” habitat for any of these three species in the vicinity of the BAM at this time (USFWS 2017).

**Table 3-14. Potential Effects Evaluation of Federal T&E Species in the Area of the BAN Tract**

Status	Species Common Name	Potential Effects
Experimental, non-essential	Black-footed Ferret	No effect
Threatened	Northern Long-eared Bat	May affect <sup>1</sup>
Threatened	Ute ladies'-tresses	May affect <sup>1</sup>

<sup>1</sup> Not likely to adversely affect individuals or populations.

Source: USFWS (2017)

#### Black-footed Ferret

On March 6, 2013, the USFWS issued a letter acknowledging ‘block clearance’ for the State of Wyoming in response to a request from the Wyoming Game and Fish Department. Consequently, the USFWS no longer recommends surveys for the black-footed ferrets in either black- or white-tailed prairie dog towns in the State of Wyoming (USFWS 2013). Prairie dog towns, which provide habitat for black-footed ferrets, are not found within the BAN tract.

#### Northern Long-eared Bat

The northern long-eared bat was listed as a threatened species under the ESA on April 1, 2015, and therefore, was not discussed in the 2009 SGAC EIS. The listing was primarily due to the threat posed by white-nose syndrome, a fungal disease that has devastated many bat populations. The northern long-eared bat is a medium sized bat found throughout eastern and central North America, with an anticipated species range that includes portions of Campbell, Crook, and

Weston counties, Wyoming (USFWS 2015b). This species typically emerges at dusk to fly through the understory of forested hillsides and ridges, feeding on a variety of insects caught in flight or gleaned from vegetation. In the summer, male and reproductive female bats roost singly or in colonies in cracks, crevices, cavities, and under the bark of living or dead trees, while other males and non-reproductive females roost in cooler places like caves and underground mines. Breeding occurs in late summer and fall when bats swarm at entrances of hibernacula, which also typically are located in large underground cavities.

Woodlands and prominent rocky features are extremely limited in the BAN tract. Vegetation communities are dominated by shrubland and grassland habitats, and no known underground cavities or caves exist in the area. Small water bodies (creeks and impoundments), which represent potential foraging habitat where insects tend to concentrate, are present throughout the BAN tract and surrounding survey area. No northern long-eared bat populations have been documented within Campbell County; however, approximately 17 percent of the BAN tract is within an area of influence (AOI) for the northern long-eared bat established by the USFWS.

#### Ute ladies'-tresses

Although the ULT is a vegetative species, the discussion of this T&E species is included here since affected environment discussions for vegetation are not provided in this EA, as discussed in **sections 1.4 and 3.0**. An in-depth discussion on the biology and habitat requirements of the ULT is included in Appendix E - Section I of the 2009 SGAC EIS. Conditions or the potential for occurrence have not changed since the publication of the 2009 SGAC EIS. The environs of the Duck Nest Creek drainage that passes through the study area and playa grasslands within the tract constitute the closest approximation of suitable habitat for the ULT. Additional ULT surveys were completed by ESCO Associates Inc. (ESCO) within and adjacent to the tract in 2010, 2011, and 2012 using USFWS protocol for assessment of the presence. No ULTs were located within the BAN study area during the 2010, 2011, or 2012 searches (ESCO 2012).

#### 3.3.3.2 Vertebrate Sensitive Species

Special status species, including BLM's Buffalo Field Office sensitive species and USFWS Birds of Conservation Concern (BCC) that could occur in in the study area (as determined from the Wyoming Natural Diversity Database [WYNDD]), are present (**appendix D**).

##### 3.3.3.2.1 BLM Sensitive Species

No quantitative surveys specifically targeting vertebrate sensitive species were conducted for the BAN EA. However, annual and periodic wildlife monitoring surveys conducted as part of programs at the BAM since at least 1974 provided information on the occurrence of and potential impacts to sensitive species.

As indicated in **appendix D**, 18 BLM sensitive species could potentially occur in the area. The absence or extremely limited presence of specialized habitat types, such as forests and woodlands, caves, cliffs, large expanses of wetlands and lakes, and calcareous rock outcrops, among others, make it unlikely that species restricted to those habitats would occur in the BAN tract study area. Nine vertebrate BLM-designated sensitive species have been documented in or within 0.5 mile of the BAM permit area from 1984 through 2016: northern leopard frog (*Rana pipiens*); bald eagle (*Haliaeetus leucocephalus*), Brewer's sparrow (*Spizella breweri*), burrowing owl, ferruginous hawk, GRSG, loggerhead shrike (*Lanius ludovicianus*), long-billed curlew (*Numenius americanus*), and sage thrasher (*Oreoscoptes montanus*). Detailed discussions of the observed species are included below.

**Northern leopard frogs** are common residents in Wyoming and were observed in 2016 along a reclaimed creek route during waterfowl surveys, approximately 0.7 mile southeast of the tract. This species was not recorded in the BAN tract study area during waterfowl surveys in 2016. There are three major habitat types categorized for northern leopard frogs: winter habitat (overwintering in lakes, streams, and ponds), summer habitat (feeding by adults in upland areas), and tadpole habitat (up to 3 months spent as tadpoles in shallow breeding ponds) (Smith and Keinath 2007). Approximately 69.4 acres of aquatic features occur within the BAN tract. These features are considered marginally suitable habitat for northern leopard frogs. While these areas may provide habitat for this species in early spring when they are wet, they are typically dry by mid- to late-summer. The northern leopard frogs can migrate across the landscape to and from overwintering sites; the routes they take on these migrations probably include wet meadows, tall grass, and riparian corridors (Smith 2003). These routes are not found within the BAN tract study area.

**Bald eagles** are relatively common winter residents and migrants in northeastern Wyoming. Bald eagles have been observed within 1 mile of the BAN tract study area. However, no bald eagle nests or winter roost sites have been documented in or within 1 mile of the BAN tract study area or BAM permit area during more than two decades of annual monitoring at the mine. As noted above, the BAM annual monitoring area (permit area and a 1.0-mile perimeter) encompassed the entire BAN tract study area. The nearest known bald eagle nest is approximately 5 miles south of the BAN tract. Potential bald eagle roosting and nesting habitat is limited largely to the western portion of the BAN tract study area in cottonwood trees adjacent to a pond impoundment, trees in a small windbreak, and a few other individual trees. A few other trees exist within the BAN tract; however, the majority of those trees are too small to support roosting or nesting bald eagles. Additionally, no unique, concentrated, or predictable sources of prey or carrion (e.g., fisheries, sheep operations, large prairie dog colonies, or waterfowl staging areas) occur in the BAN tract study area or on surrounding lands, so foraging bald eagles would not be attracted to the location in great numbers.

**Brewer's sparrows** are common summer residents in Wyoming and are known to breed within northern Campbell County (Orabona et al. 2012). This species has been recorded within 1 mile of the BAN tract. Brewer's sparrows have been recorded at the BAM during general migratory bird surveys during each of the last 17 years (2000–2016) (ICF 2017). Most observations occurred in stands of big sagebrush, their preferred habitat (Rotenberry et al. 1999), in the northern extent of the annual monitoring area. Although nests have rarely been encountered, the presence and behavior (singing and defending territories) of birds throughout spring and summer suggest that Brewer's sparrows regularly nest in the area. The BAN tract study area is composed primarily of large expanses of grassland; however, a few small, scattered pockets of sparse to moderately-dense sagebrush which could provide suitable habitat for the Brewer's sparrow are present in the area.

**Ferruginous Hawks** are common residents in Wyoming and are known to breed within northern Campbell County (Orabona et al. 2012). Breeding occurs in most grassland, shrub steppe, and desert environments in Wyoming. Wintering birds also occur at low densities in similar habitats in the state, typically in the southern counties (Travsky and Beauvais 2005). Ferruginous hawks have been documented as nesting in the vicinity of the BAM every year since 1987. Over time, this species has established more nest sites than any other raptor species in the survey area, with as many as seven pairs nesting in a single year. At least four ferruginous hawk pairs nested in 7 of the 9 years from 1987 through 1995, with at least five pairs nesting in 6 of those years. However, no more than three pairs nested annually after 1995. In 2016, two pairs

of ferruginous hawks fledged a combined total of six young. In 2016, both active ferruginous hawk nests were on artificial platforms. Aside from the ferruginous hawks associated with the active nests mentioned above, no other individuals were observed during the 2016 breeding season (ICF 2017).

**Greater sage-grouse** are common residents that have been documented to breed within northern Campbell County (Orabona et al. 2012). GRSG occurrence within the project area is thoroughly discussed in **section 3.3.2**, above.

**Loggerhead shrikes** are common summer residents in Wyoming and have been observed breeding in northern Campbell County (Orabona et al. 2012). The breeding habitat for the loggerhead shrike is generally open country with scattered trees and large shrubs. The most important habitat feature seems to be the presence of dense shrubs or trees for nesting with nearby open herbaceous areas for foraging (e.g., grasslands or pastures) (Keinath and Schneider 2005). Limited suitable habitat is present within the BAN tract study area for this species. Northern shrikes have been observed during BAM wildlife monitoring surveys (ICF 2017).

**Long-billed curlews** are an uncommon summer resident in Wyoming but are known to breed within northern Campbell County (Orabona et al. 2012). As described by Dark-Smiley and Keinath (2004), long-billed curlews breed in prairies and grassy, moist meadows, generally near water and they are known to frequent plowed fields, meadows, and pastures for nesting. Short-grass or mixed-grass prairie habitats, with flat to rolling topography, are their preferred nesting habitat and they nest in shallow depressions in the ground. They have been documented nesting on the ground in flat areas with short grass, sometimes on more irregular terrain, often near a rock or other conspicuous object. They prefer open, sparse grassland habitats with low vegetation (under 30 cm) because tall vegetation hinders foraging, encourages predation, and reduces reproductive success (Dark-Smiley and Keinath 2004). Long-billed curlews have only been observed on rare occasions during BAM wildlife monitoring surveys (ICF 2017)

**Sage thrashers** are common summer residents in Wyoming and have been observed in northern Campbell County (Orabona et al. 2012). Breeding generally occurs in sagebrush steppe habitats, typically dominated by big sagebrush (*Artemisia tridentata*), with nest sites most often occurring deep within or under big sagebrush (Buseck et al. 2004). Sage thrashers have been recorded in the BAN tract study area and are listed as rarely nesting in the 2016 annual wildlife report (ICF 2017).

**Burrowing owls** are known to have nested and fledged young within the current BAM raptor monitoring area during 12 of the last 29 years (1987 through 2016) (ICF 2016). Despite their low nesting frequency, burrowing owls lay a relatively high number of eggs (clutch size can be up to 12 eggs [Lantz et al. 2004]) and consequently have the highest production average at the BAM (ICF 2015). Two intact burrowing owl nests have been documented within the BAN tract (**map 3-5**). One nest is located very close to the Bishop Road and has not been active since prior to 2010. The other nest (BO14) was discovered in 2015. No burrowing owls were observed within the current BAM raptor monitoring area during the 2016 report period (ICF 2107).

Burrowing owls often use prairie dog burrows or other larger mammal burrows for nesting (Johnsgard 1990). One black-tailed prairie dog colony occurs within the BAM annual monitoring area. The colony is located approximately 1.9 miles southwest of the BAM permit area and approximately 5.3 miles from the BAN tract. No burrowing owl nests have been recorded within this prairie dog colony (ICF 2015). Over time, the BAM has constructed five artificial burrowing owl nest boxes in reclamation using the most current designs available. One box mitigated the loss of a nest site due to mining, and four were voluntarily constructed in an effort to provide

additional nest sites for this species. However, none of the artificial nest boxes at the BAM has been used by burrowing owls to date, nor have any of the six other burrowing owl nest boxes that ICF has installed over the years at other mine properties (ICF 2017).

#### 3.3.3.2.2 USFWS Birds of Conservation Concern

As indicated in **appendix D**, 19 USFWS Region 17 BCC could potentially occur in the area. Fifteen of these BBC have been documented in or within 0.5 mile of the BAM permit area from 1984 through 2016: bald eagle, golden eagle, grasshopper sparrow (*Ammodramus sayannarum*), short-eared owl, Brewer's sparrow, burrowing owl, ferruginous hawk, Swainson's hawk, prairie falcon (*Falco mexicanus*), GRSG, loggerhead shrike, long-billed curlew, upland sandpiper (*Bartramia longicauda*), red-headed woodpecker (*Melanerpes erythrocephalus*), and sage thrasher. Bald eagles, Brewer's sparrows, burrowing owls, ferruginous hawks, GRSG, loggerhead shrikes, long-billed curlew, and sage thrashers are discussed in **section 3.3.3.2.1**, above. Detailed discussions of the remaining observed species are included below.

**Golden Eagles** in North America typically inhabit open areas where small and medium-sized mammals are abundant. The species is classified as a common year-round resident in Wyoming (WGFD 2016b). Foraging habitat includes grasslands, sagebrush, and agricultural lands. Golden eagles nest on cliffs or in trees. Golden eagles nested in the monitoring area during 18 of the last 30 years (ICF 2017). As with several of the other large raptor species, golden eagle nesting success in the BAM raptor monitoring area appears to have been heavily influenced by fluctuating lagomorph abundance over time. No golden eagle pairs have nested in the BAM annual monitoring area since 2006 (ICF 2017).

**Grasshopper sparrows** in Wyoming inhabit grassland mainly in the eastern half of the state, and are considered common summer residents. Grasshopper sparrows require herbaceous cover and conspicuous perches, and avoids areas containing more than 35% shrubs. Conversion of native grasslands to croplands and habitat loss to urbanization and industrialization have caused a contraction in this species' breeding range and rangewide population declines. Heavy livestock grazing can be detrimental to nests, young, and the availability of prey (WGFD 2010a). The grasshopper sparrow has been observed frequently in recent years within the BAM wildlife survey area and has likely nested in grassland habitats in the area. Grasshopper sparrows were recorded in 4 of the 5 habitats (excluding reclaimed shrubland) during breeding bird surveys conducted in 2016 (ICF 2017). This species is typically associated with taller grassland vegetation, which is prevalent in mature stands of reclamation in the permit area.

**Swainson's Hawks** breed primarily in western North America from Alaska and western Canada, south into northern Mexico, and east to Oklahoma and Iowa. They winter primarily in southern South America, irregularly north to Costa Rica and Panama, and sometimes north to the southwestern US and southern Florida. During summer, Swainson's hawks occur and breed throughout most of Wyoming where preferred habitats (prairies, plains, shrub-steppe, large mountain valleys, savannahs, open pine-juniper woodlands, and cultivated lands with scattered trees) are present. Swainson's Hawks are considered a common summer resident in Wyoming. They are impacted by the loss of native grasslands and nest trees and habitat fragmentation can accentuate the impacts of fluctuations of prey populations (WGFD 2010b). At least one pair of Swainson's hawks fledged young in 26 of the last 30 years; no young fledged from 1993 through 1995 or in 2013 (ICF 2017).

**Short-eared owls** occur year-round in Wyoming and are scattered across most of the state in open habitats. They are considered commons resident in Wyoming. Short-eared owls occupy broad expanses of open habitat with dense, low vegetation, including prairies, grasslands, meadows, marshes, and open sagebrush shrublands. They strongly associated with ungrazed and undisturbed native grasslands and wetlands that support dense small mammal populations. Short-eared owls are dependent on the meadow vole, which comprises at least 90 percent of its

diet (WGFD 2010c). Habitat fragmentation can accentuate the impacts of fluctuations of prey populations and they are impacted by the loss or degradation of both breeding and wintering habitats, including urbanization, industrialization, intensive agriculture, overgrazing, and human disturbance. Nesting short-eared owls were only documented at the BAM during 4 of the last 30 years and young fledged in 2 of those 4 years (ICF 2017).

**Upland Sandpipers** occurs primarily in the eastern half of Wyoming during the summer, although they have also been observed in north-central and northwestern Wyoming. Upland Sandpipers are considered an uncommon summer resident in Wyoming. They inhabit open grassland habitats, including prairies, meadows, pastures, hayfields, alfalfa fields, and highway ROWs. They require large areas of short grasses for foraging and courtship, interspersed with or adjacent to taller grasses for nesting and short to medium grasses for brood cover. They are impacted by the loss of habitat to urbanization, conversion of grasslands to woodlands and cultivated croplands, and loss of vegetation cover during the nesting season. Conversion of native grasslands to croplands and habitat loss to urbanization and industrialization have caused a contraction in this species' breeding range and rangewide population declines. Human activities have caused the loss of suitable nesting habitat in some areas (WGFD 2010d). Upland sandpipers have been documented in the area but nests have rarely been encountered in the area (ICF 2017).

**Prairie falcons** are considered a common resident in Wyoming, nesting in cliff habitats in open areas (WGFD 2009). Where suitable nesting habitat is available in the Wyoming PRB study area, several pairs can be found nesting in close proximity (BLM 2012 Task ID report). Prairie Falcons feed primarily on birds and mammals, often exploiting locally abundant prey populations. Prairie falcons have been documented in the area (ICF 2017) but nesting substrate is limited.

**Red-headed woodpeckers** are associated with cottonwood-riparian, ponderosa pine savannah, aspen habitats (WGFD 2016b). These birds typically nest in a cavity in dead trees or stubs on live trees with no bark. They feed on a variety of plant and animal material including insects, bird eggs, nestlings, mice, corn, berries, and seeds. The loss of breeding and wintering habitats in the form of burned pine forests, park-like ponderosa pine forests, riparian cottonwood stands, and oak woodlands is thought to be the primary threat to the long-term persistence of Lewis's woodpecker populations (Abele et al. 2004). This species has been documented in the area but observations are rare (ICF 2017).

### 3.4 Transportation

This section describes existing transportation conditions associated with the BAN tract.

As discussed in the 2009 SGAC EIS, State Highway 59 is the major north-south public transportation corridor in this area (BLM 2009). Access to the BAM is on the Bishop Road, which crosses the BAN tract. No recent annual average daily traffic (AADT) data are available for this county road. The Bishop Road is a paved highway with two 12-foot wide travelways and very narrow shoulders. It provides access to the BAM and the Caballo mine and rural areas east of the mines. The Bishop Road crosses under the BAM rail loop east of the mine and crosses under a three-track main line in the same area (**map I-2**). Traffic using the Bishop Road is not affected by these underpasses.

The 2009 SGAC EIS included discussions of the Dakota, Minnesota & Eastern Railroad (DM&E), which if built, would have provided additional rail capacity for the BAM. The Canadian Pacific Railway Ltd (CP) acquired the DM&E and its subsidiaries in 2007 and subsequently decided to suspend further consideration of the rail line expansion (TwinCities Pioneer Press 2015). In 2014, CP sold the west end of its DM&E line to Genesee & Wyoming, Inc. (RailwayAge 2014). There has been no further development activity regarding expansion of the rail line into the area.

### 3.5 Socioeconomics

This section describes existing socioeconomic conditions in Wyoming and Campbell County specific to the local and state economy, population, employment, and environmental justice.

#### 3.5.1 Local Economy

Wyoming's coal mines produced an estimate 375.7 million tons in 2015, a decrease of about 90.6 million tons (19.4%) over the record 466.3 million tons produced in 2008. Coal produced from 14 active mines in Campbell County, which makes up approximately 5 percent of the surface area of Wyoming, accounted for approximately 97% of total statewide coal production in 2015 (Wyoming State Inspector of Mines 2015). According to coal production numbers from the U.S. Energy Information Administration, the coal from Campbell County accounted for approximately 52 percent of the coal produced in the U.S. in 2015 (USEIA 2016).

The estimated total fiscal benefit from coal production in Campbell County to the State of Wyoming in 2016 was calculated by including half of the bonus bid payments, half of the federal mineral royalties based on current prices, a designated portion of the AML fees, and all of the ad valorem taxes, severance taxes, and sales and use taxes for coal produced in Campbell County in 2015. The coal sales results in an estimated \$922.5 million, or \$2.48 per ton (**figure 3-2**). The calculations for revenues related to the BAN tract are included in **appendix E**.

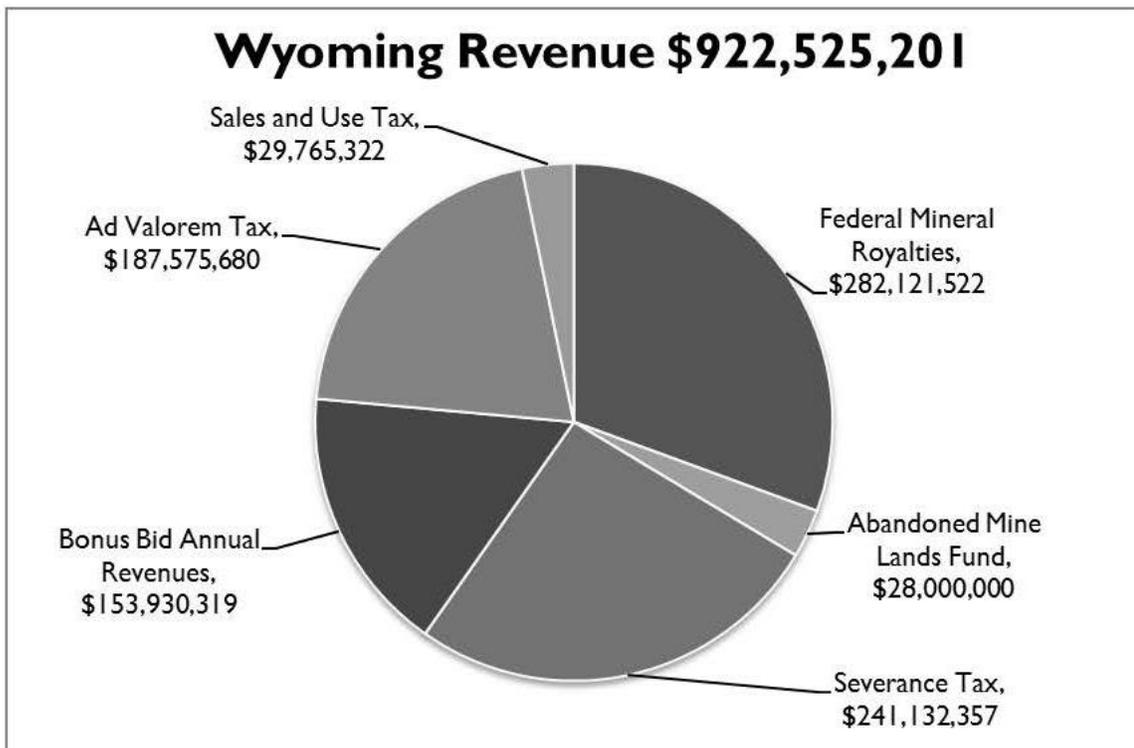
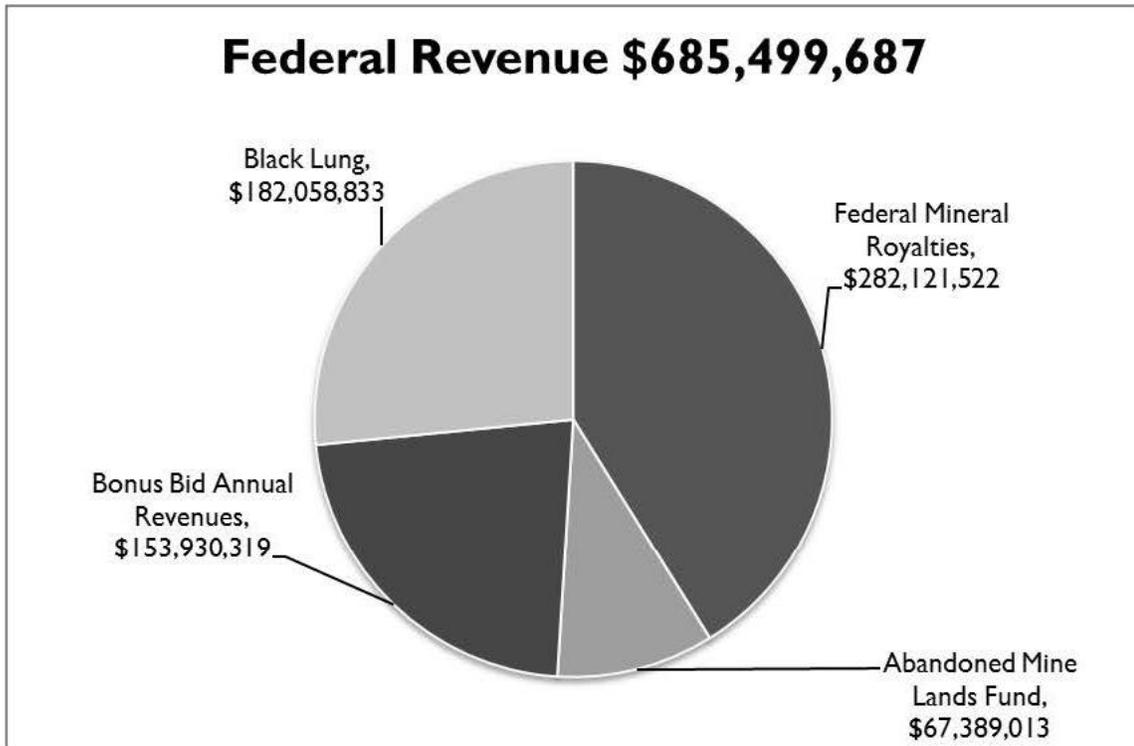
Recent (2015) Gross Domestic Product (GDP) calculations for Wyoming indicate that the minerals industry (mining and oil and gas) accounted for about 23 percent of the state's total GDP of \$38.6 billion, which made it the largest sector of the Wyoming economy. The contribution of mining was nearly three times that of government, the next largest sector, and nearly three times more than the contribution of the real estate industry, the next largest private sector. In 2014, mining alone accounted for 11 percent of the Wyoming GDP (WDAI/EAD 2016).

Wyoming's economy was exposed to a substantial decline in the price of oil in 2015, an extended period of low natural gas prices, and the decline in the price of coal (WDWS 2016). This trend continued into 2016. As well as direct effects to oil and gas and mining employment, the effects of the reduced demand for these natural resources also effects the required support industries for the mining and quarrying of minerals and for the extraction of oil and gas.

#### 3.5.2 Population

As shown in **table 3-15**, Campbell County had a population of 49,220 in 2015 (U.S. Census Bureau 2016). Campbell County's population ranks it as the third most populous of Wyoming's 23 counties (U.S. Census Bureau 2014a).

The majority of the Campbell County mine employees and support services reside in the city of Gillette. It is estimated that the total population in the Gillette city limits increased from 19,646 in 2000 to 32,649 in July 2015, an increase of 66.2 percent over the period (U.S. Census Bureau 2014b and 2017). **Table 3-15** presents the population changes for Campbell County and Gillette. As of July 2013, Gillette accounted for roughly 66 percent of the county's residents (WDAI/EAD 2014). Gillette was the fourth largest city in the state, following Cheyenne, Casper, and Laramie (WDAI/EAD 2014).



Source: WWC 2017

**Figure 3-2. Estimated 2016 Wyoming and Federal Revenues from 2015 Coal Production in Campbell County**

**Table 3-15. Campbell County and City of Gillette Population Change, 2000 and 2011 to 2015**

	2000	2011	2012	2013	2014	2015	2000-2015 Increase	2000-2015 % Change
Campbell County	33,698	46,600	47,881	48,121	48,243	49,220	14,478	43.0
City of Gillette	19,646	30,432	31,423	31,732	31,920	32,649	13,003	66.2

Source: U.S. Census Bureau (2014a - 2017)

### 3.5.3 Employment

**Table 3-16** presents the employment changes for Wyoming and Campbell County between 2000 and August 2016. The statewide total employment increased by 30,670 jobs (12 percent) from 2000 to 2015 while the employment in Campbell County increased by 30,670 (30.4 percent) during the same time period (Bureau of Labor 2016). The average unemployment rate in Campbell County for 2000 was 3.4 percent and 6.8 percent for August 2016 (Bureau of Labor 2016). Between the second quarter of 2014 and the second quarter of 2016, the mining sector lost approximately 1,977 jobs (Bureau of Labor 2016). The Natural Resources and Mining sector in Campbell County experienced an approximate 14.7 percent decline in employment between June 2015 and June 2016 (WDWS 2016).

As stated in **section 2.3**, 259 people are currently employed at the BAM (CCW 2016).

**Table 3-16. Wyoming and Campbell County Employment Rate Change, 2000 and 2011 to 2015**

	2000	2011	2012	2013	2014	2015	August 2016
Wyoming (Number Employed)	256,414	289,019	291,076	292,157	294,207	293,262	287,084
Wyoming (Number Unemployed)	10,394	17,796	16,349	14,414	12,726	12,750	14,686
Wyoming Unemployment Rate	3.9	5.8	5.3	4.7	4.1	4.2	5.5
Campbell County (Number Employed)	17,975	24,605	24,919	24,609	25,423	24,943	23,446
Campbell County (Number Unemployed)	830	1,267	1,213	1,087	882	987	1,708
Campbell County Unemployment Rate	3.4	4.9	4.6	4.2	3.4	3.8	6.8

Source: Bureau of Labor 2016

### 3.5.4 Environmental Justice

Environmental justice is defined by EPA as, "The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic group should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies" (EPA 2017d). Executive Order 12898 - Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations also addresses this issue. Its purpose is to focus federal attention on the environmental and human health effects of federal actions on minority and low-income populations with the goal of achieving environmental protection for all communities (EPA 1994).

According to U.S. Census Bureau data for 2015, 93.6 percent of the population of Campbell County were white, which is slightly higher than the 91.0 percent of the population of Wyoming that were listed as white (U.S. Census Bureau 2015). Also, according to U.S. Census Bureau (2015), the percentage rate of Native Americans in Campbell County population (1.3 percent) is

lower than in the state rate as a whole (2.2 percent) and there are no known Native American sacred sites on or near the BAN tract.

The poverty rate in Campbell County for all people combined was 7.2 percent (U.S. Census Bureau 2015). This rate was lower than the 2015 poverty rate for Wyoming for all people combined, which was 11.5 percent (U.S. Census Bureau 2015).

### **3.5.5 Housing**

Section 3.17.4 of the 2009 SGAC EIS discusses in detail the housing opportunities in Gillette and Campbell County (BLM 2009) and the 2012 Task IC Report (Current Social and Economic Conditions) of the Powder River Basin Coal Review provides additional, more current, information. Housing information specifically related to the leasing and mining of coal within the BAN tract is included below.

The 2015 census FactFinder estimated 19,525 housing units in Campbell County, an increase of 47 percent since 2000. Approximately 89.7 percent of the Campbell County units were occupied at the time of the 2015 estimate (U.S. Census Bureau 2015). The 2015 census FactFinder estimated 12,796 housing units in Gillette, with approximately 89.2 percent of the units occupied at the time of the 2015 estimate (U.S. Census Bureau 2015). CCW does not anticipate adding additional employees if the federal mining plan modification is approved so there will be no additional demands placed on the housing infrastructure of Campbell County or Gillette.

### **3.5.6 Local Government Facilities and Services**

Detailed discussions on government facilities and services in Campbell County and Gillette are included in Section 3.17.5 of the 2009 SGAC EIS (BLM 2009). Revenues generated by mineral production continues to support local government facilities and services, which allows these facilities to keep pace with growth. Current facilities and services are generally adequate for the current population, although several service providers are engaged in expansion plans to accommodate future growth. CCW does not anticipate adding additional employees if the federal mining plan modification is approved so there will be no additional demands placed on the Campbell County or Gillette government facilities or services.

## 4.0 Environmental Consequences/Cumulative impacts

### 4.1 Introduction

This chapter discusses the potential direct, indirect, and cumulative effects of the Proposed Action and the No Action Alternative, as described in **chapter 2**. The discussion is organized by the affected resource in the same order as they are described in **chapter 3** and then by alternative.

An impact, or effect, is defined as a modification to the environment brought about by an outside action. Impacts vary in significance from no change, or only slightly discernible change, to a full modification or elimination of the resource. Impacts can be beneficial (positive) or adverse (negative). Impacts are described by their level of significance (i.e., significant, moderate, minor, negligible, or no impact). For purposes of discussion and to enable use of a common scale for all resources, resource specialists considered the following impact levels in qualitative terms.

**Significant Impact:** Impacts that potentially could cause irretrievable loss of a resource; significant depletion, change, or stress to resources; or stress within the social, cultural, and economic realm.

**Moderate Impact:** Impacts that potentially could cause some change or stress to an environmental resource but the impact levels are not considered significant.

**Minor Impact:** Impacts that potentially could be detectable but slight.

**Negligible Impact:** Impacts in the lower limit of detection that potentially could cause an insignificant change or stress to an environmental resource or use.

**No Impact:** No discernible or measurable impacts.

Direct impacts are defined as those impacts which are caused by the action and occur at the same time and place (40 CFR 1508.8[a]). Indirect impacts are those that are caused by the action and occur later in time or are farther removed in distance, but are still reasonably foreseeable (40 CFR 1508.8[b]). Cumulative impacts are those impacts that result from incremental effects of an action when added to other past and present actions, and reasonably foreseeable future actions regardless of what agency or other entity undertakes such other actions (40 CFR 1508.7). Cumulative impacts occur over a given time period. The time period for cumulative effects includes the time period when the impacts of past and present actions and reasonably foreseeable future actions overlap with the time period when project impacts would occur (including construction, operation, and reclamation phases).

Impacts can be short term meaning these impacts generally occur over a short period during a specific point in the mining process and these changes generally revert to pre-disturbance conditions at or within a few years after the ground disturbance has taken place. Long-term impacts are defined as those that substantially would remain beyond short-term ground-disturbing activities. Long-term impacts would generally last the life of the federal mining plan modification approval and beyond.

The direct, indirect, and cumulative effects of the Proposed Action and No Action Alternative are comparable to those described in the 2009 SGAC EIS, except as noted herein. In addition to addressing the specific issues identified in **chapter 1**, this updated environmental consequences analysis reflect changes to the mining operations presented in **chapter 2** and any updated

descriptions of the affected environment presented in **chapter 3** that have taken place since the 2009 SGAC EIS and the 1999 federal mining plan modification were approved.

Regional activity includes coal mining, oil and gas development, recreation, and agricultural activities. The Task 2 Report for the Powder River Basin Coal Review provides a detailed discussion of reasonably foreseeable development activities in the PRB (BLM 2011). The Task 3D Report for the Powder River Basin Coal Review provides a detailed discussion of cumulative environmental effects in the PRB (BLM 2013). Both of these reports provide information updated since the 2009 SGAC EIS was published.

Regarding subregion 2 activity, the primary regional activity is associated with coal recovery at the Caballo, Belle Ayr, Cordero Rojo, and Coal Creek mines (Subregion 2, middle group of mines) that are in the immediate vicinity of the BAN tract (**map I-1**). Information regarding ownership, permitted areas, and 2015 coal production from these mines is included in **table 4-1**.

**Table 4-1. Ownership, Permitted Acres, and Coal Production of Subregion 2 Mines**

Mine	Ownership	Permitted Acres	2015 Production (Mt)
Caballo	Peabody Caballo Coal, LLC	21,269	11.4
Belle Ayr	Alpha Coal West Inc.	12,091	18.3
Cordero Rojo	Cloud Peak Energy LLC	21,685	22.9
Coal Creek	Thunder Basin Coal Co.	9,741	7.8
<b>Total</b>		<b>64,786</b>	<b>60.4</b>

The Task 2 Coal Review Report (BLM 2011) includes estimates of current, 2020, and 2030 disturbance for the Subregion 2 area (coal-mine related disturbance) and for subwatersheds (for oil and gas related development) (**table 4-2**). Task 2 Report discussions for oil and gas development disturbance are presented by watershed and, as discussed in Section 3.5.2.1 of the 2009 SGAC EIS and in **section 3.2.2** of this EA, the major drainage associated with the Subregion 2 mines is the upper portion of the Belle Fourche River.

**Table 4-2. Total Development-related Disturbance Acreages Associated with the BAN Study Area**

Area	2008	2020	2030
Subregion 2 (Coal-mine Related)	35,395	37,060	39,120
Upper Belle Fourche River (Oil and Gas Related)	2,015	2,015	2,075

As noted from **table 4-2**, coal-mine related disturbance within Subregion 2 is estimated to increase by 10 percent by the year 2030 and oil and gas related disturbance within the Upper Belle Fourche River subwatershed is estimated to increase by only 3 percent by the year 2030.

As determined from the National Land Cover Database (NLCD), agricultural use within a 345,600-acre area that includes all mines within Subregion 2 is estimated at approximately 2,450 acres (0.71 percent of total) (NLCD 2017). Few, if any, of the developed recreation sites in the study area would be affected by long term disturbance under the lower and upper development scenarios listed in the Task 3D Coal Review Report (BLM 2013). Therefore, due to the relatively small proportion of the area utilized for agriculture and recreation and due to detailed discussions

included in the 2009 SGAC EIS and the BLM Coal Review documents, these resources will not be included in cumulative effects analysis for this EA.

The environmental and cumulative effects discussions below assume that under the Proposed Action, the federal mining plan modification to mine coal in the remaining Federal Coal Lease WYWI61248 would be approved. Market conditions are highly variable, which results in variable annual coal recovery rates. From 2009 through 2016, the annual coal recovery at the BAM ranged from 28.7 Mt in 2009 to 14.9 Mt in 2016, averaging 22.2 Mtpy over that time period (CCW 2016). Coal recovery would continue within the BAM permit boundary at an estimated annual rate of 20 Mt, which is consistent with the 2009 through 2016 average annual recovery rate. The recovery of federal coal would continue for approximately 10.4 additional years over the No Action Alternative. New mine facilities, associated surface disturbances, and subsidence repairs would not be required in connection with the Proposed Action.

Under the No Action Alternative, the mining plan modification for the federal coal within WYWI61248 would not be approved. Currently approved mining operations associated with federal coal would continue for approximately 2.2 years within federal leases WYW78629, WYW80954, and WYW0317682, approved in prior ASLM federal mining plan modifications in accordance with conditions to WDEQ-LQD Permit No. PT0214, at an estimated rate of approximately 20 Mtpy. The actual mining rate is dictated by coal demands. The BAM is currently permitted to mine at a rate of 35 Mtpy.

#### **4.1.1 Summary Comparison of Direct and Indirect Environmental Impacts**

A summary comparison of the direct and indirect environmental impacts is included in **table 4-3** and in Table 2-2 of the 2009 SGAC EIS.

## **4.2 Topography and Physiography**

### **4.2.1 Direct and Indirect Effects**

#### *4.2.1.1 Proposed Action*

The direct and indirect effects to topography and physiography would not be significantly different from those described in the 2009 SGAC EIS. Following reclamation, the average surface elevation would be lower due to removal of the coal. The reclaimed land surface would approximate premining contours, and the basic drainage network would be retained; however, the reclaimed surface would typically contain fewer and gentler topographic features. The Proposed Action would impact the topography and physiography of the remaining portions of lands included in WYWI61248 but these impacts would be similar to those currently occurring on the existing BAM coal leases as coal is mined and the mined-out areas are reclaimed. The direct effects on topography and physiography resulting from the Proposed Action are expected to be moderate and permanent on the BAN tract. There would be no indirect effects under the Proposed Action. As discussed in **section 1.2**, WDEQ-LQD, through the PAP process, considered and approved the impacts of mining coal related to WYWI61248, including effects to topography and physiography.

**Table 4-3. Summary Comparison of Direct and Indirect Environmental Impacts**

<b>Resource Name</b>	<b>Proposed Action</b>	<b>No Action Alternative</b>
Added Recoverable Coal (Mt)	208.4	0.0
Added Disturbance (Acres)	695.0	0
Topography and Physiography	Moderate, permanent on the tract. Local impacts only.	Moderate, permanent on the tract due to mine related activity authorized under a state mine permit and federal mining plan. Local impacts only.
Geology, Minerals and Paleontology	Moderate, permanent on the tract. Recovery of 208.4 Mt of Wyodak coal and CBNG within Wyodak coal. While CBNG is not part of the Proposed Action, there would be a loss of CBNG through venting and/or depletion of hydrostatic pressure in Wyodak coal resulting from mining adjacent areas. However, CBNG recovery has been greatly reduced in the area. Local impacts only.	Moderate, permanent on the tract due to mine related activity authorized under a revised state mine permit and federal mining plan. Approximately 208.4 Mt of coal would not be removed on the CCW but loss of CBNG would occur though venting and/or depletion of hydrostatic pressure in Wyodak coal resulting from mining adjacent areas. Local impacts only.
Air Quality	Moderate, short term (10.4 years) from full mining on the tract. Primarily local impacts, with the potential for regional and global impacts from transportation and combustion of coal.	Moderate, short term (2.2 years) on the tract due to mine related activity authorized under a state mine permit and federal mining plan. Primarily local impacts, with the potential for regional and global impacts from transportation and combustion of coal.
Water Resources – Surface Water	Moderate, short term (10.4 years) on the tract from full mining. Primarily local impacts, with the potential for regional impacts.	Moderate, short term (2.2 years) on the tract due to mine related activity authorized under a state mine permit and federal mining plan. Primarily local impacts, with the potential for regional impacts.
Water Resources-Groundwater	Moderate, short and long term on the tract due to aquifer (alluvial, overburden, and coal) removal. Local impacts only.	Moderate, short and long term on the tract due to mine related activity authorized under a state mine permit and federal mining plan. Local impacts only.
Alluvial Valley Floors	Moderate, short term (10.4 years) on the tract from full mining. Local impacts only.	Moderate, short term (2.2 years) on the tract from full mining. Local impacts only.
Wetlands	Moderate, short term (10.4 years) on the tract from full mining. Local impacts only.	Moderate, short term (2.2 years) on the tract due to mine related activity authorized under a state mine permit and federal mining plan. Local impacts only.

**Table 4-3.** Continued

<b>Resource Name</b>	<b>Proposed Action</b>	<b>No Action Alternative</b>
Soils	Moderate, short term (10.4 years) on the tract from full mining. Local impacts only.	Moderate, short term (2.2 years) on the tract due to mine related activity authorized under a state mine permit and federal mining plan. Local impacts only.
Vegetation	Moderate, short term (10.4 years) on the tract from full mining. Local impacts only.	Moderate, short term (2.2 years) on the tract due to mine related activity authorized under a state mine permit and federal mining plan. Local impacts only.
Wildlife	Moderate, short term (10.4 years) on the tract from full mining. Local impacts only.	Moderate, short term (2.2 years) on the tract due to mine related activity authorized under a revised state mine permit and federal mining plan. Local impacts only.
Land Use	Minor, short term (10.4 years) on the tract from full mining. Local impacts only.	Moderate, short term (2.2 years) on the tract due to mine related activity authorized under a state mine permit and federal mining plan.
Cultural Resources	Negligible, long term on the tract from full mining. Local impacts only.	Negligible, long term on the tract due to mine related activity authorized under a revised state mine permit and federal mining plan. NRHP sites would not be disturbed. Local impacts only.
Visual Resources	Moderate, long term (LOM) on the tract from full mining. Local impacts only.	Moderate, long term (LOM) on the tract due to mine related activity authorized under a state mine permit and federal mining plan. Local impacts only.
Noise	Minor to moderate, short term (10.4 years) on the tract from mining. The moderate effects would attenuate rapidly due to the reduction effect related to distance. Local impacts only.	Minor to moderate, short term (2.2 years) on the tract due to mine related activity authorized under a state mine permit and federal mining plan. Local impacts only.
Transportation facilities	Moderate, long term due the likelihood of the need to relocate the Bishop Road.	No impact
Hazardous and Solid Waste	No impact	Same as Proposed Action
Socioeconomics	Moderate, beneficial, short term (10.4 years) on the tract from full mining. LOM state and federal revenues from the BAN tract coal would be \$798.7 million. Local and regional impacts.	Moderate direct and indirect negative socioeconomic effects short term on the tract due the loss of \$798.7 million in federal and state revenues, compared to Proposed Action. Local and regional impacts.

#### 4.2.1.2 *No Action Alternative*

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the federal coal included in the BAN tract. The impacts to topography under the No Action Alternative would be similar to those under the Proposed Action although the impacts to approximately 695.0 acres to recover federal coal within the tract would not occur.

#### 4.2.2 **Cumulative Effects**

The cumulative impacts to topography and physiography would not be significantly different than those described in the 2009 SGAC EIS. The cumulative effects would primarily be related to the existing Caballo, Belle Ayr, Cordero Rojo, and Coal Creek mines (middle group of mines). Following surface coal mining and reclamation, topography would be modified within the permit boundary of these mines. The cumulative effects on topography and physiography resulting from the Proposed Action are expected to be moderate and permanent on the tract.

#### 4.2.3 **Mitigation Measures**

No mitigation measures would be necessary for topography beyond those required by the BAM WDEQ-LQD mining permit.

### 4.3 **Geology, Mineral Resources, and Paleontology**

#### 4.3.1 **Direct and Indirect Effects**

##### 4.3.1.1 *Proposed Action*

The direct and indirect effects to geology, mineral resources, and paleontology would not be significantly different than those described in the 2009 SGAC EIS. As stated in Section 3.3.1.2.1 of the 2009 SGAC EIS, the stratigraphic units from the base of the lowest coal seam mined to the land surface would be subject to permanent change after the coal is removed under the Proposed Action or Alternative 2 or 3. Mining would substantially modify the subsurface characteristics of these lands. The replaced overburden and interburden (backfill) would be a mixture of the geologically distinct layers of sandstone, siltstone, claystone, and shale that currently exist. As a result, the physical characteristics of the backfill would be different from the physical characteristics of the existing layered overburden stratigraphy.

The geology from the base of the Wyodak coal seam to the land surface would be subject to permanent change on the areas of coal removal, and the Proposed Action would alter the subsurface physical characteristics on 695.0 acres associated with the BAN tract. These impacts are occurring on the existing BAM coal leases as coal is mined and the mined-out areas are reclaimed. The Proposed Action would result in the recovery of approximately 208.4 Mt of federal coal from the Wyodak coal seam. The Proposed Action would also result in the loss of any remaining CBNG through venting and/or depletion of hydrostatic pressure in Wyodak coal resulting from mining adjacent areas. Therefore, the direct and indirect effects on geology and mineral resources are expected to be moderate and permanent on the tract.

As of March 2, 2017, 254 CBNG wells and 135 oil and gas wells had been permitted within three miles of the BAN tract (Wyoming Oil and Gas Conservation Commission [WOGCC 2016]). Fifty-six CBNG wells have been permitted within the BAN tract. There are 47 CBNG wells completed within the tract, with one of those wells currently producing gas. CBNG would be recovered from

the Wyodak coal seam within the BAN tract until mining approaches near enough to the wells to result in loss through venting and/or depletion of hydrostatic pressure. CBNG reserves not recovered from the Wyodak coal seam prior to mining would be vented to the atmosphere. As of March 2, 2017, eight conventional oil and gas wells had been permitted within the BAN tract; all eight of the wells have been abandoned. There are existing facilities and equipment associated with CBNG production and development within the tract. The direct effects on CBNG resources resulting from the Proposed Action are expected to be moderate and permanent for CBNG on the BAN tract due to the loss of any remaining CBNG within the Wyodak coal seam. Current conventional oil and gas drilling techniques (horizontal drilling) allow extraction of oil and gas from areas not available using vertical drilling techniques (USEIA 1993). Therefore, the effects would be minor and short term for conventional oil and gas due to the surface disturbance that could prohibit recovery of the resource.

Section 3.3.3 of the 2009 SGAC EIS provides a detailed discussion of BAN paleontological resources (BLM 2009). No unique or significant paleontological resources have been identified or are suspected to exist on the BAM. As stated in the 2009 SGAC EIS, none of the fossil material found within the general South Gillette analysis area was considered to have much scientific significance; as a result, no specimens were collected. While vertebrate fossils appear to be very scarce, BLM imposed lease and permit conditions that require, should previously unknown, potentially significant paleontological sites be discovered, work in that area would stop and measures would be taken to assess and protect the site. The direct effects on paleontological resources resulting from the Proposed Action are expected to be moderate and permanent on the BAN tract.

#### *4.3.1.2 No Action Alternative*

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the federal coal included in the BAN tract. Impacts to the geological resources have resulted from current mining activity and therefore under this alternative, geological resources in the area would be similar to those under the Proposed Action although the impacts to the geological and paleontological resources on approximately 695.0 acres within the tract would not occur. Impacts to CBNG resources may still occur as a result of mining activities in adjacent lands.

#### **4.3.2 Cumulative Effects**

The cumulative impacts to geology, mineral resources, and paleontological resources would not be significantly different than those described in the 2009 SGAC EIS. The PRB coalfield encompasses an area of about 12,000 square miles. The USGS estimates that there are approximately 162 billion tons of recoverable coal in the PRB, of which, an estimated 25 billion tons are considered economically recoverable coal, with a maximum stripping ratio of 10:1 (USGS 2013). The cumulative effects would primarily be related to the existing BAM and Campbell County.

According to October 17, 2016 information from the WOGCC website, 21,360 CBNG wells have been drilled in Campbell County. The WOGCC records indicate that a majority of the wells produce from privately held or state minerals, while approximately 36.7 percent of the wells (7,846 of 21,360) produce from federal minerals. Status of these wells includes shut-in, producing, plugged and abandoned, and injection. Currently, one of the 21,360 CBNG wells permitted in the analysis

area is reported as being in production. The pace of CBNG development in Wyoming has recently slowed considerably (WOGCC 2016).

Impacts to paleontological resources as a result of the already-approved cumulative energy development occurring in the PRB consist of losses of plant, invertebrate, and vertebrate fossil material for scientific research, public education (interpretive programs), and other values. Losses have and would result from the destruction, disturbance, or removal of fossil materials as a result of surface-disturbing activities, as well as unauthorized collection and vandalism. A beneficial impact of surface mining can be the exposure of fossil materials for scientific examination and collection, which might never occur except as a result of overburden removal, exposure of rock strata, and mineral excavation. The cumulative effects on geology, mineral resources, and paleontology resulting from the Proposed Action are expected to be moderate and permanent.

### 4.3.3 Mitigation Measures

No mitigation measures would be necessary for geology or mineral resources. Should significant paleontological resources be encountered as a result of the Proposed Action, the appropriate agencies would be consulted.

## 4.4 Air Quality and Climate Change

### 4.4.1 Particulate Matter

#### 4.4.1.1 *Direct and Indirect Effects*

##### 4.4.1.1.1 Proposed Action

CCW projects that the annual coal production is expected to average 20 Mt with mining the remaining federal coal within the BAN tract (CCW 2016). BAM's currently approved air quality permit (P0014896) issued by WDEQ-AQD, limits annual coal production to 35 Mt of coal. According to CCW, production would continue for approximately 10.4 additional years under the Proposed Action. Public exposure to particulate emissions from surface mining operations is most likely to occur along publicly accessible roads and highways that pass through the area of the mining operations. Occupants of residences in the area could also be affected. As indicated on **map 3-1**, the closest residence is located approximately 3,300 feet from the tract disturbance and the closest public transportation route is the Bishop Road, which bisects the tract.

WDEQ-AQD issued air quality permit P0014896 for the BAM on June 3, 2015, based partially on an analysis using emission factors, estimation methods, and model selection consistent with WDEQ-AQD policy. Fugitive and point source emission inventories for PM<sub>10</sub> for the years 2014 through 2031 were developed for BAM based on site-specific information provided by the mine. A summary of modeling results is included in **appendix E**. The resultant PM<sub>10</sub> inventories were used to determine the years that would be modeled. Maximum PM<sub>10</sub> emission rates were predicted to occur during 2016 and 2017, based on estimated emissions of 1,486 and 1,443 tpy, respectively. The selection of these years should ensure that the maximum potential PM<sub>10</sub> impacts on ambient air quality are addressed. PM<sub>10</sub> inventories for the mining activities at the BAM were modeled for all years in the currently anticipated LOM. Fugitive emission sources, such as overburden and coal blasting events and truck dumps, and point sources, such as baghouse dust, were modeled using the Industrial Source Complex Long-term (ISCLT3) model to estimate average annual PM<sub>10</sub> concentrations. McVehil-Monnett Associates, Inc. (McVehil-Monnett) reviewed regulatory modeling techniques to select the most appropriate air quality dispersion model to simulate

dispersion of air pollutants emitted by the proposed project for a near-field air quality impact analyses (AQIA). Following WDEQ-AQD guidance, the ISCLT3 model was used in all modeling analysis (McVehil-Monnett 2014). The model evaluated overall maximum PM<sub>10</sub> emissions resulting from mining activities at the Caballo, Belle Ayr, Cordero Rojo, and Coal Creek mines (middle group of mines).

Redhorse Corporation (Redhorse) also conducted air quality modeling in 2016 for the Cordero Rojo Mine located immediately adjacent (south) of the BAM. Redhorse also used the ISCLT3 model to estimate average annual PM<sub>10</sub> concentrations for the years 2016 through 2035, for the Caballo, Belle Ayr, Cordero Rojo, and Coal Creek mines (middle group of mines) (Redhorse 2016). Based on mine plan parameters and highest emissions inventories, the years 2017 and 2023 were selected as the worst-case years for evaluation, since those years had the highest modeled PM<sub>10</sub> concentrations.

WDEQ-AQD does not require modeling of fugitive dust emissions to predict compliance with the 24-hour PM<sub>10</sub> NAAQS of 150 µg/m<sup>3</sup> (WDEQ-AQD 2006). Compliance with the 24-hour PM<sub>10</sub> ambient air quality standard has been demonstrated by ambient air monitoring conducted at BAM and other nearby mines. A discussion of PM<sub>10</sub> monitoring results for the BAM is included in **section 3.1.4.1**. There have been no recorded exceedances of the NAAQS or WAAQS 24-hour PM<sub>10</sub> at the BAM.

While the results were slightly different, the two models indicated that the currently projected mine activities will be in compliance with the annual PM<sub>10</sub> ambient air standard for the LOM. Coal production in all years was modeled at the maximum permitted production level of 35 Mt (McVehil-Monnett 2014 and Redhorse 2016). The results of annual dispersion modeling are included in **table 4-4**. The locations of the maximum-modeled annual PM<sub>10</sub> concentrations for 2016 and 2017 (BAM) are shown on **map 4-1** and the locations of the maximum-modeled annual PM<sub>10</sub> concentrations for 2017 and 2023 (Cordero Rojo) are shown on **map 4-2**. A discussion of PM<sub>10</sub> monitoring results for the 2009 through 2016 period for the BAM is included in **section 3.1.4.1**. Based on the information included in **section 3.1.4.1**, the BAM would not cause or contribute to a violation of the federal 24-hour PM<sub>10</sub> NAAQS of 150 µg/m<sup>3</sup>. Note that **maps 4-1** and **4-2** also include references to NO<sub>2</sub>, which is discussed in **section 4.4.3**.

An inventory of all point sources, controls, and emissions for the P0014896 air quality permit showed the potential to emit a maximum of 37.9 tpy of PM<sub>10</sub>; therefore, as discussed in **chapter 3**, a PSD increment consumption analysis was not necessary. Since the maximum potential to emit is below the 100 tpy major source threshold limit specified in Chapter 6, Section 3 of the WAQSR, the BAM will not be subject to the Title V Operating Permit program (McVehil-Monnett 2014).

There have been no recorded exceedances of the 24-hour PM<sub>10</sub> NAAQS or the annual PM<sub>10</sub> WAAQS. In addition, the 2014 ISCLT3 modeling conducted for the years 2014 through 2031 for the current BAM AQ permit and the 2016 ISCLT3 modeling conducted for the current Cordero Rojo Mine AQ permit predicted no future exceedances of the annual PM<sub>10</sub> AAQS for the combined emissions at the Caballo, Belle Ayr, Cordero Rojo, and Coal Creek mines (McVehil-Monnett 2014 and Redhorse 2016, respectively). At the estimated average annual production rate of 20 Mt there would be an extension of approximately 10.4 years in the duration of coal production. Also, an increase in overburden thickness within the BAN tract would occur; however, fugitive dust

**Table 4-4. McVehil-Monnett and Redhorse Annual Particulate Matter PM<sub>10</sub> and NO<sub>2</sub> Dispersion Modeling Results**

Pollutant	Modeled Concentration <sup>a</sup> (µg/m <sup>3</sup> )	Background Concentration (µg/m <sup>3</sup> )	Total Concentration <sup>b</sup> (µg/m <sup>3</sup> )	NAAQS/ WAAQS (µg/m <sup>3</sup> )
<b>McVehil- Monnett</b>				
	<b>2016</b>	<b>Mine</b>	<b>Year</b>	
PM <sub>10</sub>	36.78	9.00	45.78	50 <sup>c</sup>
NO <sub>2</sub>	34.94	14.00	48.94	100
	<b>2017</b>	<b>Mine</b>	<b>Year</b>	
PM <sub>10</sub>	34.47	9.00	43.97	50 <sup>c</sup>
NO <sub>2</sub>	31.99	14.00	45.99	100
<b>Redhorse</b>				
	<b>2017</b>	<b>Mine</b>	<b>Year</b>	
PM <sub>10</sub>	26.06	9.50	35.56	50 <sup>c</sup>
NO <sub>2</sub>	30.67	20.00	50.67	100
	<b>2023</b>	<b>Mine</b>	<b>Year</b>	
PM <sub>10</sub>	15.58	9.50	25.08	50 <sup>c</sup>
NO <sub>2</sub>	23.18	20.00	43.18	100

<sup>a</sup> PM<sub>10</sub> modeled concentrations include the Belle Ayr, Caballo, Coal Creek, and Cordero Rojo mines plus background (Redhorse 2017 PM<sub>10</sub> total does not include Caballo Mine per Redhorse report)

NO<sub>2</sub> modeled concentrations include the Belle Ayr, Caballo, Coal Creek, and Cordero Rojo mines, a regional concentration plus background

<sup>b</sup> The total includes modeled concentrations for the Belle Ayr, Caballo, Coal Creek, and Cordero Rojo mines plus background

<sup>c</sup> WAAQS standard only (no annual standard for NAAQS). Violation occurs with more than one expected exceedance per calendar year

Source: McVehil-Monnett (2014) and Redhorse (2016)

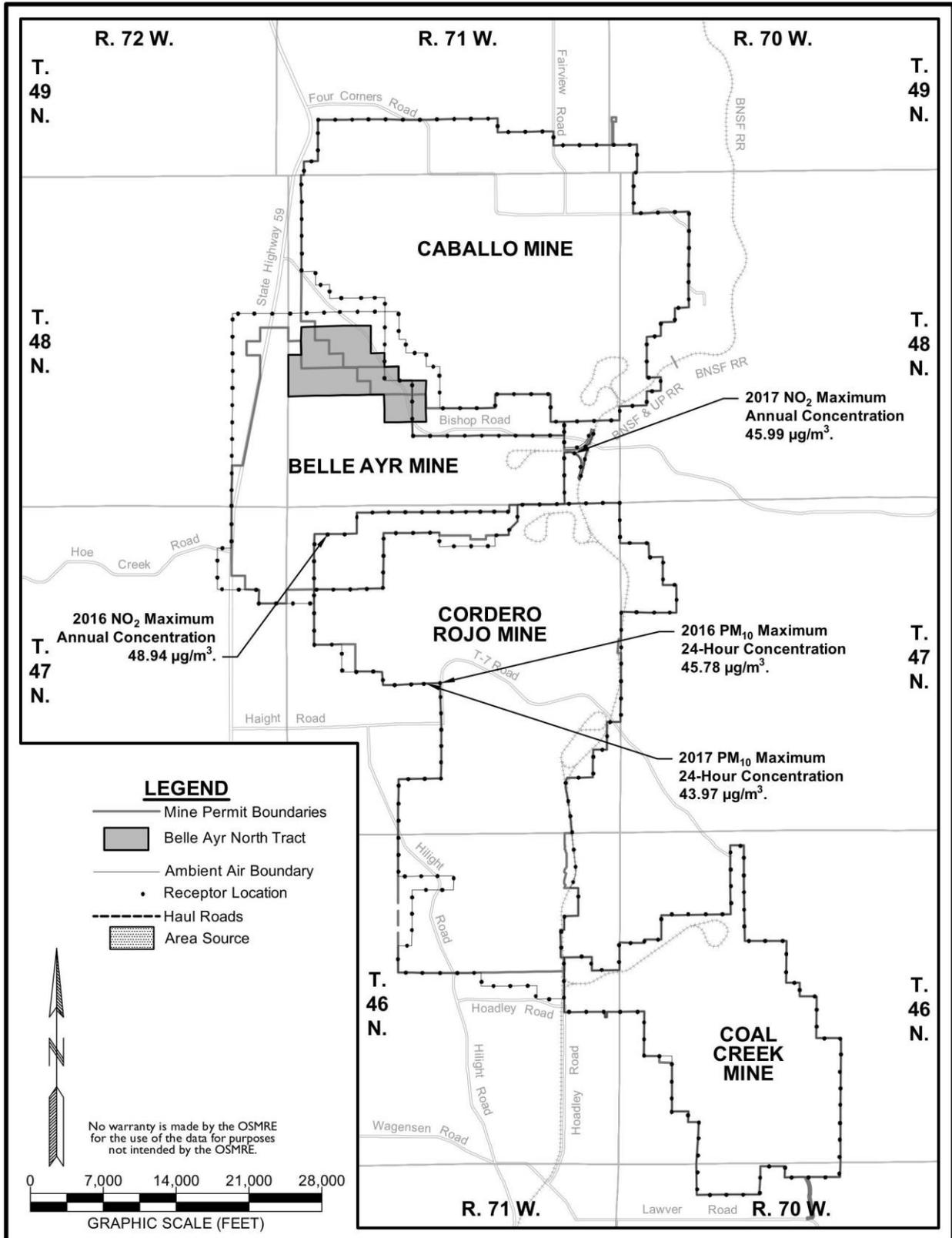
emissions are projected to remain within 24-hour and annual NAAQS and WAAQS limits (McVehil-Monnett 2014).

As indicated in **table 3.4**, the highest concentrations of PM<sub>2.5</sub> recorded at Site BA-4 (24 µg/m<sup>3</sup>- 24-hour and 7.3 µg/m<sup>3</sup> – annual; excluding an event that was flagged as exceptional on July 4, 2012) were well below the PM<sub>2.5</sub> NAAQS, which are 35 µg/m<sup>3</sup> for the 24-hour period and 15 µg/m<sup>3</sup> for the annual average. Assuming future PM<sub>2.5</sub> concentrations would be proportional to previous concentrations, based on coal production levels consistent with the 2009 through 2016 average annual production and related emissions, the proposed modifications to the BAM federal mining plan would not significantly increase monitored values, nor would they cause the monitored values to approach the PM<sub>2.5</sub> NAAQS. Also, based on monitoring data in the PRB, annual and 24-hour PM<sub>2.5</sub> NAAQS and WAAQS are not projected to be exceeded.

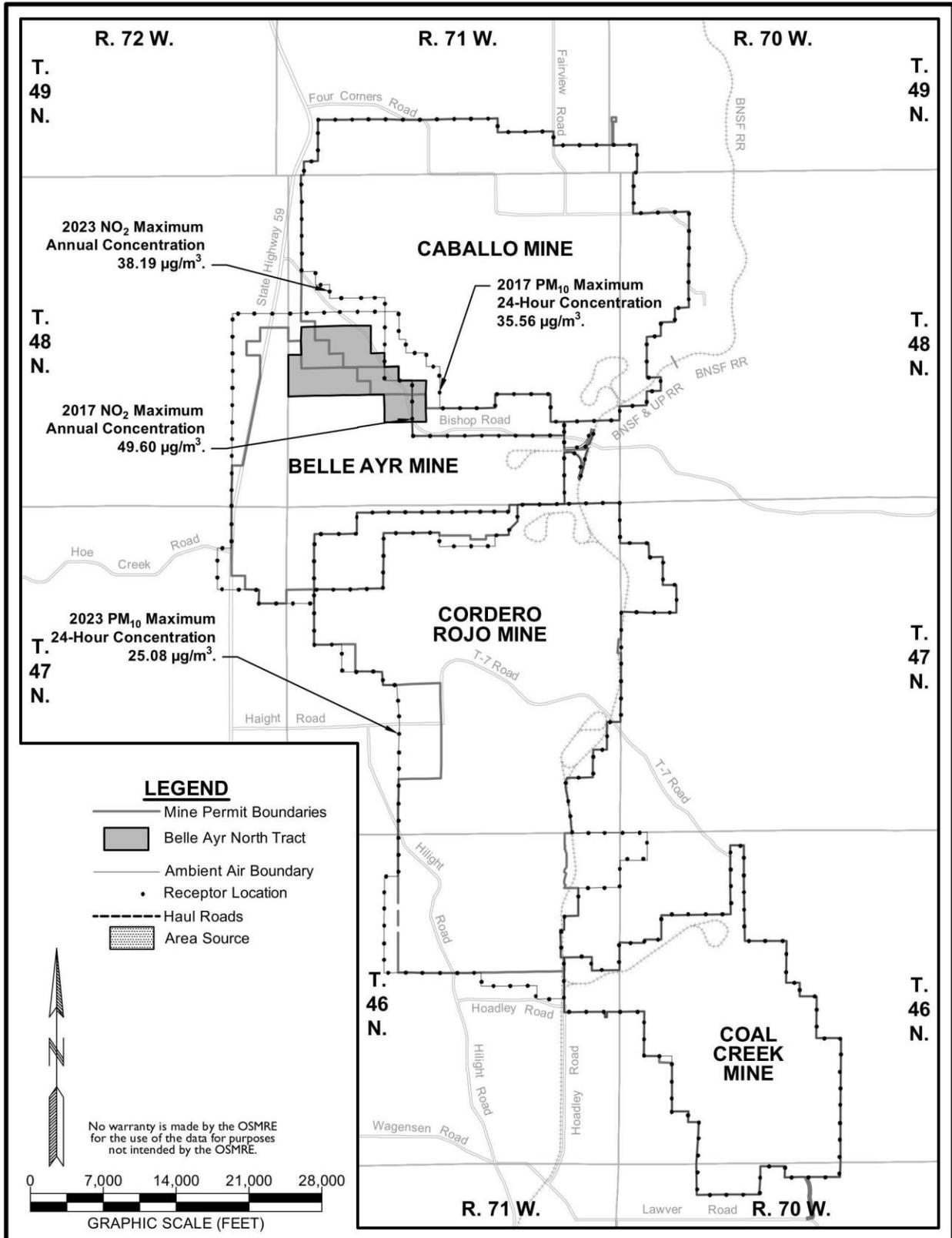
Public exposure to particulate emissions from surface mining operations is most likely to occur along publicly accessible roads and highways that are adjacent to the area of the mining operations. Occupants of residences in the area could also be affected. Although modeling indicates that there would be no exceedances of particulate matter as a result of the Proposed Action, the direct and indirect effects related to particulate matter emissions could affect local residences and are therefore listed as moderate but short term (10.4 years) on the BAN tract.

#### 4.4.1.1.2 No Action Alternative

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the federal coal included in the BAN tract. Impacts from particulate



**Map 4-1. Maximum Modeled PM/10 and NO<sub>2</sub> Concentrations at the South Gillette Area for the Years 2016 and 2017, McVehil-Monnett Modeling**



**Map 4-2. Maximum Modeled PM<sub>10</sub> and NO<sub>2</sub> Concentrations at the South Gillette Area for the Years 2017 and 2023, Redhorse Modeling**

matter emissions have resulted from current mining activity and therefore under this alternative, particulate matter emission impacts in the area would be similar to those under the Proposed Action but would not be extended for an additional 10.4 years.

#### 4.4.1.2 Cumulative Effects

The locations of PM<sub>10</sub> and PM<sub>2.5</sub> emission monitoring samplers within Coal Mine Subregion 2 (Belle Ayr, Coal Creek, Caballo, and Cordero Rojo mines) are depicted on **map 3-2**. Monitoring during the 2009-2016 period demonstrated that ambient concentrations of PM<sub>10</sub> were within established short-term (24-hour) NAAQS and WAAQS presented in **table 4-5**. During this period, no exceedances of the PM<sub>10</sub> standards were reported at the Belle Ayr, Coal Creek, Caballo, or Cordero Rojo mines. The highest 24-hour average concentration reported from any individual station during the 2009-2016 monitoring period was 122 µg/m<sup>3</sup>, recorded at Caballo/C-8A/B (56-005-0886). This site is approximately 4 miles east of the BAN tract.

**Table 4-5. PM<sub>10</sub> Concentration Values (First Maximum Value - µg/m<sup>3</sup>) for 2009-2016 Associated with the Middle Group<sup>2</sup> of Mines in the PRB.**

Location/Site Name/AQS Site ID <sup>3</sup>	2009	2010	2011	2012	2013	2014	2015	2016
South Campbell County/Campbell County/56-005-0456	43	36	41	71	39	52	135	34
Belle Ayr/BA-1/56-005-0802	28	29	51	45	27	28	49	44
Belle Ayr/BA-3/56-005-0893	25	31	46	48	34	38	52	27
Belle Ayr/BA-4/56-005-0892	50	55	69	54	39	43	66	38
Caballo/C-8A/B/56-005-0886	117	122	98	99	84	55	80	52
Caballo/C-9/56-005-0908	72	67	69	76	64	54	72	76
Coal Creek/CCM 7-1/56-005-0841	24	26	32	45	30	21	51	20
Coal Creek/Site 26/56-005-0890	32	44	38	49	**	**	**	**
Coal Creek/Site 3/56-005-0303	**	**	**	65	56	39	51	31
Cordero/CRC-E10A/56-005-0885	86	66	83	108	68	67	88	52
Cordero Rojo/CRM-W11 Hilight Road/56-005-1003	**	**	66	63	55	60	51	35
Cordero Rojo/Site W/56-005-0883	83	83	53	**	**	**	**	**
Cordero/Hv-3/PM-3/56-005-0889	54	54	27	**	**	**	**	**
Cordero Rojo/CRM-S11/56-005-1009	**	**	47	68	41	46	56	57

<sup>1</sup> The standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 µg/m<sup>3</sup>, as determined in Appendix K, 40 CFR Part 50, is equal to or less than 1

<sup>2</sup> Belle Ayr, Caballo, Cordero Rojo, and Coal Creek mines (See **map 3-2**)

<sup>3</sup> See **map 3-2** for site locations

\*\* Indicates that the site is inactive  
Source: WDEQ-AQD (2016)

The adjacent middle group of mines would contribute cumulative particulate matter emissions to the surrounding area. PM<sub>10</sub> modeling conducted for the current BAM and Cordero Rojo air quality permits each included the effects of the adjacent middle group of mines. The models indicated that the mining activities at the middle group of mines would not contribute to a violation of the WAAQS annual PM<sub>10</sub> of 50 µg/m<sup>3</sup> or the WAAQS or NAAQS 24-hour standards of 150 µg/m<sup>3</sup> (McVehil-Monnett 2014 and Redhorse 2016). Cumulative impacts from particulate matter emissions could be higher in the short term (10.4 years) in this area due to coal mining activities if surface inversions occur in the middle portion of the PRB. This would be temporary, lasting only during the inversion event. Air quality impacts would cease to occur after mining and reclamation are completed. Although modeling indicates that there would be no exceedances particulate

matter as a result of the Proposed Action, the cumulative effects from particulate matter emissions could affect local residences and are therefore listed as moderate but short term (10.4 years) on the BAN tract. The effects of particulate matter emissions from coal combustion are included in **section 4.4.3**.

#### 4.4.1.3 *Mitigation Measures*

No mitigation measures beyond those required by the BAM air quality permit would be required for emissions of particulate matter.

### 4.4.2 Emissions of Carbon Monoxide (CO), Sulfur Dioxide (SO<sub>2</sub>), and Lead (Pb)

#### 4.4.2.1 *Direct and Indirect Effects*

##### 4.4.2.1.1 Proposed Action

CCW projects that the annual coal production is expected to average 20 Mt, with mining of the federal coal associated with the BAN tract (CCW 2016). BAM's currently approved air quality permit from WDEQ limits annual coal production to 35 Mt of coal. According to CCW, the recovery of federal coal would continue at an average rate of 20 Mtpy for approximately 10.4 additional years under the Proposed Action. The BAM is not required to monitor CO, SO<sub>2</sub>, or Pb so a direct comparison between current CO, SO<sub>2</sub>, or Pb at the mine and state or federal standards is not possible.

SO<sub>2</sub> monitoring data were available from Wyodak Site 4 (560050857), which is approximately 11 miles north of the BAN tract. As presented in **table 3-8**, SO<sub>2</sub> data collected at the Wyodak Site 4 were below the 1-hour NAAQS and WAAQS 99th percentile concentration of 75 ppb, indicated in **table 3-3**. Therefore, it is likely that ambient air quality within the vicinity of the proposed action is currently in compliance with the SO<sub>2</sub> WAAQS and NAAQS.

Hg emissions data collected from three coal-fired power plants located in Campbell County are shown in **table 3-9**. A direct comparison between the monitored values at the power plants and NAAQS and WAAQS is not possible since the monitored values were presented in pounds, rather than the NAAQS and WAAQS units (µg/m<sup>3</sup>). In lieu actual comparisons of Pb emissions with NAAQS and WAAQS, WDEQ-AQD annual inspection reports stated that the Dry Fork Station power plant (DFS) appeared to be operating in compliance with all applicable Wyoming Air Quality Standards & Regulations (WAQS&R), including those for Hg (WDEQ-AQD 2011, 2012, 2013a, 2013b, 2014, and 2015b).

Pb emissions data collected in Campbell County from three coal-fired power plants, one mine, and one AQS site are shown in **table 3-10**. A direct comparison between the monitored values at the power plants/ mine and NAAQS and WAAQS is not possible since the monitored values were presented in pounds, rather than the NAAQS and WAAQS units (µg/m<sup>3</sup>). In lieu actual comparisons of Pb emissions with NAAQS and WAAQS, WDEQ-AQD annual inspection reports stated that DFS appeared to be operating in compliance with all applicable Wyoming Air Quality Standards & Regulations (WAQS&R), including those for Pb (WDEQ-AQD 2011, 2012, 2013a, 2013b, 2014, and 2015b). The 2011-2015 monitoring results from the Thunder Basin AQS site showed that annual 1<sup>st</sup> maximum Pb monitoring values were well below the 90-day average NAAQS and WAAQS of 0.15 µg/m<sup>3</sup>.

CO is not monitored in Campbell County, therefore the effects of CO emissions from the Proposed Action are difficult to assess based on monitored values. However, there are currently no counties/cities in Wyoming, Montana, or South Dakota that are considered as nonattainment for CO, based on NAAQS and WAAQS (EPA 2017b).

Coal recovery would continue within the BAM permit boundary at an estimated annual rate of 20 Mt, which is consistent with the 2009 through 2016 average annual recovery rate. Given the results of ongoing SO<sub>2</sub>, Hg, and Pb monitoring in the area that show not exceedances of these AQ parameters, the effects of emissions of CO, SO<sub>2</sub> and Pb from the Proposed Action would be minor.

#### 4.4.2.1.2 No Action Alternative

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the coal included in the BAN tract. Impacts from CO, SO<sub>2</sub>, and Pb emissions have resulted from current mining activity and therefore the impacts related to CO, SO<sub>2</sub>, and Pb emissions under the No Action Alternative would be similar to those under the Proposed Action but would not be extended for an additional 10.4 years.

#### *4.4.2.2 Cumulative Effects*

The adjacent middle group of mines would contribute additional CO, SO<sub>2</sub>, and Pb emissions to the surrounding area. Based on past monitoring, the permit modification request would not likely increase CO, SO<sub>2</sub>, or Pb emissions since coal recovery would continue at an estimated annual rate that is consistent with the 2009 through 2016 average annual recovery rate. While cumulative impacts from CO, SO<sub>2</sub>, and Pb could be higher in the short term in this area due to coal mining activities if surface inversion occurs in the northern portion of the PRB, this would be temporary, lasting only during the inversion. Air quality impacts would cease to occur after mining and reclamation are complete. Therefore, the cumulative effects from CO, SO<sub>2</sub>, and Pb emissions are expected to be minor and they would be extended by approximately 10.4 years.

#### *4.4.2.3 Mitigation Measures*

No mitigation measures beyond those required by the BAM air quality permit would be required for emissions of CO, SO<sub>2</sub> and Pb.

### **4.4.3 Emissions of Nitrogen Oxides (NO<sub>x</sub>) and Ozone (O<sub>3</sub>)**

#### *4.4.3.1 Direct and Indirect Effects*

##### 4.4.3.1.1 Proposed Action

Fugitive and point source NO<sub>2</sub> emission inventories for the years 2014 through 2031 were developed for the BAM based on site-specific information provided by the mine. Modeling for NO<sub>x</sub> for the years 2016 through 2035 was also conducted in 2016 for the Cordero Rojo Mine, which is immediately adjacent (south) of the BAM. The resultant NO<sub>2</sub> inventories were used to determine the years that would be modeled. Maximum NO<sub>x</sub> emission rates were predicted to occur during 2016 and 2017 using the BAM site-specific model and during 2017 and 2023 using the Cordero Rojo modeling. The selection of these years should ensure that the maximum potential NO<sub>x</sub> impacts on ambient air quality are addressed.

The approval of the WDEQ-AQD issued air quality permit P0014896 for the BAM was based partially on an analysis of NO<sub>2</sub> dispersion modeling, which was consistent with WDEQ-AQD policy. NO<sub>2</sub> modeling closely followed many of the same procedures used in the PM<sub>10</sub> analysis. Emissions were apportioned in a similar manner, and the same meteorological data set was used. Emissions were modeled as NO<sub>x</sub>, and the final concentrations were multiplied by 0.75 to account for chemical conversion to NO<sub>2</sub>. Background concentrations of 14.0 µg/m<sup>3</sup> and 20.0 µg/m<sup>3</sup> NO<sub>2</sub> were then added to the model results to obtain the total impact (McVehil-Monnett 2014 and Redhorse 2016).

While resulting in slightly different results, the two models indicated that the currently projected mine activities will be in compliance with the annual NO<sub>x</sub> ambient air standard for the LOM (**table 4-3**). The locations of the maximum-modeled annual NO<sub>2</sub> concentrations for 2016 and 2017 (BAM modeling) are shown on **map 4-1** and the locations of the maximum-modeled annual NO<sub>2</sub> concentrations for 2017 and 2023 (Cordero Rojo modeling) are shown on **map 4-2**. The annual NAAQS and WAAQS are 100 µg/m<sup>3</sup> (53 ppb). The potential NO<sub>2</sub> impacts from mining the BAN tract have been inferred to be similar to the currently permitted impacts of mining the existing coal leases at the BAM because of the similarities in mining rates and mining operations.

Public exposure to emissions caused by surface mining operations is most likely to occur along publicly accessible roads and highways that pass through the area of the mining operations. Occupants of dwellings in the area could also be affected. There are occupied dwellings located approximately 3,300 feet southwest of the BAN tract. There are currently no bus stops along the Bishop Road within the tract. The mine uses small blasts that are loaded and detonated on the same day, which greatly reduces the potential to produce NO<sub>x</sub>. There have been no reported events of public exposure to NO<sub>2</sub> from blasting activities at the BAM through December 2015 (Emme 2015).

As indicated in **section 3.1.4.2**, O<sub>3</sub> monitoring is not required by WDEQ-AQD at PRB mines but levels have been monitored at WDEQ-AQD operated and maintained ambient air quality monitor sites in the PRB since 2001. No violations of the 8-hour O<sub>3</sub> NAAQS have occurred at the Thunder Basin National Grassland (56-005-0123), north of I-90, or the Campbell County monitoring site (56-005-0456), located in the PRB, south of I-90.

As stated above, there have been no reported events of public exposure to NO<sub>2</sub> from blasting activities at the BAM through December 2015 and there have been no violations of the NAAQS or WAAQS 8-hour O<sub>3</sub> standards in Campbell County during the 2009-2016 monitoring period. Coal recovery would continue within the BAM permit boundary at an estimated annual rate of 20 Mt, which is consistent with the 2009 through 2016 average annual recovery rate. While the results from ongoing monitoring show no violations of NO<sub>x</sub> or O<sub>3</sub> NAAQS or WAAQS standards in Campbell County, the slight potential for exposure to NO<sub>x</sub> and O<sub>3</sub> emissions suggests that the direct and indirect effects from emissions resulting from the Proposed Action would be moderate for NO<sub>x</sub> and minor for O<sub>3</sub>. The effects would be short term (10.4 years) on the BAN tract.

#### 4.4.3.1.2 No Action Alternative

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the federal coal included in the BAN tract. Impacts from NO<sub>x</sub> and O<sub>3</sub> emissions have resulted from current mining activity and therefore the impacts related to NO<sub>x</sub>

and O<sub>3</sub> emissions under the No Action Alternative would be similar to those under the Proposed Action but would not be extended for an additional 10.4 years.

#### 4.4.3.2 Cumulative Effects

The adjacent middle group of mines would contribute cumulative NO<sub>x</sub> and O<sub>3</sub> emissions to the surrounding area. NO<sub>x</sub> modeling conducted for the current BAM and Cordero Rojo air quality permits each included the effects from the adjacent middle group of mines. The models predicted that mining activities at the middle group of mines would not contribute to a violation of the NAAQS or WAAQS annual NO<sub>2</sub> of 100 µg/m<sup>3</sup> (53 ppb) (McVehil-Monnett 2014 and Redhorse 2016). Cumulative impacts from NO<sub>x</sub> could be higher in the short term (10.4 years) in this area due to coal mining activities if surface inversion occurs in the northern portion of the PRB. This would be temporary, lasting only during the inversion. NO<sub>x</sub> impacts would cease to occur after mining and reclamation are complete.

O<sub>3</sub> has been monitored at AQS sites 56-005-0123 and 56-005-0456 (**map 3-1**) since 2009. Monitoring at the two sites provide an estimate of cumulative O<sub>3</sub> emissions effects. No exceedances of the 8-hour or O<sub>3</sub> standard have occurred at the monitoring sites during the 2009 through 2016 monitoring period.

The cumulative effects from NO<sub>x</sub> and O<sub>3</sub> emissions are expected to be moderate and they would be extended by approximately 10.4 years under the Proposed Action.

#### 4.4.3.3 Mitigation Measures

No mitigation measures beyond those required by the BAM air quality permit would be required for emissions of NO<sub>x</sub> or O<sub>3</sub>.

### 4.4.4 Air Quality Related Values (AQRVs)

#### 4.4.4.1 Direct and Indirect Effects

##### 4.4.4.1.1 Proposed Action

##### Visibility

Since the BAN tract is adjacent to the current BAM, the impacts to visibility from mining the BAN tract have been inferred from the currently permitted impacts from mining the existing coal leases at the BAM.

Current techniques for blasting, coal removal, and coal processing would be expected to continue for a longer period of time than is shown in the BAM's currently approved air quality permit. Material movement would continue utilizing direct cast blasting, draglines, and/or truck and shovel fleets for overburden and truck and shovel fleets and overland conveyors for coal. The BAM would not propose significant changes to the facilities shown in the current air quality permit or the blasting procedures or blast sizes. However, the blasting processes and required mitigation measures would be reviewed when the mining permit is amended to include the coal within the BAN tract, and the blasting plan would be modified to incorporate best available control technology (BACT) protection measures that are in effect at that time. Impacts to visibility under the Proposed Action would be minor but they would be extended by approximately 10.4 years.

### Acidification of Lakes/Acid Deposition

Because the BAM is not required by WDEQ-AQD to monitor H<sub>2</sub>S, a direct comparison to WAAQS standards is not possible. Since factors affecting H<sub>2</sub>S emissions would not change as a result of the Proposed Action, the direct and indirect effects have been inferred from the currently permitted impacts of mining the existing coal leases at the BAM. As indicated in **table 4-6**, the 2011-2015 trend in hydrogen ion (H<sup>+</sup>) concentrations at monitoring site WY99 (see **map 3-1**) appears to be relatively stable. Based on this comparison of the current information available, the Proposed Action is not expected to contribute to increased direct or indirect effects to acidification of lakes or acid deposition that may impact soils.

**Table 4-6. Measured Hydrogen Ion (H<sup>+</sup>) Concentrations<sup>1</sup> at Monitoring Site WY99, 2011–2015**

Parameter	2011	2012	2013	2014	2015
pH	5.7	5.8	5.8	5.7	5.8
Wet (kg/hectare)	0.01	<0.01	0.01	0.01	0.01

<sup>1</sup> Measures as pH and WET (whole effluent toxicity) deposition  
Source: National Atmospheric Deposition Program (2011-2015)

#### 4.4.4.1.2 No Action Alternative

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the federal coal included in the BAN tract. Impacts to air quality related values have resulted from current mining activity and therefore the impacts related to AQRVs under the No Action Alternative would be similar to those under the Proposed Action but would not be extended for an additional 10.4 years.

#### 4.4.4.2 Cumulative Effects

The cumulative AQRVs would be effected by mines in Campbell County. One method of evaluating the cumulative effects of the Proposed Action on AQRVs would be to assess the air quality index (AQI) for Campbell County. As described by the AirNow website, the AQI provides an index of how clean or polluted the air is within an area, and what associated health effects might be a concern (AirNow 2016). The AQI focuses on health affects experienced within a few hours or days after breathing polluted air. EPA calculates the AQI for five major air pollutants regulated by the Clean Air Act: ground-level O<sub>3</sub>, particle pollution (also known as particulate matter), CO, SO<sub>2</sub>, and NO<sub>2</sub>. For each of these pollutants, EPA has established national air quality standards to protect public health. Ground-level O<sub>3</sub> and airborne particles are the two pollutants that pose the greatest threat to human health in this country. The AQI evaluates air quality based on six levels (categories) of health concern that correspond to a different level of health concern.

The six categories of health concern are:

**Good** - Number of days in the year having an AQI value 0 through 50, indicating that air quality is considered satisfactory, and air pollution poses little or no risk.

**Moderate** - Number of days in the year having and AQI value 51 through 100, which means that air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution.

**Unhealthy for Sensitive Groups** - Number of days in the year having an AQI value 101 through 150, where members of sensitive groups may experience health effects. The general public is not likely to be affected.

**Unhealthy** - Number of days in the year having an AQI value 151 through 200. Everyone may begin to experience health effects; members of sensitive groups may experience more serious health effects.

**Very Unhealthy** - Number of days in the year having an AQI value 201 or higher. This category is a health alert: everyone may experience more serious health effects.

**Hazardous** - Number of days in the year having an AQI greater than 300. This would trigger a health warnings of emergency conditions with the entire population more likely to be affected.

According to information obtained from the AirNow Website for Campbell County, approximately 98.9 percent of the days between 2012 and 2016 were classified as having a good or moderate AQI and no days were classified as very unhealthy or hazardous (**table 4-7**).

**Table 4-7. Average Annual Campbell County Air Quality Index Values, 2009-2016.**

	Days With AQI	Good	Moderate	Unhealthy for Sensitive Groups	Unhealthy	Very Unhealthy	Hazardous
2009	365	217	147	1	0	0	0
2010	365	223	139	3	0	0	0
2011	365	201	159	4	1	0	0
2012	366	130	221	13	2	0	0
2013	365	222	142	1	0	0	0
2014	365	262	102	1	0	0	0
2015	365	252	110	2	1	0	0
2016 <sup>1</sup>	274	195	79	0	0	0	0
<b>Average</b>	--	<b>212.8</b>	<b>137.4</b>	<b>3.1</b>	<b>1.0</b>	<b>0</b>	<b>0</b>
Percent of Total Average	--	60.1%	38.8%	0.9%	0.1%	0.0%	0.0%

<sup>1</sup> Annual statistics for 2016 are not final until May 1, 2017

Source: EPA (2017)

Mercury is a heavy metal that is a known persistent, bioaccumulative, and toxic (PBT) substance that occurs naturally in coal. Air releases of mercury are associated with a variety of important environmental and human health consequences (CEC 2011). Power plants can release trace metals, such as mercury, during the combustion of coal to generate electricity.

The Proposed Action would not increase Hg emissions but would extend the current emissions rate by approximately 10.4 years. Based on an average of 20 Mtpy, the estimated Hg emissions resulting from the proposed action would contribute approximately 0.032 ton of Hg emissions per year for an additional 10.4 years (WWC 2017).

Blasting, coal crushing, loading and hauling of coal, moving equipment, and other activities associated with surface coal mining and the combustion of coal at power plants produce particulates that can be released into the air, which could impact AQRVs. However, specific end user locations are unknown and can fluctuate based on market conditions. The cumulative effects on AQRVs are expected to be minor but they would be extended by approximately 10.4 years.

Impacts to AQRVs from mining the federal coal within the BAN tract would cease to occur after mining and reclamation are completed.

#### 4.4.4.3 *Mitigation Measures*

No mitigation measures beyond those required by the BAM air quality permit would be required for visibility.

### 4.4.5 **Air Quality Related to Coal Combustion**

#### 4.4.5.1 *Direct and Indirect Effects*

##### 4.4.5.1.1 Proposed Action

Emissions that affect air quality also result from combustion of fossil fuels. Comprehensive emission summaries are available for particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>), SO<sub>2</sub>, nitrogen oxides (sum of NO and NO<sub>2</sub>), VOC, and CO. **Table 4-8** presents the PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, NO<sub>2</sub>, Hg, and CO emissions estimates from coal mined at the BAM used for power generation. Emission estimates for 2017 through 2027 are also provided based on the projected average coal recovery for the time period. Using information from **table 4-8**, comparisons can be made between combustion emissions from coal mined BAM and emissions from coal mined from Campbell County. Total U.S. emissions are also included in the table.

Hg is a heavy metal that is a known persistent, bioaccumulative and toxic (PBT) substance that occurs naturally in coal. Air releases of Hg are associated with a variety of important environmental and human health consequences (CEC 2011). Power plants can release trace metals, such as Hg, during the combustion of coal to generate electricity. The Hg emissions from BAM supplied coal-fired power plants are indicated in **table 4-8**. Based on an average of 20 Mtpy, the estimated Hg emissions resulting from the proposed action would contribute approximately 0.6 ton of Hg emissions per year for an additional 10.4 years (WWC 2017). Therefore, the Proposed Action would not increase Hg emissions but would extend the emissions by approximately 10.4 years.

Impacts to air quality related to coal combustion under the Proposed Action would be similar to the conditions currently experienced and the anticipated future production at the BAM is consistent with the 2009 through 2016 average annual recovery rate. In addition, when compared to emissions from Campbell County mines, direct and indirect effects would be minor (approximately 5.2 percent of the Campbell County average emissions) but they would be extended by approximately 10.4 years.

##### 4.4.5.1.2 No Action Alternative

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the federal coal included in the BAN tract. Impacts from combustion of coal mined at the BAM have resulted from current mining activity and therefore the impacts related to air quality impacts from combustion under the No Action Alternative would be similar to those under the Proposed Action but would not be extended for an additional 10.4 years.

#### 4.4.5.2 *Cumulative Effects*

The cumulative impacts from coal combustion would be effected by mines in Campbell County. Comprehensive emission summaries are available for particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>), SO<sub>2</sub>, nitrogen oxides (sum of NO and NO<sub>2</sub>), VOC, and CO. **Table 4-8** presents the PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>,

**Table 4-8. Estimated Annual PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, NO<sub>x</sub>, and Hg Contributions from Combustion of Coal Mined at the BAM for 2009-2016 and 2017-2027, Compared to Campbell County and U.S. Total Emissions**

Year	Coal Recovered (Mt)	PM <sub>10</sub> (Tons)	PM <sub>2.5</sub> (Tons)	SO <sub>2</sub> Emissions (Tons)	NO <sub>2</sub> Emissions (Tons)	Hg Emissions (Tons)	CO Emissions (Tons)
2009	28.7	19,911.2	6,072.9	250,739.6	103,161.4	1.2	7,164.0
2010	25.8	17,903.1	5,460.5	225,452.7	92,757.7	1.1	6,441.5
2011	24.6	17,080.4	5,209.5	215,092.6	88,495.2	1.0	6,145.5
2012	24.2	16,834.4	5,134.5	211,993.7	87,220.2	1.0	6,057.0
2013	18.3	12,686.9	3,869.5	159,765.6	65,732.1	0.8	4,564.7
2014	15.8	10,976.0	3,347.7	138,219.9	56,867.6	0.7	3,949.1
2015	18.3	12,728.4	3,882.2	160,288.0	65,947.1	0.8	4,579.7
2016	14.8	10,307.0	3,143.6	129,795.6	53,401.6	0.6	3,708.4
2017-2027 Annual Average	20.0	13,896.7	4,238.5	175,000.0	72,000.0	0.8	5,000.0
Total Campbell County <sup>1</sup>	386.2	268,345.3	81,845.3	3,379,250.0	1,390,320.0	16.0	96,550.0
2017-2027 Average Percent of Campbell Co.	--	5.2%	5.2%	5.2%	5.2%	5.2%	5.2%
Total U.S. Emissions (2015)	824.8	573,077.7	174,788.7	7,216,720.0	2,969,164.8	34.2	206,192.0
2017-2027 Average Percent of U.S.	--	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%

<sup>1</sup> Based on an estimated production of 386.2 Mt (average of 2011 through 2016 production)  
Source: WWC 2017, calculations provided in **appendix E**

NO<sub>x</sub>, and Hg emissions estimates from coal mined in Campbell County used for power generation for 2017 through 2027, based on the projected average coal recovery for the time period. Using information from **table 4-8**, comparisons can be made between combustion emissions from coal mined BAM and emissions from coal mined from Campbell County. Total U.S. emissions are also included in the table.

Cumulative Impacts to air quality related to coal combustion under the Proposed Action would be similar to the conditions currently experienced but they would be extended by approximately 10.4 years.

#### 4.4.6 Greenhouse Gas Emissions

As discussed in **section 3.1.4.4**, each GHG has a different lifetime in the atmosphere and a different ability to trap heat in the atmosphere, which is referred to as GWP. To allow different gases to be compared and added together, emissions can be converted into CO<sub>2</sub>e emissions.

##### 4.4.6.1 Direct and Indirect Effects

###### 4.4.6.1.1 Proposed Action

Emissions were estimated from combined sources based on annual coal recovered from 2012 through 2016 and known production and variables used to calculate CO<sub>2</sub>e emissions, and for the 2017-2029 period using estimated production and estimated variables (**table 4-9**). CO<sub>2</sub>e emissions are projected to remain constant at the BAM for the LOM. When compared to the 2009 through 2016 average annual coal production at the BAM, the Proposed Action would not increase annual production but would extend the life of the mine by approximately 10.4 years. The direct and indirect effects from GHG emissions at the mine resulting from the Proposed

**Table 4-9. Estimated Annual Equivalent CO<sub>2</sub> (CO<sub>2</sub>e) Emissions<sup>1</sup> for the Proposed Action at the BAM (2009 through 2016, and 2017-2027 Average)**

	2009	2010	2011	2012	2013	2014	2015	2016	2017-2027 Average
<b>General</b>									
Mt of Coal Recovered	28.7	25.8	24.6	24.2	18.3	15.8	18.3	14.8	20.0
Average Transport Miles (One Way)	1,090	1,090	999	1,009	1,003	1,073	1,009	1,030	1,038 <sup>3</sup>
Number of Train Trips (One Way)	1,852	1,666	1,589	1,566	1,180	1,021	1,184	959	1,512
<b>Direct Emissions Sources</b>									
Fuel	93,616	84,175	80,307	79,150	59,650	51,606	59,845	48,460	65,338
Electricity Consumed in Mining Process	76,514	68,798	65,636	64,691	48,753	42,178	48,913	39,608	53,402
Mining Process	32,888	29,572	28,213	27,806	20,956	18,130	21,024	17,025	22,954
<b>Total Direct Emissions</b>	<b>203,018</b>	<b>182,545</b>	<b>174,156</b>	<b>171,647</b>	<b>129,359</b>	<b>111,914</b>	<b>129,782</b>	<b>105,093</b>	<b>141,694</b>
<b>Indirect Emissions Sources</b>									
Rail Transport <sup>2</sup>	1,090,579	980,595	857,430	853,535	639,428	591,804	645,357	533,463	724,841
From Coal Combustion	47,998,721	43,158,092	41,174,862	40,581,642	30,583,694	26,459,231	30,683,704	24,846,578	33,500,000
<b>Total Indirect Emissions</b>	<b>49,089,300</b>	<b>44,138,687</b>	<b>42,032,291</b>	<b>41,435,178</b>	<b>31,223,122</b>	<b>27,051,035</b>	<b>31,329,060</b>	<b>25,380,042</b>	<b>34,224,841</b>
<b>Total Estimated CO<sub>2</sub>e Emissions</b>	<b>49,292,319</b>	<b>44,321,231</b>	<b>42,206,447</b>	<b>41,606,825</b>	<b>31,352,481</b>	<b>27,162,949</b>	<b>31,458,842</b>	<b>25,485,134</b>	<b>34,366,535</b>

<sup>1</sup> In metric tons

<sup>2</sup> Coal haulage emissions based on train trips per year; 452.7 kg CO<sub>2</sub>e per mile per loaded train, 87.2 Kg CO<sub>2</sub>e per mile per empty train; and one-way mileage to power plants. Coal haulage emissions calculations includes a loaded train and a returning empty train, per train trip. 2017-2027 rail distance calculated as the average 2009-2016 rail miles.

Source: WWC (2017), calculations are provided in **appendix E**

Action are expected to be minor but they would be extended by approximately 10.4 years. Because emissions would remain constant and because 2017-2029 emissions are estimated to represent only 0.59 percent of the projected 2020 U.S. CO<sub>2</sub> emission, impacts would be potentially detectable but slight, meeting the definition of “minor” as described in the EA.

As presented in **table 4-9**, the combustion of the coal is the primary contributing factor related to CO<sub>2</sub>e emissions from the Proposed Action, accounting for approximately 99.6 percent of the emissions. Based on estimated average annual CO<sub>2</sub>e emissions of 34,366,535 metric tons (34.4 million metric tons) from coal mined from 2017 through 2029, the total estimated CO<sub>2</sub>e emissions at the BAM (including coal combustion) resulting from the Proposed Action would be 433,018,346 metric tons (433.0 million metric tons). The direct and indirect effects from GHG emissions when rail transport to final destinations at power plants and loading terminals and coal combustion are included are expected to be moderate and would be extended by approximately 10.4 years. However, specific end user locations are unknown and can fluctuate based on market conditions and emissions presented could vary depending on BACT used at plants.

#### 4.4.6.1.2 No Action Alternative

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the federal coal included in the BAN tract. The impacts directly resulting from GHG emissions under the No Action Alternative would be similar to those under the Proposed Action but would not be extended by approximately 10.4 years. While annual CO<sub>2</sub>e emissions would remain the same as the Proposed Action for approximately 2.2 years, the CO<sub>2</sub>e emissions from coal mined at the BAM would decrease by approximately 82.5 percent as a result of the No Action Alternative, based on 10.4-fewer years of combustion of BAM coal.

#### *4.4.6.2 Cumulative Effects*

The analyses provided above include direct and indirect effects analysis for GHG emissions. Due to the global nature of climate change, and the difficulty therefore of predicting climate change impacts caused by an incremental increase in GHG emissions from specific actions separately or together, a separate cumulative impacts analysis for GHG emissions is not appropriate.

#### *4.4.6.3 Mitigation Measures*

As determined from **table 4-9**, a majority (approximately 99.7 percent) of the estimated average 2017-2027 GHG emissions would be from non-mining activities, not controlled by CCW (e.g., rail transportation to and combustion at power plants). The DOI has no regulatory authority over GHG emissions from rail transportation and coal combustion. Air emissions, both direct and indirect, are regulated by other regulatory entities, including WDEQ-AQD (for emissions at the BAM) and other state regulatory agencies (for emissions from out-of-state power plants), through permit limits. Given these facts, OSMRE has determined that no additional mitigation is required.

### **4.4.7 Climate Change Cause and Effect**

#### *4.4.7.1 Proposed Action/No Action Alternative*

Although the effects of GHG emissions and other contributions to climate change in the global aggregate are estimable, it is currently not feasible to determine what effect GHG emissions in a specific area resulting from a specific activity might have on climate change and resulting

environmental impacts. It is therefore not currently possible to associate any particular action with the creation or mitigation of any specific climate-related environmental effects.

Historically, the coal mined in the PRB has been used as one of the sources of fuel to generate electricity in power plants located throughout the U.S. Coal-fired power plant emissions include CO<sub>2</sub>, which has been identified as a principal anthropogenic greenhouse gas. According to the EPA (2016g) in 2014 (the most recent year of available CO<sub>2</sub> data at this time):

1. CO<sub>2</sub> emissions represent approximately 81 percent of the total 2014 U.S. greenhouse gas emissions.
2. Estimated CO<sub>2</sub> emissions in the U.S. totaled 6,871 million metric tons in 2014, which was a 3.1 percent decrease from 2012.
3. Estimated CO<sub>2</sub>e emissions from energy-related consumption in the U.S. totaled 5,556 million metric tons in 2014.
4. Estimated CO<sub>2</sub> emissions from the electric power sector totaled 2,081 million metric tons, or approximately 37.5 percent of total U.S. energy-related CO<sub>2</sub> emissions in 2014.
5. Estimated CO<sub>2</sub> emissions from fossil fuel electric power generation totaled 2,039 million metric tons, or about 36.7 percent of total U.S. energy-related CO<sub>2</sub> emissions in 2014.

Approximately 98 percent of the 394.6 Mt of coal mined in 2014 in Wyoming was used to generate electricity by coal-fired power plants in the U.S. (USEIA 2016). Coal production from Wyoming represented approximately 46.9 percent of the coal used for power generation in 2014, which means that Wyoming surface coal mines were responsible for approximately 665.6 million metric tons of the estimated U.S. CO<sub>2</sub> emissions from coal power generation in 2014. The BAM produced 15.8 Mt of coal in 2014, which represents approximately 4.0 percent of the coal produced in Wyoming in 2014, or about 27.1 million metric tons of the estimated 2014 U.S. CO<sub>2</sub> emissions from coal power generation and approximately 4.1 percent of the CO<sub>2</sub> produced from Wyoming coal. From 2009 through 2016, all coal mined at the BAM was burned in power plants outside of Wyoming (CCW 2016a).

Estimated CO<sub>2</sub> emissions in the U.S. decreased 10.4 percent from 2007 through 2015 (EPA 2017a). Under the Proposed Action, CCW anticipates producing the coal included in the BAN tract at 20 Mtpy levels, using existing production and transportation facilities. This would extend the mine's current GHG emissions by approximately 10.4 years and combustion of BAN tract federal coal in coal-fired power plants would also continue for approximately 10.4 additional years. Because CO<sub>2</sub> emissions have been declining in recent years and because CO<sub>2</sub> from coal mined at the BAM would remain at or only slightly above current levels, climate impacts associated with direct/indirect emissions from BAN from mining, transportation, and combustion would be moderate but short term (10.4 years). The impacts would diminish after the life of the mine.

#### 4.4.7.2 *Cumulative Effects*

All GHG emissions contribute to cumulative climate change on a global scale. However, it is not scientifically possible to determine the impact that would result on the global climate conditions from the emissions from this specific proposed action or in total from the emissions of other actions. As stated in 40 CFR 1502.22(b), the variables involved in such an analysis would make this determination conjectural and not within the rule of reason. For this reason, past projects and

other projects that may or may not be approved by OSMRE are not included in the GHG emissions cumulative effects analysis.

#### 4.4.7.3 *Direct and Indirect Effects on the Proposed Action/No Action Alternative*

USGS predicted potential impacts between 2025 and 2049 using the conservative climate change scenario (RCP8.5), which assumes no new climate change regulations or reductions would be implemented (USGS 2016). According to the USGS National Climate Change Viewer (USGS 2016), potential climate change impacts in Campbell County, Wyoming could include:

1. annual mean temperature increases of up to 3.8 degrees Fahrenheit,
2. annual mean precipitation increases of up to 0.4 inch per day,
3. annual mean snowfall decrease of up to 0.1 inch per year,
4. annual mean soil water storage decrease of up to 0.1 inch per year,
5. annual mean evaporation deficit increase of up to 0.2 inch per month, and
6. annual mean runoff increases up to 0.1 inch per month.

For analysis purposes, the EA assumes that the maximum annual mean values would be realized during the life of the mine and that the direct and indirect effects on the Proposed Action and the No Action Alternative would be similar.

#### Hydrology

The potential changes to the annual snowfall, precipitation levels, and streamflow could impact area surface water body levels, groundwater recharge, and soil erosion. During the anticipated 10.4-year life of the project, natural variations result in dryer or wetter years. Considering the overall climate change timeframe of centuries, it is possible that decreased snowpack may or may not be observable locally during the project timeframe. Likewise, decreases in streamflow may be observed, but during the mining dewatering timeframe of 10.4 years, mine dewatering may compensate for climate change related stream flow reduction, or may have no additional influence on streamflow. Therefore, there would be no climate change impacts on streamflows where project impacts occur or they may be negligible during the project timeframe. The Proposed Action would have moderate, short-term effects on surface water bodies and groundwater, however, the impact from changes to these resources based on climate change would be negligible and long-term.

#### Soils

The Proposed Action would involve new surface disturbance of approximately 695.0 acres. As described in **section 4.8.1.1**, the direct and indirect effects related to the Proposed Action to soils would be moderate and they would be extended by approximately 10.4 years on the tract. However, the USGS climate viewer does not predict any significant changes to annual mean runoff so there would be negligible impacts from climate change on soils.

#### Vegetation/Wildlife

The Proposed Action would involve new surface disturbance of approximately 695.0 acres. As described in **sections 4.9.1.1** and **4.10**, the direct and indirect effects related to the Proposed Action to vegetation and wildlife would be moderate and they would be extended by

approximately 10.4 years on the tract. The Proposed Action is consistent with BLM's Approved Resource Management Plan (BLM 2015b), which takes into account potential climate change. Impacts from climate change on the wildlife and vegetation during the life of the project are anticipated to be negligible.

### Reclamation

The post-reclamation land use would be wildlife habitat and grazing, utilizing vegetation cover of grasses and shrubs. Potential changes to the natural environment, as listed above, could result in the need to consider different plant species during reclamation to account for the higher temperatures and increased precipitation levels. WDEQ-LQD regulates surface coal mining operations and the surface effects of underground coal mining on federal lands within the state of Wyoming. Federal coal leaseholders in Wyoming must submit a permit application package to OSMRE and WDEQ-LQD for any proposed revisions to reclamation operations on federal lands in the state. Therefore, any change to reclamation practices (i.e., seed mix) at the BAM would require the approval of WDEQ. Climate change impacts on reclamation during the life of the project would be negligible. Reestablishment of wildlife and vegetation in areas that have been disturbed is reliant on the reclamation process which would be negligibly impacted by climate change; therefore, climate change impacts to wildlife and vegetation in reclaimed areas would be negligible and long-term.

## **4.5 Water Resources**

### **4.5.1 Groundwater**

#### *4.5.1.1 Direct and Indirect Effects*

##### 4.5.1.1.1 Proposed Action

Additional discussions regarding groundwater can be found in sections 3.5.1.1 and 3.5.1.2 of the 2009 SGAC EIS. Additional discussions can also be found in the groundwater portion of the Cumulative Hydrologic Impacts Assessment (CHIA) for the Middle Powder River Basin, Cordero Rojo Mine (Ogle et al. 2011). The existing federal leases at the BAM include approximately 6,616.5 acres, including the WYW161248 federal lease tract. Under the Proposed Action, continued mining the BAN tract would extend the area of overburden and coal removal on about approximately 695.0 acres.

The general impacts to groundwater as a result of surface coal mining include the following:

1. The removal of the coal aquifer and any overburden and alluvial aquifers within the areas that are mined would continue, as would the replacement of these aquifers with backfilled overburden material. Should any overburden or alluvial aquifer be critical to the area's hydrologic balance, and restoration of the essential hydrologic functions can only be achieved by reestablishment of the aquifer, these materials may be selectively salvaged and replaced.
2. A lowering of static water levels in the coal and overburden aquifers around the mine would continue due to dewatering associated with removal of these aquifers within the mine boundaries. This reduction in static water levels would not be permanent, and recharge to the backfill and adjacent undisturbed aquifers would occur as mined areas are reclaimed.

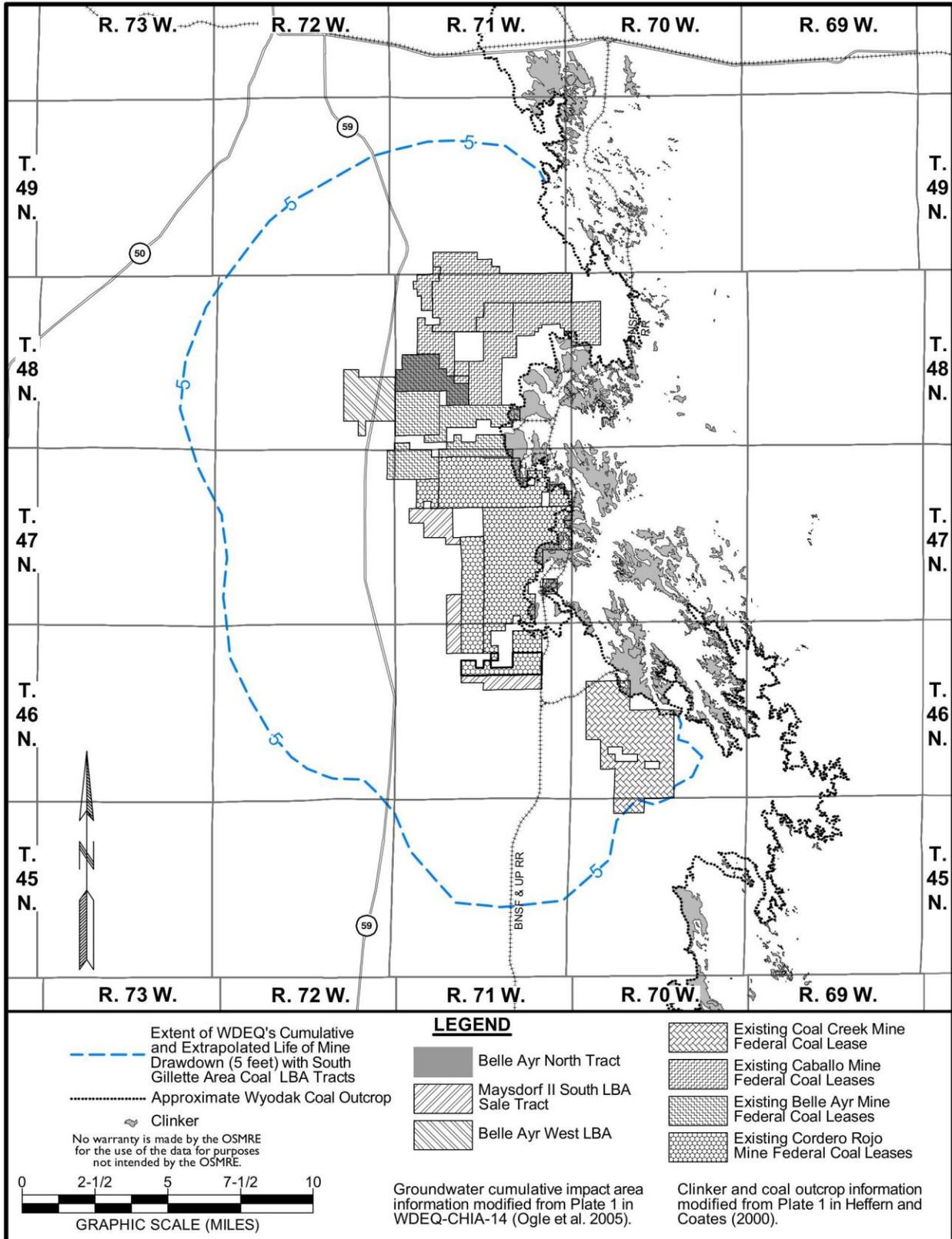
3. Other groundwater impacts that may or may not occur, or may occur only at specific locations, include changes in water quality (usually deterioration) outside the area that is mined and reclaimed. This would result from communication between the reclaimed aquifer and the unmined aquifer, and changes in recharge-discharge conditions and/or groundwater flow patterns.

Additional alluvium, overburden, and Wyodak coal aquifers would be removed in the BAN tract during the mining process. These aquifers would be replaced with backfilled overburden and interburden materials. The physical characteristics of the reclaimed backfill material are dependent upon mining methods and premining overburden lithology. Information provided in the 2011 CHIA for the Middle Powder River Basin states that the backfill aquifers will likely have hydraulic conductivities at least that of the overburden and possibly even greater than the fractured coal (Ogle et al. 2011). In addition, permeability and porosity of the backfill within the BAM are expected to be at least that of or possibly even greater than the original material. Data compiled and analyzed for backfill aquifer from the middle PRB coal mines for the period from 1977 to 2011 shows that the median concentration of the major ions and TDS concentrations are below the WQD livestock water standards of 3,000 mg/l for sulfate (SO<sub>4</sub>) and 5,000 mg/l for TDS (Ogle et al. 2011). Based on existing groundwater quality monitoring, it is anticipated that TDS concentrations will not exceed premine conditions, and the water will be suitable for the post-mine land use after reclamation and recovery are complete (Ogle et al. 2011). Therefore, the reclaimed spoil aquifer could provide adequate water quality for stock wells. Predicted drawdowns for the Wyodak coal seam included in the 2016 Gillette Area Groundwater Monitoring Organization (GAGMO) report is presented on **map 4-3** (Hydro-Engineering 2016). According to the 2011 CHIA, the groundwater migrating from the backfill aquifer in the future is not expected to cause material damage to the coal aquifer (Ogle et al. 2011). This statement is supported by the results of backfill well monitoring, discussed in **section 3.2.1**. Therefore, mining the BAN tract is not expected to change the potential for material damage to groundwater quality.

Overall, evaluation of the three material damage indicators (physical characteristics, water level recovery, and water quality of the backfill aquifer) suggests that there is limited potential for the BAN tract at the BAM to cause material damage to the native aquifers outside the coal mine permit boundaries (Ogle et al. 2011). As discussed in **section 3.2.1**, while the physical characteristics of the backfill is different from premine conditions, backfill recharge has been documented. In addition, as discussed in **section 3.2.1** and in the 2011 CHIA (Ogle et al. 2011), backfill water quality is generally suitable for livestock use and wildlife habitat, which are the planned post-mining land uses. These water quality values are consistent with premine water quality discussions presented in Section 3.5.1.1 of the 2009 SGAC EIS (BLM 2009). Therefore, the direct and indirect effects to groundwater resources resulting from the Proposed Action are expected to be moderate and short and long term on the tract due to aquifer removal.

#### 4.5.1.1.2 No Action Alternative

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the federal coal included in the BAN tract. The impacts to groundwater under the No Action Alternative would be similar to those under the Proposed Action but the aerial extent of groundwater aquifer removal would be reduced by approximately 695.0 acres. However, as discussed in **section 3.2.1**, a continuous cone of depression currently affects the overburden and coal aquifers around the BAM due to ongoing BAM mining activities;



**Map 4-3. Predicted drawdowns for the Wyodak coal seam**

its proximity to the Coal Creek, Caballo, and Cordero Rojo mines; and the cumulative drawdown effects from pit dewatering and nearby CBNG discharges (Hydro-Engineering 2011). Therefore, implementation of the No Action Alternative would have negligible effect on reducing the extent of impacts to overburden and coal aquifers around the BAM.

#### 4.5.1.2 Cumulative Effects

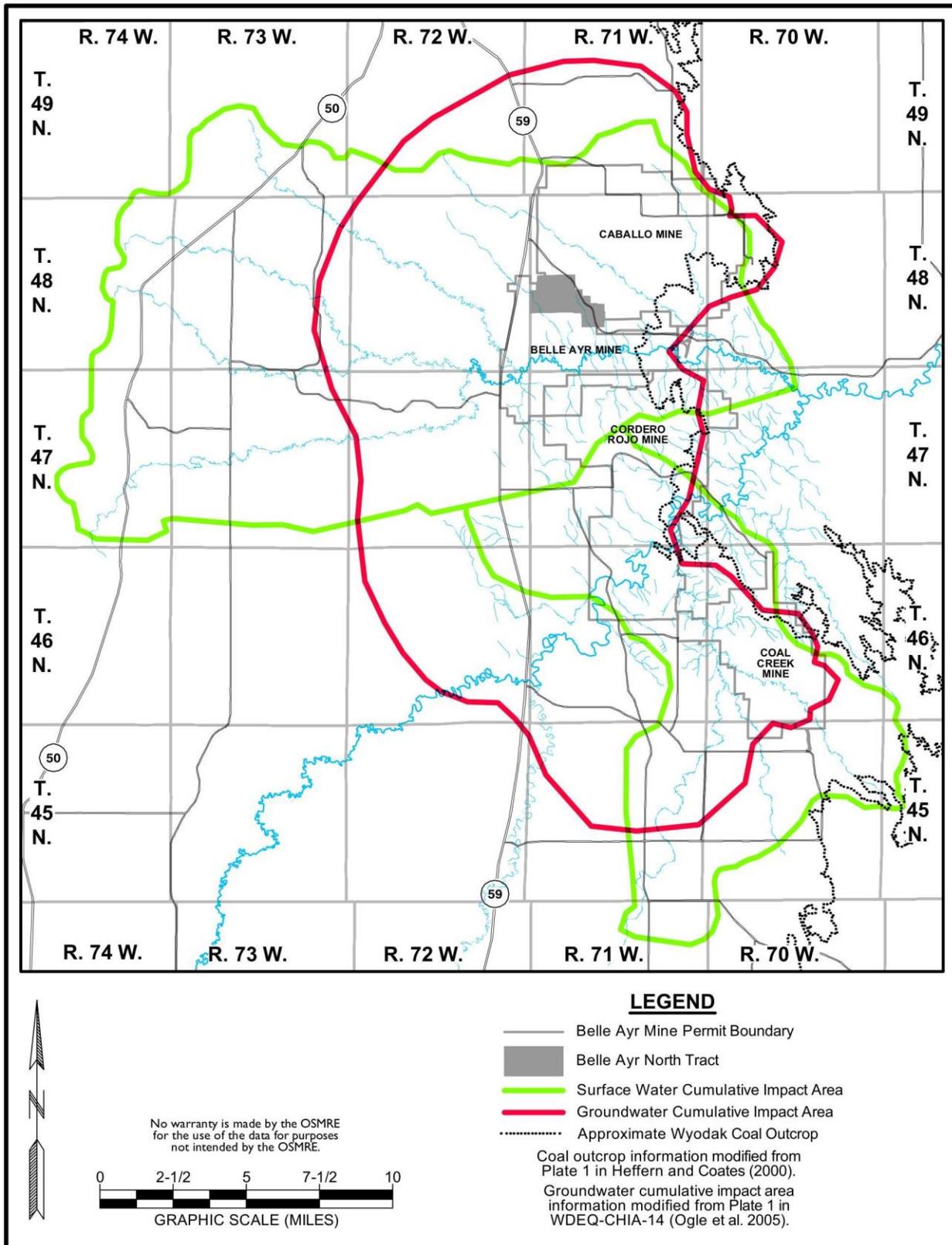
The 5-foot drawdown area was selected as the cumulative impacts area (CIA) for groundwater since this limit would detect the extent of minor groundwater impacts. This area corresponds to the CIA utilized in the 2011 CHIA (Ogle et al. 2011). The area delineated by the maximum cumulative 5-foot drawdown contour in the Wyodak coal aquifer for the Caballo, Belle Ayr, Cordero Rojo, and Coal Creek mine is included on (**map 4-4**). The CIA for groundwater impacts includes parts of the Caballo Creek and Belle Fourche River drainage basins. The effects of removal of the coal and overburden aquifers and replacing them with backfilled overburden are the foremost groundwater concern regarding cumulative effects. Continued mining of the BAN tract would increase the cumulative size of the backfill area in the middle group of mines in the PRB. The extent of water level drawdown in the coal and shallower aquifers in the area surrounding the mines also would be expected to increase slightly as a result of continued mining in the tract and from dewatering the active mine pits. Where the effects of pumping from Caballo, Belle Ayr, Cordero Rojo, and Coal Creek mines overlap, additional water level declines would result from concurrent operations.

As described in the 2011 CHIA of coal mining in the middle Powder River Basin, Wyoming, CBNG dewatering in the CIA has caused drawdown of water levels in the Wyodak coal aquifer within the CIA, making it difficult to accurately distinguish the impacts caused by mining and to estimate groundwater recovery rates. However, the saturated thickness of the coal seams increases to the west and becomes confined as the coal seams dip below the water table. Therefore, the effect of this predicted mining induced drawdown on the Wyodak coal seam is likely minor. Modeling conducted for the Cordero Rojo Mine predict that the coal aquifer will achieve 25 percent recovery within 5 years of cessation of mining and would be 75 percent recovered within 75 years (Ogle et al. 2011). While some other mines predict a longer period of time, most of the model area recovers much faster than 300 years, and only the most interior backfill locations require this long recovery period (Ogle et al. 2011). The reference to Cordero Rojo modeling is appropriate since it is one of the middle group of mines and is adjacent to the BAM.

Studies in the PRB show that the backfill water quality is similar to premine overburden water quality (Van Voast and Hedges 1975 and Davis et al. 1978). Van Voast (1974) indicated that the first groundwater to enter a backfill aquifer will dissolve a high percentage of the available salts, but the quality of groundwater will be less mineralized. This less mineralized water probably results from the clay content of the backfill causing reduction and cation exchange (Ogle et al. 2011).

Other studies found that chemical equilibrium within backfill aquifers was reached very quickly (Davis et al. 1978).

As discussed in **section 4.5.1.1.1**, while the physical characteristics of the backfill is different from premine conditions, backfill recharge has been documented at the BAM. In addition, backfill water quality is generally suitable for livestock use and wildlife habitat, which are the planned post-mining land uses. Similar groundwater quality and quantity results have been noted within the CIA (Ogle et al. 2011). Information from the Wyoming State Geological Survey (WSGS) shows that average



**Map 4-4. Cumulative Impact Area for Potential Surface Water and Groundwater Impacts**

monthly CBNG water production in the PRB had declined by 72 percent over 2006 when water production reached peak levels (WSGS 2017), which has likely reduced effects on groundwater. Therefore, cumulative effects to groundwater resources resulting from the Proposed Action are expected to be moderate but long term (direct aquifer removal would be extended by approximately 10.4 years on the tract).

#### 4.5.1.3 *Mitigation Measures*

WDEQ-LQD Rules and Regulations require surface coal mine permittees to replace any domestic, agricultural, industrial, or any other legitimate use groundwater supplies if, as a result of mining, a supply is diminished, interrupted, or contaminated, to the extent of precluding use of the water. The Wyoming State Rules and Regulations also require surface coal mine permittees to enhance or restore the hydrologic conditions of disturbed land surfaces and minimize adverse impacts to the hydrologic balance. The recharge capacity of the reclaimed lands will be restored to a condition that minimizes disturbance to prevailing hydrologic balance in the permit area and in adjacent areas (WDEQ-LQD 2012).

Under provisions of WDEQ-LQD Permit PT0214, the BAM is required to monitor water levels and water quality in the overburden, coal, interburden, underburden, and backfill (CCW 2016). Operational groundwater monitoring programs are dynamic and modified through time as wells are removed by mining, discontinued from monitoring to eliminate redundancy, or added to replace those removed by mining and to facilitate monitoring of future mine expansion areas as mining has progressed. Additional wells have also been installed in the reclaimed backfill to monitor recovering, postmine groundwater conditions. Many groundwater monitoring wells installed by BAM within and around its current permit area have been used to evaluate groundwater conditions associated with the mine since the early 1970s and continue to be monitored to reveal a long-term record of groundwater conditions. Also under provisions of WDEQ-LQD Permit PT0214, materials would be selectively salvaged and replaced for any overburden or alluvial aquifers that are critical to the area's hydrologic balance, where restoration of the essential hydrologic functions can only be achieved by reestablishment of the aquifer.

### **4.5.2 Surface Water**

#### 4.5.2.1 *Direct and Indirect Effects*

##### 4.5.2.1.1 Proposed Action

Additional discussions regarding surface water can be found in sections 3.5.2.1 and 3.5.2.2 of the 2009 SGAC EIS. Additional discussions can also be found in the Surface Water portion of the CHIA for the middle group of mines (Ogle et al. 2011). As discussed in **section 3.2.2**, streamflow and water quality in Caballo Creek are currently being monitored by the BAM at Sites BA-4 and BA-6 and the data are being reported to WDEQ in the mine's annual reports. Water quality is also being monitored at a site on Duck Nest Creek. Current (2013-2015) analytical results for selected constituents from surface water samples at the BA-4, Duck Nest Creek, and USGS 06425900 (Caballo Creek at Mouth) sampling sites indicated that class of use criteria was met during that time period and mining had not caused material damage to surface-water quality (Ogle et al. 2011).

Changes in surface runoff characteristics and sediment discharges would occur during mining on the BAN tract because of the mining and reconstruction of drainage channels as mining

progresses and because of the use of sediment control structures to manage discharges of surface water from the mine permit areas. Since the BAN tract would be mined as an extension of the existing BAM there would not be a significant increase in the size of the area that is disturbed at any given time. Reclamation would be ongoing and concurrent with mining. As discussed in **section 3.2.2**, while the physical characteristics of the surface is different from premine conditions, surface water quality monitoring shows that surface water quality is generally suitable for livestock use and wildlife habitat, which are the planned post-mining land uses. Stream channels would be restored after surface mining operations are completed on the tract. Monitoring conducted on site suggests that surface water flow, quality, and sediment discharge would approximate premining conditions. Therefore, the direct and indirect effects to surface water are expected to be moderate and long term (until final bond release has been obtained).

#### 4.5.2.1.2 No Action Alternative

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the federal coal included in the BAN tract. The impacts to surface water under the No Action Alternative would be similar to those under the Proposed Action (moderate and long term [until final bond release has been obtained]) but the areal extent of surface water feature removal would be reduced by approximately 695.0 acres. However, impacts to surface water features have already occurred within the tract related to CBNG recovery and mining activities unrelated to recovery of coal from the tract. As discussed above, since the BAN tract would be mined as an extension of the existing BAM, there would not be a significant increase in the size of the area that is disturbed at any given time. In addition, reclamation would be ongoing and concurrent with mining, which would reduce the amount of disturbed but unreclaimed land and only a slight reduction in streamflow downstream of the BAM during mining is expected because runoff is currently being controlled within the BAM as a result of mining unrelated to the Proposed Action. Therefore, implementation of the No Action Alternative would have negligible effect on reducing the extent of these impacts.

#### *4.5.2.2 Cumulative Effects*

The surface water CIA includes two separate drainages in the upper Belle Fourche River Basin (**map 4-4**). This area corresponds to the proposed LOM disturbance areas for the adjacent middle group of mines within local drainage basins and, therefore, is not specific to permit boundaries. CIA also corresponds to the CIA utilized in the 2011 CHIA (Ogle et al. 2011). The CIA for surface water impacts includes parts of the Caballo Creek and Belle Fourche River drainage basins. The CIA is the area where existing and proposed mining activities may cause measurable changes to the hydrologic environment and depends on the characteristics of the surface systems. The cumulative impact area for potential surface water impacts includes (**map 4-4**). Premine stream morphology measurements have been used to design and evaluate reconstructed stream channels. Runoff modeling is used to evaluate hydraulic suitability and predict post-mine discharges in reconstructed channels for varied recurrence intervals. The reclaimed topography includes the reconstruction of portions of several of the main channels associated with the BAM and adjacent mines, including Caballo Creek and the Belle Fourche River. Cumulative mining related impacts to surface water resources associated within the Caballo Creek/Belle Fourche River CIA were analyzed in the 2011 CHIA (Ogle et al. 2011).

While the physical characteristics of the surface is different from premine conditions, surface water quality monitoring from area mines shows that surface water quality is generally suitable

for livestock use and wildlife habitat, which are the planned post-mining land uses (Ogle et al. 2011). Stream channels in the CIA would be restored after surface mining operations are completed on area mines. Information from the WSGS shows that average monthly CBNG water production in the PRB had declined by 72 percent over 2006 when water production reached peak levels (WSGS 2017), which has likely reduced effects on surface water. Therefore, the cumulative effects to surface water are expected to be moderate and long term (until the disturbed areas within the CIA have been reclamation).

#### 4.5.2.3 *Mitigation Measures*

The WDEQ-LQD Rules and Regulations require surface coal mine permittees to enhance or restore the hydrologic conditions of disturbed land surfaces and minimize adverse impacts to the hydrologic balance (WDEQ-LQD 2012). And, as stated above, proposed mining operations must be designed and conducted in a way to prevent material damage to the hydrologic balance outside the permit area (WDEQ-LQD 2012).

Under provisions of WDEQ-LQD Permit PT0214, the BAM is required to restore stream channels after surface mining operations are completed on the tract (CCW 2016). The drainages that intersect the BAM permit area will be reclaimed to exhibit channel geometry characteristics similar to the premining characteristics. The Caballo Creek stream channel would be restored in approximately the same location as the natural channel, and its premining hydrologic functions would be restored. Other WDEQ-LQD permit requirements for the BAM include constructing sediment control structures to manage discharges of surface water from the mine permit area, treating all surface runoff from mined lands as necessary to meet effluent standards, and restoring stock ponds, playas, and in-channel impoundments disturbed during mining (CCW 2016).

### 4.5.3 **Water Rights**

#### 4.5.3.1 *Direct and Indirect Effects*

##### 4.5.3.1.1 Proposed Action

The type and number of groundwater and surface-water rights within 3 miles of the tract are discussed in **section 3.2.3** of this EA. Additional discussions regarding water rights can be found in sections 3.5.3.1 and 3.5.3.2 of the 2009 SGAC EIS. Prior to energy development in the area, water appropriations (both groundwater and surface water) were typically for livestock use. Currently, mining companies hold the majority of the water rights in the vicinity of the EA project area. According to Wyoming State Rules and Regulations, proposed mining operations must be designed and conducted in a way to prevent material damage to the hydrologic balance outside the permit area (WDEQ-LQD 2012). According to W.S. 35-11-415(b) (xii), the BAM must replace, in accordance with state law, the water supply of an owner of interest in real property, who obtains all or part of his supply of water for domestic, agricultural, industrial, or any other legitimate use from an underground or surface source where the supply has been affected by contamination, diminution or interruption resulting from the surface coal mine operation. Ogle et al. (2011) assessed the potential for coal mining to result in material damage to groundwater and surface water resources in the middle group of mines. Material damage is presumed to occur when the median concentrations of a given constituent exceed WDEQ-WQD surface water standards, and the available evidence suggests the cause of exceedance is due to coal mining activity and will contribute to permanent or long-term change of use suitability. Groundwater-quality parameters for domestic (Class I), agriculture (Class II), and livestock (Class

III) are included in Chapter 8 of Wyoming Rules and Regulations and surface water-quality parameters for outstanding waters (Class 1), fisheries and drinking water (Class 2), aquatic life and other fish (Class 3), and agriculture, industry, recreation, and wildlife (Class 4) are included in Chapter 1 of Wyoming Rules and Regulations (Wyoming Secretary of State 2017).

Monitoring wells are placed between mine operations and nearby private wells to monitor for water level and water quality changes to anticipate any downgradient impacts. Currently, CBNG production has exceeded the amount of drawdown predicted to result from mining. Therefore, potential impacts from mining to stock and domestic wells in the area have become largely irrelevant (WDEQ 2014b). Several livestock water wells have been removed over the years to facilitate mining operations but no effects to domestic supplies have been reported. The BAM currently has a stock watering system in place in the reclamation plan that utilizes water from a deep well. The postmining land use plan for grazing land includes a commitment to provide water for livestock, so the water will be replaced using a combination of stock reservoirs, water wells, and reclaimed creek channels. Typically, the wells that replace premine stock wells are drilled into deeper aquifers that produce more water, so there are fewer wells overall but the amount of water available for livestock is the same or greater (CCW 2016). As stated in Section 3.5.2.1.1 of the 2009 SGAC EIS, some privately permitted water wells in the vicinity of the BAN tract have been or will likely be impacted (either by removing the well or by water level drawdown) by mining and CBNG development (BLM 2009). Future drawdowns to the Wyoming coal aquifer are expected to be negligible because the coal seam has essentially been dewatered due to ongoing BAM mining activities; its proximity to the Coal Creek, Caballo, and Cordero Rojo mines; and the cumulative drawdown effects from pit dewatering and nearby CBNG discharges (Hydro-Engineering 2011). Therefore, it is unlikely that any of these privately permitted water wells would be impacted by water level drawdown to a greater extent than they currently are if the BAN tract is mined.

Only a slight reduction in streamflow downstream of the BAM during mining is expected because runoff is currently being controlled within the BAM as a result of mining unrelated to the Proposed Action. Therefore, it is unlikely that any of these privately permitted surface water rights would be impacted by removal of surface water features within the BAN tract to a greater extent than they currently are if the BAN tract is mined.

In general, the proposed federal mining plan modification would contribute to additional, more extensive, mining disturbance that may impact groundwater and surface-water rights in the BAM area. As stated in **section 3.2.1**, a continuous cone of depression that affects overburden and coal aquifers currently exists around the BAM due to its closeness to other area mines and the cumulative drawdown effects from pit dewatering and nearby CBNG discharges (Hydro-Engineering 2016). In addition, only a slight reduction in streamflow downstream of the BAM during mining is expected because runoff is currently being controlled within the BAM as a result of mining unrelated to the Proposed Action. Impacts to groundwater or surface-water rights have already occurred from mining within the BAM and from CBNG development and implementation of the Proposed Action would have negligible effect on increasing the extent of impacts. Therefore, the Proposed Action would not result in substantial declines in the groundwater or surface water availability due to reduced quantity and quality for livestock use and wildlife habitat, which are the planned post-mining land uses. Impacts to groundwater and surface water rights would be minor.

#### 4.5.3.1.2 No Action Alternative

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the federal coal included in the BAN tract. The impacts to surface and groundwater rights under the No Action Alternative would be similar to those under the Proposed Action but the areal extent of surface water feature and groundwater aquifers removal would be reduced by approximately 695.0 acres. Impacts to water rights have already occurred within the tract related to coal recovery on adjacent federal coal leases, as approved by CCW's WDEQ-LQD Permit PT0214 and OSMRE's 1999 federal MPDD. As discussed in **section 3.2.1**, a continuous cone of depression that affects overburden and coal aquifers currently exists around the BAM due to its closeness to other area mines and the cumulative drawdown effects from pit dewatering and nearby CBNG discharges (Hydro-Engineering 2016). In addition, only a slight reduction in streamflow downstream of the BAM during mining is expected as a result of the Proposed Action because runoff is currently being controlled within the BAM. Therefore, implementation of the No Action Alternative would have negligible effect on reducing the extent of these groundwater and surface water impacts.

#### 4.5.3.2 *Cumulative Effects*

The CIA for water rights impacts are the same as those described above for groundwater and surface water. The type and number of groundwater and surface-water rights within 3 miles of the tract are discussed in **section 3.2.3** of this EA. A continuous cone of depression that affects overburden and coal aquifers currently exists around the BAM due to ongoing BAM mining activities; its proximity to the Coal Creek, Caballo, and Cordero Rojo mines; and the cumulative drawdown effects from pit dewatering and nearby CBNG discharges (Hydro-Engineering 2016). The physical characteristics of the backfill in the CIA is different from premine conditions but backfill aquifer recharge has been documented. Backfill water quality from monitoring wells in the CIA is generally suitable for livestock use and wildlife habitat, which are the planned post-mining land uses (Ogle et al. 2011). Any impacts to downstream water rights would fall under the jurisdiction of the State Engineer. If it is determined that a water right has been impacted by activities of the BAM, that impact will be mitigated. Cumulative effects on groundwater rights would be similar to direct and indirect effect described in **section 4.5.3.1**.

Only a slight reduction in streamflow downstream of the CIA during mining is expected because runoff is currently being controlled within the all mines within the CIA as a result of mining unrelated to the Proposed Action. Therefore, it is unlikely that any of these privately permitted surface water rights would be impacted by removal of surface water features within the CIA to a greater extent than they currently are if the BAN tract is mined. Postmine reclamation at the BAM has been designed to satisfy any downstream water rights.

While the approval of the federal mining plan modification request would contribute to additional, more extensive mining disturbance in the Caballo, Belle Ayr, Cordero Rojo, and Coal Creek mine areas, there would be minor additional cumulative water rights impacts because groundwater and surface water systems have already been affected by CBNG removal and ongoing mining and because runoff is currently being controlled in within the Caballo, Belle Ayr, Cordero Rojo, and Coal Creek mines. Regarding water quality within the Caballo Creek CIA analyzed in the 2011 CHIA, current mining at the Caballo, Belle Ayr, and Cordero Rojo mines is not expected to cause long-term or permanent material damage to surface water quantity in the Caballo Creek CIA (Ogle et al. 2011). In addition, as discussed above, the water supply of an

owner of interest in real property, who obtains all or part of his supply of water for domestic, agricultural, industrial, or any other legitimate use from an underground or surface source where the supply has been affected by contamination, diminution, or interruption resulting from the surface coal mine operation.

#### 4.5.3.3 *Mitigation Measures*

Wyoming State Rules and Regulations require surface coal mine permittees to replace any domestic, agricultural, industrial, or any other legitimate use groundwater supplies if such supplies are diminished, interrupted, or contaminated, to the extent of precluding use of the water as a result of mining. The regulations also require restoration of the essential hydrologic function of disturbed land surfaces.

Under provisions of WDEQ-LQD Permit PT0214, the BAM is required to update the list of potentially impacted private water supply wells and predict impacts to those wells within the 5-foot drawdown contour as part of the permitting process. The operator would be required to replace those water supplies affected by mining with water of equivalent quality and quantity (CCW 2016). Any impacts to downstream water rights would fall under the jurisdiction of the State Engineer. If it is determined that a water right has been impacted by activities of the BAM, that impact will be mitigated.

## 4.6 Alluvial Valley Floors

### 4.6.1 Direct and Indirect Effects

#### 4.6.1.1 *Proposed Action*

Additional discussions regarding alluvial valley floors (AVFs) can be found in sections 3.6.1 and 3.6.2 of the 2009 SGAC EIS. There are approximately 10.9 acres of declared AVF along Duck Nest Creek within the BAN tract. Mining activity would not be restricted in the AVF areas because the WDEQ-LQD has declared them not to be significant to farming (WDEQ-LQD 1988). The entire reach of Duck Nest Creek downstream of the tract has been affected by previous and current mining operations at the BAM. The mine is required to restore the essential hydrologic functions of affected AVFs and preserve the hydrologic functions of the AVFs on adjacent lands. The direct and indirect effects AVFs would not be significantly different than those described in the 2009 SGAC EIS and are expected to be moderate and short term (10.4 years).

#### 4.6.1.2 *No Action Alternative*

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the federal coal included in the BAN tract. Therefore, under this alternative, disturbance related impacts to AVFs in the area would remain as described in **section 4.6.1.1**, but to a lesser extent (10.9 acres).

### 4.6.2 Cumulative Effects

The cumulative effects to AVFs would not be significantly different than those described in the 2009 SGAC EIS. AVF investigations conducted within and adjacent to the tract have identified approximately 10.9 acres of declared AVF along Duck Nest Creek within the BAN tract.

The BAM is required to monitor impacts to downstream AVFs by measuring discharges from sediment ponds for quantity and quality. The mine is also required to restore the essential

hydrologic functions of any affected AVFs, if delineated, and preserve the hydrologic functions of the AVFs on adjacent lands. WDEQ-LQD believes that mining operation at the BAM will not result in any material damage to the any AVFs downstream of the current BAM and that reclamation will replace the alluvial materials and restore the hydrologic function of the Belle Fourche River (WDEQ-LQD 2004). Therefore, the cumulative effects on AVFs are expected to be negligible and short term (10.4 years).

### **4.6.3 Mitigation Measures**

The mine is required to restore the essential hydrologic functions of affected AVFs and preserve the hydrologic functions of the AVFs on adjacent lands.

## **4.7 Wetlands (Aquatic Resources)**

### **4.7.1 Direct and Indirect Effects**

#### *4.7.1.1 Proposed Action*

A detailed discussion of wetlands occurring within the BAN tract and a 0.25-mile disturbance buffer was included in sections 3.7.1.1 and 3.7.1.2 of the 2009 SGAC EIS.

U.S. Army Corps of Engineers (USACE)-verified delineations are made a part of the mine permit document. The reclamation plan requires replacement of at least equal types and number of jurisdictional wetlands. Approximately 9.0 acres of jurisdictional wetlands occur along the watercourse of Duck Nest Creek, within the BAN tract. Approximately 0.9 acre of jurisdictional other waters of the U.S. that did not qualify as wetlands consisting primarily of open water held within the in-channel impoundments and intermittent pools along Duck Nest Creek. Disturbed non-jurisdictional wetlands would be restored as required by the authorized federal, state, or private surface landowner, as specified in the mining permit, which are approved by WDEQ-LQD before mining operations are conducted on the BAN tract. There are approximately 55.0 acres of non-jurisdictional wetlands, consisting of the internally drained playas, within the BAN tract.

During the period of time after mining and before replacement of wetlands, all functions of the jurisdictional and non-jurisdictional wetlands would be lost. However, there would be no net loss of jurisdictional wetlands since wetlands would be replaced during the reclamation phase of mining. The direct and indirect effects to surface water would not be significantly different than those described in the 2009 SGAC EIS and are expected to be moderate and short term (10.4 years).

#### *4.7.1.2 No Action Alternative*

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the federal coal included in the BAN tract. Therefore, under this alternative, disturbance related impacts to jurisdictional wetlands in the area would remain as described in **section 4.7.1.1**, but to a lesser extent (9.9 acres of jurisdictional and 55.0 acres of non-jurisdictional wetlands).

### **4.7.2 Cumulative Effects:**

The cumulative effects to jurisdictional wetlands would not be significantly different than those described in the 2009 SGAC EIS. Wetland delineations conducted within the tract have identified approximately 9.9 acres of jurisdictional wetlands and other waters of the U.S. along Duck Nest

Creek and 55.0 acres of non-jurisdictional playas within the BAN tract. Disturbed jurisdictional and non-jurisdictional wetlands would be restored as required by the authorized federal, state, or private surface landowner, as specified in the mining permit, which are approved by WDEQ-LQD before mining operations is conducted on the BAN tract. There would be no net loss of jurisdictional wetlands so cumulative impacts to wetlands would be moderate and short term (10.4 years).

### **4.7.3 Mitigation Measures**

Disturbed jurisdictional and non-jurisdictional wetlands would be restored as required by the authorized federal, state, or private surface landowner, as specified in the mining permit, which are approved by WDEQ-LQD before mining operations is conducted on the BAN tract.

## **4.8 Soil**

### **4.8.1 Direct and Indirect Effects**

#### *4.8.1.1 Proposed Action*

Additional discussions regarding soils can be found in sections 3.8.1 and 3.8.2 of the 2009 SGAC EIS. The direct and indirect effects to soils would not be significantly different than those described in the 2009 SGAC EIS. Soils within the BAN tract would be altered under the Proposed Action. The potential impacts from the Proposed Actions include

1. increased near-surface bulk density and decreased soil infiltration rate resulting in increased potential for soil erosion,
2. more uniformity in soil type, thickness, and texture,
3. decreased runoff due to topographic modification,
4. reduction in organic matter,
5. reduction in microorganism population,
6. reduction in seeds, bulbs, rhizomes, and live plant parts, and
7. more uniform soil nutrient distribution.

According to the Natural Resources Conservation Service (NRCS) (2017), no “prime” or “unique” farmland exists within the proposed BAN tract so none would be disturbed. Drainage features would be reconstructed on the area similar to reclamation techniques used at the BAM. Therefore, special handling techniques would not be required for soils within the tract.

The direct and indirect effects related to the Proposed Action to soils would be moderate and short term (10.4 years) on the tract.

#### *4.8.1.2 No Action Alternative*

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the federal coal included in the BAN tract. Therefore, under this alternative, disturbance related impacts to soils in the area would remain as described in **section 4.8.1.1**, but to a lesser extent (695.0 acres).

## **4.8.2 Cumulative Effects**

Cumulative effects to soil would be related to cumulative disturbance at Caballo, Belle Ayr, Cordero Rojo, and Coal Creek mines. According to the 2011 Middle Powder River Basin CHIA, approximately 50,000 acres of land have been approved for disturbance within the middle group of mines (Ogle et al. 2011). If the Proposed Action is approved, the cumulative disturbance would be increased by 695.0 acres. The cumulative effects would be reduced following reclamation when the replaced topsoil would support a stable and productive native vegetation community adequate in quantity and quality to support planned post-mining land uses (i.e., rangeland and wildlife habitat). In additions, the cumulative effects would be reduced since areas within active mines are progressively disturbed and reclaimed by planting appropriate vegetation species to restore soil productivity and prevent soil erosion. The cumulative effects related to soils would be moderate.

## **4.8.3 Mitigation Measures**

Soils suitable to support plant growth would be salvaged for use in reclamation. Soil stockpiles would be protected from disturbance and erosional influences. Soil material that is not suitable to support plant growth would not be salvaged. Soil or overburden materials containing potentially harmful chemical constituents (such as selenium) would be specially handled.

Regraded overburden would be sampled to verify suitability as subsoil for compliance with root zone criteria as specified by WDEQ-LQD guideline No. IA (Topsoil and Subsoil) (WDEQ-LQD 2015). Unsuitable materials would be buried under adequate fill (at least 4 feet of suitable overburden) prior to soil redistribution to meet guidelines for vegetation root zones.

Redistributed soil would be sampled to document redistribution depths. After topsoil is redistributed on reclaimed surfaces, revegetation would reduce wind erosion. Sediment control structures would be constructed as needed to detain sediments.

Vegetation growth would be monitored on reclaimed areas to confirm vegetation establishment and acceptability for bond release. Appropriate normal husbandry practices may be implemented to achieve specific reclamation goals.

These measures are required by Wyoming State regulations and are therefore considered part of the Proposed Action.

## **4.9 Vegetation**

### **4.9.1 Direct and Indirect Effects**

#### *4.9.1.1 Proposed Action*

Additional discussions regarding vegetation can be found in sections 3.9.1 and 3.9.2 of the 2009 SGAC EIS. The direct and indirect effects to vegetation would not be significantly different than those described in the 2009 SGAC EIS. Short-term (direct) impacts associated with the removal of vegetation from the BAN tract would include increased soil erosion and habitat loss for wildlife and livestock over what is currently being experienced. Potential long-term (indirect) impacts on reclaimed lands include loss of habitat or loss of habitat carrying capacity for some wildlife species as a result of reduced plant species diversity or plant density, particularly big sagebrush. However, livestock and grassland-dependent wildlife species would benefit from the increased grass cover and production. A study conducted at the BAM has shown that vegetative cover and warm-

season grasses production was higher on reclamation than on adjacent undisturbed, native sites (Stahl et al. 2009).

The Proposed Action would result in the gradual loss of 695.0 acres of vegetation communities, which represents approximately 42 percent of the BAN tract. As described in **section 1.2.3**, approximately 58 percent of the tract has been approved for disturbance under the currently approved WDEQ-LQD Permit No. PT0214. Reclamation, including revegetation of these lands, would occur contemporaneously with mining on adjacent lands; i.e., reclamation would begin once an area is mined. In an effort to approximate premining conditions, during reclamation CCW would plan to reestablish vegetation types that are similar to the premine types. A study conducted at the BAM has shown that shrubs and warm-season grasses were being reestablished on reclamation at high densities within 5 years (Stahl et al. 2009). Reestablished vegetation would be dominated by species mandated in the reclamation seed mixtures approved by WDEQ-LQD. The Revegetation Enhancement Techniques section of the Reclamation Plan included in the WDEQ-LQD Permit No. PT0214 for the BAM includes steps to control invasion by weedy (invasive nonnative) plant species. Given the fact that successful reclamation has been demonstrated at the BAM and that mitigation measures designed to reduce negative effects are currently in-place, the direct and indirect effects related to the Proposed Action on vegetation would be moderate and short term (10.4 years).

#### *4.9.1.2 No Action Alternative*

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the federal coal included in the BAN tract. Under this alternative, disturbance to vegetation in the tract unrelated to the Proposed Action that is similar to that described in **section 4.9.1.1** would remain as but the total disturbance would be reduced by approximately 695.0 acres.

### **4.9.2 Cumulative Effects**

Cumulative effects would be related to disturbance at Caballo, Belle Ayr, Cordero Rojo, and Coal Creek mines. As described in the 2013 Task 3D Report for the Powder River Basin Coal Review, habitat fragmentation from activities such as roads, well pads, mines, pipelines, and electrical power lines can result in the direct loss of habitat (BLM 2013). Other indirect effects such as dispersal of noxious and invasive weed species and dust deposition from unpaved road traffic can extend beyond the surface disturbance boundaries. According to the 2011 Middle Powder River Basin CHIA, approximately 50,000 acres of land, and the associated vegetative communities, have been approved for disturbance within the middle group of mines (Ogle et al. 2011). Therefore, the effects of the Proposed Action related to vegetation removal, invasive weeds, and dust would increase the approved disturbance by only 695.0 acres (1.4 percent). However, the cumulative size of the disturbance associated with the middle group of mines is large enough that impacts would likely be moderate and extended by approximately 10.4 years of mining.

### **4.9.3 Mitigation Measures**

No mitigation measures would be necessary for vegetation resources.

## 4.10 Wildlife

Additional discussions regarding wildlife can be found in section 3.10 of the 2009 SGAC EIS. If the federal mining plan modification for the BAM is approved to include recovering coal within the BAN tract, disturbance would continue on the BAN tract. Mining would be extended by approximately 10.4 years at the BAM. Impacts to wildlife that would be caused by mining the tract have been addressed by the WGFD and WDEQ-LQD when the mining and reclamation permits were amended to include the BAN tract.

Mining directly and indirectly impacts local wildlife populations. These impacts are both short term (until successful reclamation is achieved) and long term (persisting beyond successful completion of reclamation). The direct impacts of surface coal mining on wildlife occur during mining and are therefore short-term. They include road kills by mine-related traffic, restrictions on wildlife movement created by fences, spoil piles, and pits, and displacement of wildlife from active mining areas. Displaced animals may find equally suitable habitat that is not occupied by other animals, occupy suitable habitat that is already being used by other individuals, or occupy poorer quality habitat than that from which they were displaced. In the second and third situations, the animals may suffer from increased competition with other animals and are less likely to survive and reproduce. Reclamation would be ongoing and concurrent with mining so habitat would be restored throughout the 10.4-year period of coal recovery. A study conducted at the BAM has shown that shrubs and warm-season grasses were reestablished on reclamation at high densities within 5 years (Stahl et al. 2009). If the proposed federal mining plan modification is approved, the direct impacts related to mine operations would be extended by approximately 10.4 years of mining.

The indirect impacts are longer term. After the BAN tract is mined and reclaimed, alterations in the topography and vegetative cover and diversity, particularly a potential reduction in sagebrush density, would cause a decrease in carrying capacity for some sagebrush dependent species. Sagebrush would gradually become reestablished on the reclaimed land, but the topographic changes described in **section 4.2.1.1** would be permanent. Microhabitats (very specific habitats) may be reduced on reclaimed land due to flatter topography, less diverse vegetative cover, and reduction in sagebrush density.

The environmental consequences related to mining the BAN tract for other mammals; upland game birds (excluding the GRSG); other birds; and amphibians, reptiles, and aquatic species are not significantly different than those presented in 2009 SGAC EIS and are not presented herein. Updated discussions for big game, raptors, GRSG, T&E species, and other species of special interest are included below.

### 4.10.1 Big Game

#### 4.10.1.1 *Direct and Indirect Effects*

##### 4.10.1.1.1 Proposed Action

Under the Proposed Action, big game would be displaced from portions of the BAN tract to adjacent ranges during mining. Mule deer likely would be most affected as the BAN tract contains good quality habitat. Pronghorn would not be substantially impacted, given that they are scattered throughout the site and there is suitable habitat available in adjacent areas. White-tailed deer, elk (*Cervus elaphus*), or moose (*Alces alces*) would not be affected, as they have not been observed

on the BAN tract (ICF 2017). Big game displacement would be incremental, occurring over several years and allowing for gradual changes in distribution patterns. Big game residing in the adjacent areas could be impacted by increased competition with displaced animals. Noise, dust, and associated human presence would cause some localized avoidance of foraging areas adjacent to mining activities. However, big game species have continued to occupy areas adjacent to and within active mine operations at the BAM, suggesting that some animals may become habituated to such disturbances. Monitoring has shown that, while annual fluctuations occur in big game numbers, the populations within the mine-wide big game monitoring area have remained relatively stable over time (ICF 2017).

The BAM would be required to reclaim disturbed habitats back to wildlife habitat, as outlined in the reclamation requirements of revised state and federal mine permits. After mining and reclamation, alterations in the topography and vegetative cover, particularly the reduction in sagebrush density, would cause a decrease in carrying capacity and diversity on the tract. Sagebrush would gradually become re-established on the reclaimed land, but the topographic changes would be permanent. Given the observed response of big game to mining relative disturbance discussed above, the direct and indirect effects related to the Proposed Action on big game would be moderate and they would be short term (extended by approximately 10.4 years).

#### 4.10.1.1.2 No Action Alternative

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the federal coal included in the BAN tract. Under this alternative, the impacts to big game and big-game habitats in the tract unrelated to the Proposed Action would be similar to that described in **section 4.9.1.1** but the total extent of the impacts would be reduced by approximately 695.0 acres and the duration of the impacts would be reduced by approximately 10.4 years.

#### *4.10.1.2 Cumulative Impacts*

Cumulative effects would be related to disturbance at Caballo, Belle Ayr, Cordero Rojo, and Coal Creek mines. As described in the 2013 Task 3D Report for the Powder River Basin Coal Review, habitat fragmentation from activities such as roads, well pads, mines, pipelines, and electrical power lines can result in the direct loss of potential wildlife habitat (BLM 2013). Other indirect effects such as increased noise, elevated human presence, dispersal of noxious and invasive weed species, and dust deposition from unpaved road traffic can extend beyond the surface disturbance boundaries. According to the 2011 Middle Powder River Basin CHIA, approximately 50,000 acres of land have been approved for disturbance within the middle group of mines (Ogle et al. 2011). Therefore, the effects of the Proposed Action related to additional habitat fragmentation, noise, elevated human presence, invasive weeds, and dust on regional big game populations would increase the approved disturbance by only 695.0 acres (1.4 percent). However, the overall contribution to cumulative impacts to big game species under Proposed Action would be moderate due to the localized effects. The improved productivity on mined lands that have been reclaimed would reduce any potential impacts. No severe mine-caused mortalities have occurred and no long-lasting impacts on big game species have been noted on the BAM. As described in **section 4.3.2**, the pace of CBNG development in Wyoming has recently slowed considerably (WOGCC 2016), which will reduce the potential for cumulative impacts to big game. Given the observed response of big game to mining relative disturbance

discussed above, the cumulative effects on regional big game populations would be moderate and they would be extended by approximately 10.4 years.

#### *4.10.1.3 Mitigation Measures*

No mitigation measures specific to big game are necessary. General reclamation practices for establishing or enhancing post-mine wildlife habitat at the BAM described in the Reclamation Plan of Permit PT0214 are in place.

### **4.10.2 Raptors**

#### *4.10.2.1 Direct and Indirect Effects*

##### 4.10.2.1.1 Proposed Action

Four intact raptor nests (two burrowing owl, one Swainson's hawk, and one Swainson's hawk/ferruginous hawk/great horned owl) were present within the tract in 2016. Only one of the nests was active in 2016. CCW has in place approved plans and procedures to minimize impacts to nesting raptors and ensure proper reclamation techniques are implemented to enhance habitat in the post-mine landscape for both raptors and their primary prey species. Inactive, non-eagle, raptor nests may be removed from areas likely to be impacted in potential disturbance areas to discourage nesting of raptors and other migratory birds, in accordance with USFWS guidance provided in the *Migratory Bird Permit Memorandum* (USFWS 2003). Decisions as to whether nest removal or relocation is the most appropriate approach would be based on the long-term history of the nest site including historic and recent raptor use; presence/absence, location, and potential vulnerability of alternate nests within the territory; number, proximity, and/or orientation of conspecific territories; historical use of artificial nest structures, if any; timing, duration (e.g., continuous and ongoing or short-term); proximity, and visibility of potentially disturbing mine activities; and other pertinent factors. In addition, CCW conducts annual surveys at multiple prairie falcon nest sites throughout the monitoring area and on neighboring lands as part of required and/or voluntary monitoring for this species.

Raptor mortalities associated with collisions with vehicles and electrocutions have been recorded at the BAM (ICF 2017). In all instances, USFWS was contacted for guidance and authorization of carcass disposal, if necessary.

Based on the low density of nesting raptors within the BAN tract and the BAM's approved plans and procedures in place to reduce impacts to raptors, the direct and indirect effects related to the Proposed Action on site-specific raptors would be moderate and short term (10.4 years).

##### 4.10.2.1.2 No Action Alternative

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the federal coal included in the BAN tract. Under this alternative, the ongoing impacts to raptors unrelated to the Proposed Action would be similar to that described in **section 4.9.1.1** but the total disturbance would be reduced by approximately 695.0 acres and the duration of the impacts would be reduced by approximately 10.4 years.

#### *4.10.2.2 Cumulative Impacts*

Cumulative effects would be related to disturbance at Caballo, Belle Ayr, Cordero Rojo, and Coal Creek mines. As described in the 2013 Task 3D Report for the Powder River Basin Coal

Review, habitat fragmentation from activities such as roads, well pads, mines, pipelines, and electrical power lines can result in the direct loss of potential wildlife habitat (BLM 2013). Other indirect effects such as increased noise, elevated human presence, dispersal of noxious and invasive weed species, and dust deposition from unpaved road traffic can extend beyond the surface disturbance boundaries. According to the 2011 Middle Powder River Basin CHIA, approximately 50,000 acres of land have been approved for disturbance within the middle group of mines (Ogle et al. 2011). The overall contribution to cumulative impacts to raptors under Proposed Action would be moderate due to the localized effects and the improved productivity on mined lands that have been reclaimed. Approved mine permits adhere to regulations specifying mitigation measures for wildlife, including minimization of disturbance, reclamation of habitats, and raptor-safe power line construction. The measures specified in mining permits and enforced by WDEQ-LQD ensure compliance with the Migratory Bird Treaty Act, the Bald and Golden Eagle Protection Act, and the ESA. The cumulative effects on regional raptor populations would be moderate and they would be extended by approximately 10.4 years.

#### *4.10.2.3 Mitigation Measures*

No mitigation measures specific to raptors are necessary. General reclamation practices for establishing or enhancing post-mine wildlife habitat at the BAM described in the Reclamation Plan of Permit PT0214 are in place. CCW has also developed plans and procedures to minimize impacts to nesting raptors and ensure proper reclamation techniques are implemented to enhance habitat in the post-mine landscape for raptors and their primary prey species.

### **4.10.3 Greater Sage-Grouse (GRSG)**

#### *4.10.3.1 Direct and Indirect Effects*

##### 4.10.3.1.1 Proposed Action

Four GRSG leks have been documented within 2 miles of the BAM permit area but no GRSG leks have been documented (**map 3-5**). Three leks (Belle Ayr I, Belle Ayr II, and Stowe) were destroyed by mining activities. The only intact lek within the survey boundary is the Lynde Lek, which was last surveyed in 2016. This lek has been classified as occupied by the WGFD. GRSG have not been observed on or near the Lynde Lek since 2009.

Long-term results from annual lek monitoring suggest that GRSG populations in the BAM annual monitoring area are cyclic, with periodic peaks and declines (CCW 2016b). These data suggest that the BAM area may only support larger groups of GRSG when regional populations are especially high (BAM 2016b).

Executive Order No. 2015-4 constitutes Wyoming's strategy for the conservation of the GRSG and their habitats. The executive order identified areas where GRSG and their habitats would be most effectively conserved (core population areas); developed a strategy to reduce or eliminate potential threats to the species; and developed methodology to evaluate, document and track potential impacts over time (State of Wyoming Executive Department 2015). Although the executive order deals primarily with activities that occur within or adjacent to core population areas, as defined in the order, guidance is provided for activities in non-core population areas. Using mapping included in Executive Order 2015-4, it has been determined that the closest core area to the BAN tract is approximately 9 miles distant. Since surface occupancy and seasonal use restrictions for non-core areas apply to 0.25-mile buffers around occupied leks and since no

occupied leks are within 0.25 mile of the BAN tract, restrictions included in the executive order do not apply to this action. In addition, according to Executive Order No. 2015-4, existing land uses and activities (including those authorized by the existing permit but not yet conducted) would be recognized and respected by state agencies, and those uses and activities that exist at the time the changes outlined in the Executive Order becomes effective would not be managed under the stipulations included in Executive Order No. 2015-4. Because the tract evaluated under the Proposed Action is within and adjacent to BAM's currently approved WDEQ-LQD Permit PT0214 permit boundary, these activities would not be managed according to the Executive Order.

According to the Buffalo RMP/FEIS, the BAN tract is within an area classified as a general habitat management area (GHMA) for GRSG (BLM 2015a). This classification prohibits or restricts surface-disturbing and disruptive activities within 0.25 mile of the perimeter of occupied GRSG leks. No GRSG leks occur within 0.25 mile of the BAN tract.

WDEQ-LQD Permit PT0214 currently contains multiple monitoring and protection plans that include numerous specific measures for GRSG and their habitats, including those mentioned above. The WDEQ-LQD has strict bonding, reclamation, and bond-release requirements for all surface coal mines in Wyoming, including detailed reclamation plans and post-reclamation monitoring requirements that extend 10 years or more to ensure that all reclamation standards have successfully been met prior to full bond release.

Potential impacts to GRSG would likely be limited primarily to indirect influences resulting from habitat disturbance, though loss of individual birds may occur at times. Ongoing BAM operations may adversely impact individual GRSG through mining activity mortality or habitat loss but are not likely to result in a loss of population viability in the wildlife monitoring area or cause a trend toward federal listing. The use of appropriate timing and spatial buffers, timely implementation of reclamation, and application of targeted conservation measures in suitable habitats both on- and off-property throughout the region are expected to sufficiently reduce overall impacts to maintain a viable population within the area. The direct and indirect effects related to the Proposed Action on GRSG would be moderate and long term.

Potential impacts to GRSG would likely be limited primarily to indirect influences resulting from habitat disturbance, although loss of individual birds may occur at times. Ongoing BAM operations may adversely impact individual GRSG but are not likely to result in a loss of population viability in the wildlife monitoring area or cause a trend toward federal listing. The use of appropriate timing and spatial buffers, timely implementation of reclamation, and application of targeted conservation measures in suitable habitats both on- and off-property throughout the region are expected to sufficiently reduce overall impacts to maintain a viable population within the area. The proposed project is not restricted by BLM or Wyoming GRSG guidance. In light of the above discussions, the direct and indirect effects related to the Proposed Action on GRSG would be moderate and short term (10.4 years).

#### 4.10.3.1.2 No Action Alternative

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the federal coal included in the BAN tract. Impacts to the GRSG have resulted from current mining activity. Under this alternative, the ongoing impacts to GRSG unrelated to the Proposed Action would be similar to that described in **section 4.9.1.1** but the

total disturbance would be reduced by approximately 695.0 acres and the duration of the impacts would be reduced by approximately 10.4 years.

#### 4.10.3.2 *Cumulative Impacts*

Cumulative effects would be related to disturbance at Caballo, Belle Ayr, Cordero Rojo, and Coal Creek mines. As described in the updated 2012 Task ID Report (BLM 2012), substantial areas of GRSB habitats have been altered from their natural conditions as a result of past and on-going human activities in the Wyoming PRB study area. Human disturbances include, but are not limited to, agriculture, mining, roads, urban areas, and oil and gas development. Potential short-term impacts arise from habitat removal and disturbance associated with a project's development and operation (e.g., coal mines, oil and gas wells, etc.) and would cease upon project completion and successful reclamation in a given area. Potential long-term impacts consist of permanent loss of habitats and the wildlife populations that depend on those habitats, irrespective of reclamation success, and habitat disturbance related to longer term projects (e.g., power plant facilities, rail lines, etc.) (BLM 2012). The severity of both short- and long-term impacts to GRSB would depend on factors such as seasonal use patterns, type and timing of a project's activities, and physical parameters (e.g., topography, cover, forage, and climate).

The GRSB population in the WGFD Sheridan Region (including the BAN tract) appears to follow a 10-year cycle (BLM 2012). WGFD information indicated that over 42,300 male sage grouse were recorded 2016 in Wyoming. The average number of male grouse per lek was up 16 percent in 2016 compared to 2015, which was 66 percent higher than 2014 (WGFD 2016).

In light of the above discussions and the discussions included in **section 4.10.3.1**, which state that impacts would be moderate and long term, the cumulative effects related to the Proposed Action on GRSB regional GRSB populations would be moderate and long term.

#### 4.10.3.3 *Mitigation Measures*

No mitigation measures specific to GRSB are necessary. The general reclamation practices for establishing or enhancing postmine wildlife habitat at the BAM described in the Reclamation Plan of WDEQ-LQD Permit PT0214 are in place. Shrub seedlings will be planted in shrub pockets in order to improve the beneficial effects of the shrubs for wildlife.

### **4.10.4 Threatened, Endangered, and Candidate Species and Other Species of Special Interest**

#### 4.10.4.1 *Direct and Indirect Effects*

##### 4.10.4.1.1 Proposed Action

The USFWS maintains a list of T&E species, and designated critical habitats on their official website for each county in Wyoming (USFWS 2016a). The USFWS also provides the Information for Planning and Conservation (IPaC) system to evaluate the potential of encountering USFWS trust resources, including T&E species, related to a specific project area. The USFWS list of T&E wildlife species includes black-footed ferrets, which are listed as experimental, non-essential; and the northern long-eared bat, which is listed as threatened. The analysis area for T&E species includes the BAM permit boundary with an additional evaluation of species that occur within Campbell County. There are no critical habitats for these T&E species within the BAN tract or within Campbell County.

On March 6, 2013, the USFWS issued a letter acknowledging ‘block clearance’ for the State of Wyoming in response to a request from the Wyoming Game and Fish Department. Prairie dog towns, which provide habitat for black-footed ferrets, are not found within the BAN tract. Block clearance provides an acknowledgement that the likelihood of identifying ferrets in Wyoming, outside of those resulting from reintroductions, is distinctly minimal (USFWS 2013).

According to the USFWS, the primary threat to the northern long-eared bat is white-nose syndrome (WNS), a fungal disease that has devastated many bat populations (USFWS 2016c). The northern long-eared bat is also threatened by the loss and degradation of summer habitat; by barotrauma (injury to the bat lungs due to an extreme change in air pressure caused by flying to near wind turbines); collision with wind turbine blades; and loss of and vandalism to winter roosts and hibernacula. No wind turbines are within the general area and, as described in **section 3.3.3.1**, preferred roosting and reproductive habitats are limited in the BAM permit area and surrounding 1.0-mile monitoring area. However, potential foraging areas are present throughout the BAM permit area and surrounding monitoring area. No northern long-eared bat populations have been documented within Campbell County (ICF 2017).

The USFWS has established an area of influence (AOI) for the northern long-eared bat. Any projects that would occur within the AOI are anticipated to have impacts on northern long-eared bat. USFWS has a 4(d) rule for this species, which provides flexibility to landowners, land managers, government agencies and others as they conduct activities in areas that could be northern long-eared bat habitat. In areas of the northern long-eared bat’s range that have not yet been affected by WNS, defined as outside the WNS zone in the final 4(d) rule, such as in Wyoming, incidental take (unintentional harm to bats incidental to otherwise lawful activities) is not prohibited. Even though the final 4(d) rule exempts incidental take, federal agencies still have an obligation to consult on may affect determinations. This obligation is addressed if the federal agency complies with measures outlined in the framework for the USFWS’s January 5, 2016, programmatic biological opinion (BO) on the final 4(d) rule.

A portion of the proposed project as defined in this EA falls within the AOI; therefore, OSMRE has complied with the programmatic BO and fulfilled the Section 7 consultation requirements under the Endangered Species Act through submission of the Northern Long-eared Bat 4(d) rule streamlined consultation form to the Wyoming Ecological Field Services Office.

As discussed in **section 3.3.3.2.1**, nine vertebrate BLM-designated sensitive species have been documented in or within 0.5 mile of the BAM permit area from 1988 through 2016: northern leopard frog, bald eagle, Brewer’s sparrow, burrowing owl, ferruginous hawk, GRSG, loggerhead shrike, long-billed curlew, and sage thrasher. While these BLM-designated sensitive species have been documented within or near the BAN tract, a majority have been only rarely observed or rely on habitats that are not prevalent in the tract. Species associated with sagebrush or grassland habitats are likely to be most impacted. Current reclamation practices in-place at the BAM would promote the reestablishment of these habitats once reclamation has been completed.

As discussed in **section 3.3.3.2.2**, 15 USFWS Region 17 BCC have been documented in or within 0.5 mile of the BAM permit area from 1984 through 2016: bald eagle, golden eagle, grasshopper sparrow, short-eared owl, Brewer’s sparrow, burrowing owl, ferruginous hawk, Swainson’s hawk, prairie falcon, GRSG, loggerhead shrike, long-billed curlew, upland sandpiper, red-headed woodpecker, and sage thrasher. While these USFWS-designated BCC have been documented within or near the BAN tract, a majority have been only rarely observed or rely on

habitats that are not prevalent in the tract. Species associated with sagebrush or grassland habitats are likely to be most impacted. Monitoring and mitigation plans for Migratory Bird Species of Management Concern have also been developed in cooperation with USFWS for the existing BAM, and those plans would be amended to include the BAN tract. Current reclamation practices in-place at the BAM would promote the reestablishment of these habitats once reclamation has been completed.

The USFWS has acknowledge that the likelihood of identifying wild ferrets in Wyoming outside of reintroduction areas is minimal (USFWS 2013), and no northern long-eared bat populations have been documented within Campbell County (ICF 2017). However, if present, T&E species would be displaced. Considering the minimal potential of encountering T&E species in the area and the in-place reclamation techniques, the direct and indirect effects related to the Proposed Action on species of special interest would be minimal but they would be extended by approximately 10.4 years.

Species of special interest have been encountered within the study area (nine BLM sensitive species and 15 USFWS BCC), and would be displaced under the Proposed Action. However, current reclamation practices in-place at the BAM would promote the reestablishment of sagebrush and grassland habitats of affected species once reclamation has been completed and the implementation monitoring and mitigation plans for BCC would reduce potential impacts. Therefore, considering in-place reclamation techniques included in the Revegetation Enhancement Techniques section of the Reclamation Plan incorporated in the WDEQ-LQD Permit No. PT0214 and mitigation and monitoring, the direct and indirect effects related to the Proposed Action on species of special interest would be moderate and they would be extended by approximately 10.4 years.

#### 4.10.4.1.2 No Action Alternative

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the federal coal included in the BAN tract. However, approximately 695.0 acres within the tract have been approved for disturbed related to recovery of coal outside of the BAN tract under OSMRE's currently approved federal MPDD and impacts to threatened, endangered, and candidate species and other species of special interest within the tract have already resulted from current mining activity. Therefore, under this alternative, disturbance related impacts to these species of special interest in the area would remain as described in **section 4.10.4.1.1** but the extent of the impacts would be reduced by approximately 695.0 acres and the duration of the impacts would be reduced by approximately 10.4 years.

#### *4.10.4.2 Cumulative Impacts*

Cumulative effects for T&E species and species of special interest are related to the cumulative disturbance at BAM, Belle Ayr, Caballo, and Coal Creek mines. As described in the 2013 Task 3D Report for the Powder River Basin Coal Review, habitat fragmentation from activities such as roads, well pads, mines, pipelines, and electrical power lines can result in the direct loss of potential wildlife habitat (BLM 2013). Other indirect effects such as increased noise, elevated human presence, dispersal of noxious and invasive weed species, and dust deposition from unpaved road traffic can extend beyond the surface disturbance boundaries. According to the 2011 Middle Powder River Basin CHIA, approximately 50,000 acres of land have been approved

for disturbance within the middle group of mines (Ogle et al. 2011). Therefore, the effects of the Proposed Action related to additional habitat fragmentation, noise, elevated human presence, invasive weeds, and dust on regional T&E species and other species of special interest populations would increase the approved disturbance by only 695.0 acres (1.4 percent). However, the cumulative size of the disturbance associated with the middle group of mines is large enough that impacts would likely be moderate and they would be extended by approximately 10.4 years.

#### 4.10.4.3 *Mitigation Measures*

No mitigation measures specific to T&E species and other species of special interest are necessary. General reclamation practices for establishing or enhancing post-mine wildlife habitat at the BAM described in the Reclamation Plan of Permit PT0214 are in place.

## 4.11 Land Use

### 4.11.1 Direct and Indirect Effects

#### 4.11.1.1 *Proposed Action*

Additional discussions regarding land use can be found in sections 3.11.1 and 3.11.2 of the 2009 SGAC EIS and in the Amended Campbell County Natural Resource Land Use Plan (Campbell County Board of County Commissioners 2016). Surface ownership within the BAN tract is private (CCW) and the proposed coal removal area is managed by the BLM. The primary adverse environmental consequences of mining the proposed BAN tract on land use would be reduction of livestock grazing, loss of wildlife habitat, and curtailment of other mineral development on about 695.0 additional acres during active mining. Recreational use of the area is limited. There would be a loss of approximately 373 acres of hayland within the tract. Wildlife (particularly big game) use would be displaced while the BAN tract is being mined and reclaimed. Livestock grazing has already been prohibited due to the BAN tract being inside the permit boundary and adjacent to active mine areas. According to the WGFD 2015 Big Game Job Completion Report, the BAN tract is within the Black Thunder Pronghorn Herd Unit, which is currently below the herd management objective of 49,000 animals (WGFD 2015). The lower than desired population numbers are likely the result of reduced fawn recruitment due to drought, significant mortality during and following the 2010-11 winter, and increased summer mortality of all age classes due to disease, and perhaps even some unknown density dependent factors (WGFD 2015). The BAN tract is within the Cheyenne River Mule Deer Herd Unit, which is currently near the herd management objective of 27,000 animals (WGFD 2015). Hunting on the BAN tract is currently limited because the tract is within and adjacent to the mine permit boundary and would continue to be discouraged during mining and reclamation (WGFD 2015). While non-coal mineral development would be curtailed on the BAN tract, the 2013 Task 3D Report for the Powder River Basin Coal Review states that much of the CBNG may be depleted in the shallower production areas of the PRB by 2020 (BLM 2013). The proposed project is consistent with the Campbell County Natural Resource Land Use Plan, which includes the goals of:

- Electrical power generation using low-sulfur Powder River Basin coal, oil and gas, and renewable energy resources.
- Use of land and resources to accommodate new growth and foster economic development.

- Diversification of the county's economic base through the development and demonstration of renewable energy and clean coal technologies such as fuel enhancement, coal-to-fuels, coal to value added products and advanced combustion.

Since CCW owns and controls the surface within the BAN tract, the loss of agricultural land would not directly impact other landowners in the area. There is also limited recreational use of the area. Following reclamation, the land would be suitable for historical uses of grazing and wildlife uses and recreational use. Therefore, the direct and indirect effects related to land use would be minor and they would be extended by approximately 10.4 years.

#### *4.11.1.2 No Action Alternative*

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the federal coal included in the BAN tract. Under this alternative, disturbance related impacts would remain as described in **section 4.11.1.1** but disturbance would be reduced by approximately 695.0 acres.

### **4.11.2 Cumulative Impacts**

Cumulative effects would be related to land use at BAM, Belle Ayr, Caballo, and Coal Creek mines. According to the 2011 Middle Powder River Basin CHIA, approximately 50,000 acres of land have been approved for disturbance within the middle group of mines (Ogle et al. 2011). The primary adverse cumulative effects of mining resulting from the proposed BAN tract on land use would be reduction of livestock grazing, loss of wildlife habitat, and curtailment of other mineral development on about 695.0 additional acres during active mining. Since the mines own or control the surface within their permit boundaries, the loss of agricultural land would not directly impact other landowners in the area. There is also limited recreational use of the area. Following reclamation, the land would be suitable for historical uses of grazing and wildlife uses and recreational use. As stated above, much of the CBNG within the shallower production areas of the PRB may be depleted in these areas by 2020. Therefore, cumulative impacts from the Proposed Action on land use would be minor and would be extended by approximately 10.4 years.

### **4.11.3 Mitigation Measures**

No mitigation measures specific to land use are necessary.

## **4.12 Cultural Resources**

### **4.12.1 Direct and Indirect Effects**

#### *4.12.1.1 Proposed Action*

Additional discussions regarding cultural resources can be found in sections 3.12.1 and 3.12.2 of the 2009 SGAC EIS. The BAN tract has been subjected to Class III cultural resource inventories. No sites within the tract have classified as NRHP eligible sites that would require mitigation prior to disturbance. The direct and indirect effects on cultural resources from the Proposed Action would be negligible but long term.

#### *4.12.1.2 No Action Alternative*

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the federal coal included in the BAN tract. Under this alternative,

disturbance related impacts would remain as described in **section 4.12.1.1** but disturbance would be reduced by approximately 695.0 acres.

#### **4.12.2 Cumulative Impacts**

The individual evaluation of cultural resource sites in the CCW study area suggests that through avoidance of sensitive site types and mitigation through data recovery for all unavoidable disturbance to NRHP eligible sites, the cumulative effects to cultural resources have been minor. The cumulative impacts on cultural resource would be negligible but long term.

#### **4.12.3 Mitigation Measures**

No mitigation measures specific to cultural resources are necessary.

### **4.13 Visual Resources**

#### **4.13.1 Direct and Indirect Effects**

##### *4.13.1.1 Proposed Action*

Additional discussions regarding visual resources can be found in sections 3.13.1 and 3.13.2 of the 2009 SGAC EIS. Mining would affect landscapes classified by the BLM as visual resource management Class IV (BLM 2015c); the overall natural scenic quality of that class rating is considered relatively low. Mining activities would be visible from State Highway 59 and the Bishop Road, though the extent and duration of visibility would vary according to the visual perspective from the roads. The nearest occupied residence is approximately 3,300 feet from the tract boundary (**map 3-1**). No unique visual resources have been identified in or near the general analysis area, and the landscape character would not be significantly changed following reclamation. Current mining activities (blasting procedures and sizes, coal haul rates and distances, dust suppression, etc.) at the BAM would not change if the federal mining plan modification is approved. Current BACT measures would continue to be employed to control visibility impacts from particulates. While the initial disturbance related to the Proposed Action would be visible from Highway 59, the Bishop Road, and from the closest residence, this visual effects would be less than effects currently visible in the area. Ongoing BAM disturbance immediately adjacent to Highway 59 and a BAM topsoil pile is approximately 1,260 feet from the residence mentioned above.

Although no unique visual resources have been identified in or near the general analysis area and the landscape character would not significantly change as a result of the Proposed Action, the direct and indirect effects related to visual resources could affect local residences and are therefore listed as moderate but long term.

##### *4.13.1.2 No Action Alternative*

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the federal coal included in the BAN tract. Under this alternative, disturbance related impacts would remain as described in **section 4.13.1.1** but the extent of the impacts would be reduced by approximately 695.0 acres and the duration of the impacts would be reduced by approximately 10.4 years.

### **4.13.2 Cumulative Impacts**

Cumulative visual resources effects would be related to disturbance at Caballo, Belle Ayr, Cordero Rojo, and Coal Creek mines and from oil and gas development. Human disturbances include, but are not limited to, agriculture, mining, roads, urban areas, and oil and gas development. Potential temporary impacts arise from disturbance associated with a project's development and operation (e.g., coal mines, oil and gas wells, etc.) and would cease upon project completion and successful reclamation in a given area. Potential long-term impacts consist of permanent changes to existing topography and the vegetative component of the area, irrespective of reclamation success. Given the fact that moderate visual impacts are currently occurring in the area and that the effects from the Proposed Action are not significantly greater than current effects, the cumulative effects related to the visual resources would be moderate but long term.

### **4.13.3 Mitigation Measures**

No mitigation measures specific to visual resources are necessary.

## **4.14 Noise**

### **4.14.1 Direct and Indirect Effects**

#### *4.14.1.1 Proposed Action*

Additional discussions regarding noise can be found in sections 3.14.1 and 3.14.2 of the 2009 SGAC EIS. Existing noise sources in the BAN tract area includes coal mining activities, rail traffic, traffic on the nearby state highway, county and access roads, natural gas compressor stations, and wind. According to the 2009 SGAC EIS, the current median noise level near mining is estimated to be 40-60 dBA for day and night, with the noise level increasing with proximity to active mining operations at the adjacent mine. Mining activities are characterized by noise levels of 85-95 dBA at 50 ft from actual mining operations and activities (BLM 1992).

The Bishop Road passes through the BAN tract and, at its closest point, Highway 59 is approximately 2,350 feet west of the tract. The nearest occupied residence is located approximately 3,300 feet north of the BAN tract. Noise levels in wildlife habitat adjacent to the expansion area might increase, but incidental observations at the BAM and other local coal mines have demonstrated that numerous wildlife species inhabit or regularly use reclaimed lands within active mines during various stages of their establishment (i.e., newly seeded, maturing, well-established) (ICF 2016). No increase in average daily railroad traffic or railroad noise would occur under the Proposed Action.

Although noise levels would not significantly change as a result of the Proposed Action, the direct and indirect effects related to the Proposed Action could affect local residences for a longer period of time and are therefore listed as moderate but long term. Given the distance from mining related to the Proposed Action, direct and indirect effects to residences would be minor to moderate and short term (10.4 years). Impacts to people using the Bishop Road as a result of the Proposed Action would increase over current conditions due to the proximity of mining activities but would be minor to moderate considering the short duration of noise exposure.

#### *4.14.1.2 No Action Alternative*

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the federal coal included in the BAN tract. Under this alternative,

noise impacts would remain as described in **section 4.14.1.1** but the extent of the impacts would be reduced by approximately 10.4 years.

#### **4.14.2 Cumulative Effects**

Cumulative effects would be related to disturbance at Caballo, Belle Ayr, Cordero Rojo, and Coal Creek mines. Potential sources of noise disturbances include, but are not limited to, agriculture, mining, roads, urban areas, and oil and gas development. Coal recovery would continue within the BAM permit boundary at an estimated annual rate of 20 Mt, which is consistent with the 2009 through 2016 average annual recovery rate. Potential impacts would cease upon project completion and successful reclamation in a given area.

Recreational users, local residents and grazing lessees using lands surrounding active mining areas do hear mining-related noise, but this has not been reported to cause a substantial impact. Wildlife in the immediate vicinity of mining may be adversely affected by noise; however, observations at the BAM indicate that wildlife generally adapt to noise conditions associated with active coal mining (ICF 2016). Although noise levels would not significantly change as a result of the Proposed Action, the cumulative noise effects related to the Proposed Action could affect local residences for a longer period of time and are therefore listed as moderate but long term. Given the distance from mining related to the Proposed Action, cumulative effects to residences would be minor to moderate and short term (10.4 years). Impacts to people using the Bishop Road as a result of the Proposed Action would increase over current conditions due to the proximity of mining activities but would be minor to moderate considering the short duration of noise exposure. The cumulative impacts related to noise as discerned by the public would be minor to moderate but short term (10.4 years).

#### **4.14.3 Mitigation Measures**

No mitigation measures specific to noise impacts are necessary.

### **4.15 Transportation Facilities**

#### **4.15.1 Direct and Indirect Effects**

##### *4.15.1.1 Proposed Action*

Additional discussions regarding transportation facilities can be found in sections 3.15.1 and 3.15.2 of the 2009 SGAC EIS. Major roads and railroads in the general area of the BAN tract are presented on **map I-2**. Existing transportation facilities include roads, railroads, coal conveyors, and overhead electrical transmission lines associated with the BAN tract. All of these facilities would continue to be used under the Proposed Action. Employees and vendors would continue to travel on the Bishop Road to access the mine at a rate consistent with current road use but the use rate would be extended by approximately 10.4 years.

All of the coal mined at the BAM is transported by rail (BNSF/UP trackage) and, based on an estimated annual production rate of 20 Mt of coal shipped by rail and an estimated 15,470 tons of coal per train, the Proposed Action would result in approximately 1,293 train trips per year (one way), which is the approximate current annual shipping rate. The Bishop Road crosses under the BAM rail loop tracks, east of the mine. The road also crosses under a three-track main line in the same area. The Proposed Action will not result in an increase in the average number of trains using BNSF/UP rail lines but the current shipping rate would be extended by approximately

10.4 years. Since the Bishop Road crosses under the tracks at both crossings, there will be no effects on that portion of the road.

As discussed in **section 3.1.4.4**, the potential for emissions of dust from the large volumes of coal transported to large generating stations can be an environmental concern (Ramboll Environ 2016). Coal dust and fines blowing or sifting from moving, loaded rail cars has been linked to railroad track stability problems resulting in train derailments and to rangeland fires caused by spontaneous combustion of accumulated coal dust (BLM 2009). In response to suits brought on by environmental groups alleging that coal spilled from trains pollutes waterways, BNSF Railway has agreed to study the use of physical covers for coal trains to reduce the effects of blowing coal particles (Seattle Times 2016). BNSF has cited studies and experience to demonstrate that shippers can take steps in the loading of coal cars using existing, cost-effective technology that will substantially reduce coal dusting events. BNSF has a Coal Loading Rule, in effect since October 2011, specifically requiring all shippers loading coal at any Montana or Wyoming mine to take measures to load cars in such a way that ensures coal dust losses in transit are reduced by at least 85% compared to cars where no remedial measures have been taken (BNSF 2016).

Two recent Australian studies involved measuring particle concentrations in the air near a coal haul transport corridor to assess whether coal dust was being emitted from the railcars and whether any such emissions would result in particulate matter concentrations that would be considered potentially harmful to human health. The two reports presented strong evidence that, while particulate levels were elevated for the several minutes during and after trains passed the monitoring station, coal trains did not result in any more emissions than any other freight-hauling trains (Ramboll Environ 2016). Rail traffic to and from the mines would continue at existing levels for over an additional 10.4 years since coal recovery would continue at an estimated annual rate that is consistent with the 2009 through 2016 average annual recovery rate.

CCW has indicated that the Bishop Road would likely be relocated under the Proposed Action so that federal coal under the current ROW could be accessed. The relocation was discussed in the preferred alternative included in the 2009 SGAC EIS, which was selected by BLM when the tract was approved for lease. However, a final alignment for the relocation route for the road has not been formally decided so an assessment of the impacts of the relocation are difficult. In accordance with 40 CFR 1502.22, it should be noted that this information is incomplete and unavailable for this OSMRE evaluation. Any mining related road relocation option plans for the Bishop Road would be reviewed and approved by the Campbell County Commissioners and Wyoming Department of Transportation (WYDOT) prior to road relocation.

The mining on the tract analyzed in this EA would extend the time period that the BAM would produce and transport coal from the mine. The added direct and indirect effects of the Proposed Action on current transportation facilities would be minor but they would be extended by approximately 10.4 years. Other than the unknown aspect of incomplete and unavailable information, the relocation of the Bishop Road would result in moderate, long-term effects. Therefore, the direct and indirect effects on transportation would be moderate and long term.

#### *4.15.1.2 No Action Alternative*

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the federal coal included in the BAN tract. Indirect impacts on transportation have resulted from current mining activity. Therefore, under this alternative,

transportation impacts in the area would remain as described in **section 4.15.1.1** but the duration of the impacts would be reduced by approximately 10.4 years.

#### **4.15.2 Cumulative Impacts**

Cumulative impacts to transportation are related to coal production levels. If coal production levels increase, cumulative impacts to transportation would increase. Highway traffic accidents and delays at grade crossings could result from train traffic. The transportation facilities for the middle group of mines are already in place, and coal production and employment levels would not change with the Proposed Action. The Proposed Action would extend the duration of mining by approximately 10.4 years at the BAM, and thus the length of employment and associated transportation utilization would be extended.

Coal extracted from the existing surface coal mines in the Wyoming PRB is transported in rail cars along the BNSF and Union Pacific (UP) rail lines. The coal mines south of Gillette, including the BAM, ship most of their coal via the Gillette to Douglas BNSF and UP joint trackage that runs south through Campbell and Converse Counties and then east over separate BNSF and UP mainlines for destinations in the Midwest. The Proposed Action would extend the duration of mining by approximately 10.4 years at the BAM, and thus the duration of utilization of BNSF and UP rail lines would be extended by that amount.

The added cumulative impacts related to transportation would be moderate and they would be extended by approximately 10.4 years.

#### **4.15.3 Mitigation Measures**

All mining related road relocation option plans would be reviewed and approved by the Campbell County Commissioners and WYDOT prior to road relocation.

### **4.16 Hazardous and Solid Waste**

#### **4.16.1 Direct and Indirect Effects**

##### *4.16.1.1 Proposed Action*

Additional discussions regarding hazardous and solid wastes can be found in sections 3.16.1 and 3.16.2 of the 2009 SGAC EIS. Waste is generated during mining operations at the BAM, as at all mines. While coal mining and associated coal processing associated with the Proposed Action would yield additional coal waste, mining wastes are currently being generated on site and are handled according to WDEQ-LQD rules and regulations. Non-hazardous waste, which is similar to domestic or municipal solid waste, is currently disposed of on-site. Most of the wastes generated at the BAM that are not recycled are disposed of in a designated sanitary landfill located on a portion of the BAM area. Disposal of these non-hazardous wastes, which include abandoned mining machinery, scrap iron, scrap lumber, packing material, and other items is permitted under the mine's existing WDEQ-LQD permit to mine. These wastes would be buried and left in place, but no solid wastes would be deposited within 8 feet of any coal outcrop or coal storage area, or at refuse embankments or impoundment sites (CCW 2014).

The BAM does utilize some non-hazardous liquids; some materials that may be classified as hazardous, or are handled as hazardous, include some greases, solvents, paints, flammable liquids; and other combustible materials determined to be hazardous by the EPA under the Resource

Conservation and Recovery Act. These types of wastes are disposed of at an off-site EPA-permitted hazardous waste facility.

As stated above, disposal of non-hazardous wastes is permitted under the mine's existing WDEQ-LQD permit to mine and wastes would be buried and left in place, but no solid wastes would be deposited within 8 feet of any coal outcrop or coal storage area, or at refuse embankments or impoundment sites. In addition, appropriate non-hazardous liquids and materials classified as hazardous or are handled as hazardous would be disposed of at an off-site EPA permitted hazardous waste facility. Therefore, the direct and indirect effects from hazardous and solid wastes would be negligible and would be extended by approximately 10.4 years.

#### *4.16.1.2 No Action Alternative*

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the federal coal included in the BAN tract. Hazardous and solid wastes are currently being generated at the BAM. Therefore, under this alternative, impacts from hazardous and solid wastes in the area would remain as described in **section 4.16.1.1** but the duration of the impacts would be reduced by approximately 10.4 years.

### **4.16.2 Cumulative Impacts**

Cumulative hazardous and solid wastes effects would be related to mining at Caballo, Belle Ayr, Cordero Rojo, and Coal Creek mines. Mining wastes are currently being generated on site and are handled according to WDEQ-LQD rules and regulations. Since coal recovery at the BAM would continue at an estimated annual rate that is consistent with the 2009 through 2016 average annual recovery rate, the Proposed Action would not contribute to additional cumulative impacts, and they would remain as described in **section 4.16.1.1**.

### **4.16.3 Mitigation Measures**

No mitigation measures specific to hazardous and solid wastes are necessary beyond those required by the BAM WDEQ-LQD mining permit.

## **4.17 Socioeconomics**

### **4.17.1 Direct and Indirect Effects**

#### *4.17.1.1 Proposed Action*

Additional discussions regarding socioeconomics can be found in sections 3.17.1 and 3.17.2 of the 2009 SGAC EIS. Wyoming, Campbell County, Campbell County School District I, the City of Gillette, and many other governmental entities across the state receive revenues derived directly and indirectly from taxes and royalties on the production of federal coal, including that at the BAM. Such revenues include lease bonus bids, ad valorem taxes, severance taxes, royalty payments, sales and use taxes on equipment and other taxable purchases, and portions of required contributions to the federal AML program and Black Lung Disability Trust Fund. A summary of federal and state revenues generated from recovery of federal coal within the BAM, including federal coal within the BAN tract, is provided in **table 4-10** and **table 4-11** provides an estimate of the revenues derived from recovering the federal coal within the BAN tract, only.

**Table 4-10. LOM Federal and State Revenues from Federal Coal Recovery within the BAM**

Revenues	Total \$ Collected (Million \$)	Federal Revenue (Million \$)	State Revenue (Million \$)
Federal Mineral Royalties	420.7	210.4	210.4
Abandoned Mine Lands Fund	71.1	35.6	35.6
Severance Tax	166.3	-- <sup>2</sup>	166.3
Bonus Bid Annual Revenues <sup>1</sup>	0.0	0.0	0.0
Ad Valorem Tax	139.9	--	139.9
Black Lung	139.7	139.7	--
Sales and Use Tax	20.3	--	20.3
<b>Totals</b>	<b>958.0</b>	<b>385.6</b>	<b>572.4</b>

<sup>1</sup> No bonus bid revenues collected after 2016

<sup>2</sup> -- denotes No Revenues

Source: WWC 2017, calculation provided in **appendix**

**Table 4-11. LOM Federal and State Revenues from Federal Coal Recovery within the BAN Tract**

Revenues	Total \$ Collected (Million \$)	Federal Revenue (Million \$)	State Revenue (Million \$)
Federal Mineral Royalties	345.2	172.6	172.6
Abandoned Mine Lands Fund	58.4	29.2	29.2
Severance Tax	134.9	-- <sup>2</sup>	134.9
Bonus Bid Annual Revenues <sup>1</sup>	0.0	0.0	0.0
Ad Valorem Tax	114.7	--	114.7
Black Lung	114.6	114.6	--
Sales and Use Tax <sup>2</sup>	16.6	--	16.6
<b>Totals</b>	<b>784.4</b>	<b>316.4</b>	<b>468.0</b>

<sup>1</sup> No bonus bid revenues collected after 2016

<sup>2</sup> -- denotes No Revenues

Source: WWC 2017, calculation provided in **appendix E**

Under the Proposed Action, Wyoming revenues generated from LOM BAM production could be increased by approximately \$468.0 million and federal revenues could be increased by \$316.4 million. The primary difference between state and federal revenues is related to the fact that severance, Ad Valorem, and sales and use taxes are only paid to the state of Wyoming. The Proposed Action would extend the duration of the substantial economic benefits related to mining the federal coal.

Continued mining in the BAN tract would not directly create new jobs and therefore, the availability of housing units would not be impacted. No additional employees are anticipated as a result of the tract being mined, although the Proposed Action would extend the duration of employment for current employees and extend the substantial economic benefits related to mining the federal coal.

The economic and demographic data presented above indicate that neither minority populations nor people living at or below the poverty level make up a greater proportion of Campbell County population than they do in the state as a whole or that they would be unequally impacted if the BAM federal mining plan modification request is approved. Consequently, no environmental justice concerns are present in Campbell County.

As described in **section 3.16**, no negative changes in the current socioeconomic situation are anticipated but the positive effects would be extended. The positive direct and indirect effects described above (additional revenues) would be moderate and would be extended by approximately 10.4 years.

#### 4.17.1.2 No Action Alternative

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the federal coal included in the BAN tract. In terms of coal conservation; the No Action Alternative would mean that approximately 208.4 Mt of federal coal within the BAN tract would not be recovered. Wyoming revenues of approximately \$482.4 million and federal revenues of approximately \$316.4 million related to this coal would not be realized over the LOM under No Action Alternative. The selection of the No Action Alternative would likely not result in direct job losses. However, the No Action Alternative would reduce the LOM by approximately 10.4 years. It is also likely that state funded programs and services would be negatively affected by the loss of the revenue and fewer abandoned mine lands and black lung fees would be collected. The loss of revenue from the No Action Alternative would result in moderate negative direct and indirect socioeconomic effects.

#### 4.17.2 Cumulative Impacts

Cumulative effects would be related to socioeconomic conditions in Campbell County. Cumulative impacts related to the Proposed Action are not significantly different than those described in **section 4.17.1.1** because Wyoming, Campbell County, Campbell County School District I, the City of Gillette, and many other governmental entities across the state receive revenues derived directly and indirectly from taxes and royalties on the production of federal coal from Campbell County. Under the Proposed Action, Wyoming revenues generated from LOM production from Campbell County mines could be increased by approximately \$482.4 million and federal revenues could be increased by \$316.4 million. The positive cumulative effects on socioeconomics are expected to be moderate but short term (10.4 years) on the tract.

#### 4.17.3 Mitigation Measures

No mitigation measures specific to reducing socioeconomic impacts are necessary.

### 4.18 Short Term Uses and Long Term Productivity

The discussions contained within this environmental consequences chapter and Section 3.18 of the 2009 SGAC EIS, which is incorporated by reference, provide the analysis and relationships of shorter uses (such as mining coal) and long-term productivity (such as generating electricity for homes, schools, and industry).

### 4.19 Unavoidable Adverse Effects

Unavoidable adverse impacts are the effects on natural and human resources that would remain after mitigation measures have been applied. For the Proposed Action, details regarding these impacts are presented in the preceding resource sections. Unavoidable adverse effects are summarized in **table 4-12**.

**Table 4-12. Unavoidable Adverse Effects of the Proposed Action**

<b>Resource</b>	<b>Unavoidable Adverse Effect</b>
Topography and Physiography	Topographic effects of mining are unavoidable because mining activities such as blasting, excavating, loading and hauling of overburden and coal are required to recover coal in an economical manner.
Geology, Mineral Resources and Paleontology	Geology, mineral resources and buried paleontological resources may be permanently impacted by mining activities. Such impacts are unavoidable as the resources are not locatable and, therefore, cannot be avoided by mining activities.
Air Quality/GHG	Emissions and associated impacts are unavoidable, but are not expected to degrade ambient air quality in the area. Mined coal is primarily used for combustion; therefore, any associated GHG emissions are unavoidable if the Proposed Action is implemented.
Water Resources	Impacts to water resources resulting from coal extraction are unavoidable. However, these impacts would be mitigated through replacement of groundwater or surface water supplies for domestic, agricultural, industrial, or any other legitimate use if such a supply is diminished, interrupted, or contaminated, to the extent of precluding use of the water, as a result of mining (see <b>Section 4.5.1.3</b> ).
Soils	Soil in disturbance areas would exhibit more homogenous textures and may have coarser fragments near the surface following mining. Some soil loss may occur as a result of erosion, prior to stabilization.
Vegetation	Vegetation would be eliminated beginning with the initial disturbance and continue until reclamation is complete, which would extend to the end of the mining term for many facilities. Noxious weeds may be introduced as a result of mining activity, potentially affecting vegetation communities and requiring implementation of control measures in the long term.
Wildlife	Wildlife would be temporarily affected by mine activities, which would alter habitat conditions, particularly in the vicinity of surface disturbance. These impacts would be short-term and habitats would be reclaimed following mining.
Cultural Resources	No sites within the BAN tract have been designated as eligible for listing on the NRHP. Undiscovered cultural resources could be impacted by surface disturbing activities. All discovered sites would be mitigated as required by Section 106 of the NHPA.
Visual Resources	Mining activity and associated disturbances and facilities would unavoidably alter the landscape during the mining term, affecting the aesthetic qualities. Some features would be visible from public access points, including State Highway 59 and the Bishop Road. The effects would be negligible following reclamation.
Noise	Noise would result from mining activities similar to the existing condition, which is unavoidable.
Transportation Facilities	State Highway 59 and the Bishop Road would continue to experience mine-related traffic from area mine employees. The Bishop Road would likely be relocated under the Proposed Action. Coal dust blowing or sifting from moving, loaded rail cars would continue. These effects are unavoidable until mining ceases throughout the entire mine.
Hazardous and Solid Waste	Coal mining and associated coal processing would yield unavoidable coal waste.

## 5.0 Consultation and Coordination

### 5.1 Public Comment Process

OSMRE released a public notice of the availability of the EA in the Gillette News Record on September 10 and again on September 24, 2015. Written comments were solicited until October 10, 2015. **Appendix B** presents a summary of the comments received by the public and the OSMRE's responses to these comments.

Public outreach letters describing the EA and soliciting comments were mailed on September 10, 2015 to a total of 144 recipients, including city governments, adjacent landowners, and other interested parties. The legal notices and letters invited the public to comment on issues of concern related to the EA. Included in the mailing list for outreach letters of notification sent to 34 tribes/tribal representatives. These tribal notification letters were mailed on September 10, 2015.

OSMRE developed a project specific website that provided legal notices, outreach notice letters, mailing address, and an email address for comments to be sent. The website was activated on July 27, 2016 and was available at:

<https://www.wrcc.osmre.gov/initiatives/belleAyrMine.shtm>.

Scoping comment letters were received from 3,232 individuals during the public scoping period. Of the total comment letters received, 3,217 letters appeared to be some form of a protest letter posted on the WildEarth Guardians website. Comment letters received during the public review period for this EA will be considered during the ASLM approval process. A summary of the comments received in comment letters is provided below:

1. Level of NEPA/NEPA Process	3223
2. Air Quality	3221
3. Wildlife	3220
4. Climate Change/Global Warming	3220
5. Water Quality	3218
6. Pro Mining	9
7. Economy	6
8. Reclamation/Self Bonding	4
9. Bankruptcy	3
10. Noise	1

## 5.2 Preparers and Contributors

OSMRE personnel that contributed to the development of this EA are listed in **table 5-1**.

**Table 5-1. OSMRE Personnel**

<b>Name</b>	<b>Organization</b>	<b>Project Responsibility</b>
Marcelo Calle	OSMRE	Project Lead
Gretchen Pinkham	OSMRE	Project Coordination
Lauren Mitchell	OSMRE	Project Assistance
Roberta Martinez Hernandez	OSMRE	Air Quality
Nicole Caveny	OSMRE	Fish and Wildlife
Jeremy Iliff	OSMRE	Cultural Resources
Jacob Mulinix	OSMRE	Soils

Third party contractors who contributed to the development of this EA are identified in **table 5-2**.

**Table 5-2. Third Party Contractor Personnel**

<b>Name</b>	<b>Organization</b>	<b>Project Responsibility</b>
John Berry	WWC Engineering	NEPA Project Manager/Document Preparation/Technical Review
Mike Evers	WWC Engineering	Technical Review, Quality Assurance/Quality Control (QA/QC)
Chris McDowell	WWC Engineering	Technical Review, QA/QC

## 5.3 Distribution of the EA

This EA will be distributed to individuals who specifically request a copy of the document. It will also be made available electronically on the OSMRE website at <https://www.wrcc.osmre.gov/initiatives/belleAyrMine.shtm>.

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## 6.2 Abbreviations/Acronyms

AIRFA	American Indian Religious Freedom Act of 1978
AQ	air quality
AQI	air quality index
AQRVs	air quality related values
AQS	Air Quality System
ASCM	alternative sediment control measures
ASLM	Assistant Secretary, Land and Mineral Management (DOI)
AVF	alluvial valley floor
BACT	Best Available Control Technology
BAM	Belle Ayr Mine
BAN	Belle Ayr North tract
BCC	birds of conservation concern
BFO	BLM Buffalo Field Office
BLM	U.S. Bureau of Land Management
BMP	Best management practice
BNSF	BNSF Railway Company
BO	biological opinion
Btu	British thermal unit
CAA	Clean Air Act, as amended
CBNG	coal bed natural gas
CEQ	Council on Environmental Quality
CFO	Casper Field Office
CFR	Code of Federal Regulations
cfs	cubic feet per second
CH <sub>4</sub>	methane
CHIA	cumulative hydrologic impacts
CIA	cumulative impacts area
CO	carbon monoxide
COA	condition of approval
CO <sub>2</sub>	carbon dioxide
CO <sub>2</sub> e	Equivalent CO <sub>2</sub>
CWA	Clean Water Act
dBA	adjusted decibels, a logarithmic unit of sound levels
DFS	Dry Fork Station
DM	Departmental Manual
DOI	U.S. Department of the Interior
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
EPA	U.S. Environmental Protection Agency
EQC	Environmental Quality Council
ESA	Endangered Species Act of 1973
FCLAA	Federal Coal Leasing Act Amendment (1976)
FEIS	Final Environmental Impact Statement

FLPMA	Federal Land Policy Management Act of 1976
FONSI	Finding of No Significant Impact
GDP	gross domestic product
GHG	Greenhouse gas
GPO	U.S. Government Publishing Office
GRSG	Greater sage-grouse
GWP	Global Warming Potential
H+	hydrogen ion
H <sub>2</sub> S	hydrogen sulfide
Hg	mercury
HAP	hazardous air pollutants
ICF	ICF International
in.	inches
IPaC	Information for Planning and Conservation
ISCLT3	Industrial Source Complex Long Term
LAC	level of acceptable change
lb.	pounds
LNCM	lands necessary to conduct mining
LOM	life of mine
µg/m <sup>3</sup>	micrograms per cubic meter
MATS	Mercury and Air Toxic Standards
MBCC	migratory birds of conservation concern
MBCY	million-bank cubic yards
MBHFI	migratory birds of high federal
MBTA	Migratory Bird Treaty Act of 1918, as amended
Mg/L	milligrams per liter
MLA	Mineral Leasing Act (1920)
MMPA	Mining and Minerals Policy Act of 1970
MPDD	Mining Plan Decision Document
Mt	million tons
Mtpy	million tons per year
MW	megawatts
N <sub>2</sub> O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act (1969)
NHPA	National Historic Preservation Act
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NOA	Notice of Availability
NOI	Notice of Intent
NO <sub>2</sub>	nitrogen dioxide
NO <sub>x</sub>	oxides of nitrogen
NRCS	Natural Resources Conservation Service
NSPS	New Source Performance Standards
NWI	Nation Wetlands Inventory
O <sub>3</sub>	ozone

OSMRE	Office of Surface Mining Reclamation and Enforcement
PAP	Permit Application Package
Pb	lead
PBT	bioaccumulative and toxic
pH	power of hydrogen
PM <sub>2.5</sub>	fine particulates less than 2.5 microns
PM <sub>10</sub>	fine particulates less than 10 microns
ppb	parts per billion
ppm	parts per million
PRB	Wyoming Powder River Basin
PRPA	Paleontological Resources Preservation Act of 2009
PSD	Significant Deterioration Program
PTE	potential to emit
R2P2	Resource Recovery and Protection Plan
RMP	Resource Management Plan
ROD	Record of Decision
ROW	right-of-way
SDWA	Safe Drinking Water Act
SH	State Highway
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SMCRA	Surface Mining Control and Reclamation Act (1977)
SO <sub>2</sub>	sulfur dioxide
SOSI	species of special interest
STP	standard temperature and pressure
TDS	total dissolved solids
T&E	threatened and endangered
tpy	tons per year
TSP	total suspended particles
TSS	total suspended solids
UP	Union Pacific
USACE	U.S. Army Corps of Engineers
USEIA	U.S. Energy Information Administration
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOC	volatile organic compound
WAAQS	Wyoming Ambient Air Quality Standards
WAQSR	Wyoming Air Quality Standards and Regulations
WDEQ	Wyoming Department of Environmental Quality
WDEQ-AQD	Wyoming Department of Environmental Quality – Air Quality Division
WDEQ-LQD	Wyoming Department of Environmental Quality – Land Quality Division
WDEQ-WQD	Wyoming Department of Environmental Quality – Water Quality Division
WDWS	Wyoming Department of Workforce Services
WEQA	Wyoming Environmental Quality Act of 1973
WET	whole effluent toxicity
WGFD	Wyoming Game and Fish Department

Chapter 6 – References and Abbreviations/Acronyms

WOGCC	Wyoming Oil and Gas Conservation Commission
WRS	Wyoming Revised Statutes
W.S.	Wyoming Statue
WYPDES	Wyoming Pollutant Discharge Elimination System
WYNDD	Wyoming Natural Diversity Database

**APPENDIX A**

LEGAL NOTICES  
FOR FEDERAL LEASE MODIFICATION APPROVAL  
WYW161248

Public Notice  
Belle Ayr Mine Mining Plan Modification  
Environmental Assessment

The U.S. Department of the Interior (DOI), Office of Surface Mining Reclamation and Enforcement (OSMRE), Western Region Office will prepare an environmental assessment (EA) for the Belle Ayr Mine North Tract Federal mining plan modification (the Project). The Project was officially proposed by Alpha Coal West (ACW), a subsidiary of Alpha Natural Resources, Inc., on October 20, 2014. In accordance with the Mineral Leasing Act of 1920 (MLA), The DOI Assistant Secretary for Land and Minerals Management (ASLM) must approve the Project before any mining and reclamation can occur on lands containing leased Federal coal. The Belle Ayr Coal Mine is located in Campbell County, Wyoming, approximately 10 miles south-southeast of Gillette. The Project is located on Federal coal leases administered by the Bureau of Land Management (BLM) Casper Field Office and located within and adjacent to the Belle Ayr Mine's permit area, approved in accordance with the Surface Mining Control and Reclamation Act.

The lease and sale of the Federal coal included in the Belle Ayr North LBA (WYWI61248) was originally evaluated in the 2009 2009 SGAC EISEnvironmental Impact Statement (EIS). The coal was offered for sale in a sealed-bid, competitive lease process on July 13, 2011. Following determination by BLM that the highest bid at the sale met or exceeded the fair market value of the coal within the tract, the bid submitted by BTU Western Resources Inc. was accepted. The lease was subsequently transferred from BTU Western Resources to Alpha Wyoming Land Company, a subsidiary of Alpha Natural Resources, Inc., in July of 2012. The coal would be mined using conventional surface-mining methods and shipped from an onsite railroad loading facility to various sites within the United States. On June 11, 2014, the Wyoming Department of Environmental Quality (WDEQ)/Land Quality Division (LQD) approved ACW's application to amend the Mine Permit No. 214-T8 to include approximately 976 acres of the Federal coal lease area within the existing and approved Belle Ayr Mine permit boundary. On January 28, 2015, ACW submitted an application to WDEQ/LQD to amend Mine Permit No. 214-T8 to include the remainder (approximately 695 acres) of the Belle Ayr North Tract.

OSMRE is preparing this EA to evaluate the environmental impacts resulting from the Project, pursuant to the requirements of the National Environmental Policy Act of 1969 (NEPA). Under the currently approved State mine permit approved in 2013, mining operations have disturbed 12,091 acres and the proposed modification would add approximately 1,478 acres of disturbance. Since 2010, the annual production rate has ranged from a high of about 25.8 million tons (mmt) in 2010 to a low of about 14.4 mmt in 2014. Due to the uncertainty in determining the demand for coal, the EA will be prepared assuming that the average annual production rate would be 22.5 mmt. Based on remaining coal reserves and the estimated future production rate; mining at the Belle Ayr Mine would be completed in approximately 2 years if the Project is not approved. The amount of federal coal to be added at this mine as a result of the Project is approximately 221.7 mmt of which, approximately 218.2 mmt would be mineable. The approval would extend the life of mine by approximately 9 years.

This EA will disclose the potential for direct, indirect and cumulative impacts to the environment from the Project. Further, this EA will update, clarify, and provide new and additional environmental information for the Project. Through the EA process, OSMRE will determine whether or not there are significant environmental impacts. If a finding of no significant impact is

reached, the OSMRE Director will make a recommendation to the DOI's ASLM on the proposed Federal mining plan modification and the ASLM will approve, approve with conditions, or disapprove the Federal mining plan modification, as required under the MLA. If the EA identifies significant impacts, an EIS will be prepared.

OSMRE is soliciting public comments on the Project. Your comments will help to determine the issues and alternatives that will be evaluated in the environmental analysis. You are invited to direct these comments to: ATTN: Belle Ayr North Tract EA, C/O Lauren Mitchell, Western Region Office, Office of Surface Mining Reclamation and Enforcement, 1999 Broadway, Suite 3320, Denver, CO 80202-3050. Email: OSM-NEPA-WY@osmre.gov. Comments should be received or postmarked no later than October 10, 2015 in order to be considered during the preparation of the EA. Comments received, including names and addresses of those who comment, will be considered part of the public record for this Project and will be available for public inspection. Additional information regarding this Project may be obtained from Lauren Mitchell, telephone number (303) 293-5028. When available, the EA and other supporting documentation will be posted at: <http://www.wrcc.osmre.gov/initiatives/belleAyrMine.shtm>

## Appendix A



### United States Department of the Interior

#### OFFICE OF SURFACE MINING RECLAMATION AND ENFORCEMENT

Western Region Office  
1999 Broadway, Suite 3320  
Denver, CO 80202-3050



September 10, 2015

Dear Interested Public Land User,

The U.S. Department of the Interior (DOI), Office of Surface Mining Reclamation and Enforcement (OSMRE), Western Region Office will prepare an environmental assessment (EA) for the Belle Ayr Mine North Tract Federal mining plan modification (the Project). The Project was officially proposed by Alpha Coal West (ACW), a subsidiary of Alpha Natural Resources, Inc., on October 20, 2014. In accordance with the Mineral Leasing Act of 1920 (MLA), The DOI Assistant Secretary for Land and Minerals Management (ASLM) must approve the Project before any mining and reclamation can occur on lands containing leased Federal coal. The Belle Ayr Coal Mine is located in Campbell County, Wyoming, approximately 10 miles south-southeast of Gillette. The Project is located on Federal coal leases administered by the Bureau of Land Management (BLM) Casper Field Office and located within and adjacent to the Belle Ayr Mine's permit area, approved in accordance with the Surface Mining Control and Reclamation Act.

The lease and sale of the Federal coal included in the Belle Ayr North LBA (WYW161248) was originally evaluated in the 2009 South Gillette Area Coal Lease Applications Environmental Impact Statement (EIS). The coal was offered for sale in a sealed-bid, competitive lease process on July 13, 2011. Following determination by BLM that the highest bid at the sale met or exceeded the fair market value of the coal within the tract, the bid submitted by BTU Western Resources Inc. was accepted. The lease was subsequently transferred from BTU Western Resources to Alpha Wyoming Land Company, a subsidiary of Alpha Natural Resources, Inc., in July of 2012. The coal would be mined using conventional surface-mining methods and shipped from an onsite railroad loading facility to various sites within the United States. On June 11, 2014, the Wyoming Department of Environmental Quality (WDEQ)/Land Quality Division (LQD) approved ACW's application to amend the Mine Permit No. 214-T8 to include approximately 976 acres of the Federal coal lease area within the existing and approved Belle Ayr Mine permit boundary. On January 28, 2015, ACW submitted an application to WDEQ/LQD to amend Mine Permit No. 214-T8 to include the remainder (approximately 695 acres) of the Belle Ayr North Tract.

OSMRE is preparing this EA to evaluate the environmental impacts resulting from the Project, pursuant to the requirements of the National Environmental Policy Act of 1969 (NEPA). Under the currently approved State mine permit approved in 2013, mining operations have disturbed 12,091 acres and the proposed modification would add approximately 1,478 acres of disturbance. Since 2010, the annual production rate has ranged from a high of about 25.8 million tons (mmt) in 2010 to a low of

## Appendix A

about 14.4 mmt in 2014. Due to the uncertainty in determining the demand for coal, the EA will be prepared assuming that the average annual production rate would be 22.5 million tons per year (mmtpy). Based on remaining coal reserves and the estimated future production rate; mining at the Belle Ayr Mine would be completed in approximately 3 years if the Project is not approved. The amount of Federal coal to be added at this mine as a result of the Project is approximately 221.7 mmt of which, approximately 218.2 mmt would be mineable. The approval would extend the life of mine by approximately 9 years.

This EA will disclose the potential for direct, indirect and cumulative impacts to the environment from the Project. Further, this EA will update, clarify, and provide new and additional environmental information for the Project. Through the EA process, OSMRE will determine whether or not there are significant environmental impacts. If a finding of no significant impact is reached, the OSMRE Director will make a recommendation to the DOI's ASLM on the proposed Federal mining plan modification and the ASLM will approve, approve with conditions, or disapprove the Federal mining plan modification, as required under the MLA. If the EA identifies significant impacts, an EIS will be prepared.

OSMRE is soliciting public comments on the Project. Your comments will help to determine the issues and alternatives that will be evaluated in the environmental analysis. You are invited to direct these comments to:

ATTN: Belle Ayr North Tract EA  
C/O Lauren Mitchell  
Western Region Office, Office of Surface Mining Reclamation and Enforcement  
1999 Broadway, Suite 3320  
Denver, CO 80202-3050

Comments may also be emailed to: [OSM-NEPA-WY@osmre.gov](mailto:OSM-NEPA-WY@osmre.gov). Comments should be received or postmarked no later than October 10, 2015 in order to be considered during the preparation of the EA. Comments received, including names and addresses of those who comment, will be considered part of the public record for this Project and will be available for public inspection. Additional information regarding this Project may be obtained from Lauren Mitchell, telephone number (303) 293-5028. When available, the EA and other supporting documentation will be posted at: <http://www.wrcc.osmre.gov/initiatives/belleAyrMine.shtm>

Sincerely,



Marcelo Calle, Manager  
Field Operations Branch

## **APPENDIX B**

PUBLIC SCOPING AND NOTICE OF AVAILABILITY MAILING LISTS,  
PUBLIC SCOPING and BAN EA REVIEW COMMENTS SUMMARIES  
and  
BAN EA REVIEW COMMENT RESPONSE LOG  
(INDIVIDUAL LETTERS RECEIVED HAVE NOT BEEN INCLUDED)

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Mailing List

<b>Name</b>	<b>Title</b>	
<b>Tribes</b>		
Ivan Posey	Chairman	Shoshone Business Council
Glenda Trosper	Director of Cultural Preservation	Eastern Shoshone Tribe
Richard Brannan	Chairman	Arapahoe Business Council
JoAnn White	Tribal Historic Preservation Officer	Northern Arapaho Tribe
Eugene Little Coyote	President	Northern Cheyenne Tribal Council
Conrad Fisher		Northern Cheyenne Cultural Commission
Carl Venne	Chariman	Crow Tribal Council
Dale Old Horn	Tribal Historic Preservation Officer	Crow Tribe
John Yellow Bird Steele	President	Oglala Sioux Tribal Council
Roger Trudell	Chairman	Santee Sioux Tribal Council
Rodney Bordeaux	President	Rosebud Sioux Tribal Council
Terry Gray	Cultural Resource Coordinator	Rosebud Sioux Tribe
Ron His-Horse-Is-Thunder	Chairman	Standing Rock Sioux Tribal Council
Tim Mentz	Tribal Historic Preservation Officer	Standing Rock Sioux Tribe
Duane Big Eagle	Tribal Council Chairman	Crow Creek Sioux Tribe
Gordon Yellowman		Cheyenne-Arapaho Tribes of Oklahoma
Joshua Weston	President	Flandreau Santee Sioux Tribe
Joe Brings Plenty Sr	Chairman	Cheyenne River Sioux Tribal Council
Michael Jandreau	Chairman	Lower Brule Sioux Tribal Council
Albert Le Beaux	THPO	Cheyenne River Sioux Tribe
Alonzo Chalepah	Tribal Chairman	Apache Tribe of Oklahoma
Bobby Jay	Administrator	Apache Tribe of Oklahoma
Billy Evans Horse	Chairman	Kiowa Business Committee
Ruth Touhty	NAGPRA Coordinator	Comanche Nation
Edgar Bear Runner		Oglala Sioux Tribe
Ruth Toahy	NAGPRA Coordinator	Comanche Tribe NAGPRA Office
Curtis Minos	Environmental Director	Kiowa Business Committee

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Name	Title	
Russell Eagle Bear		Rosebud Sioux THPO
Sam Allen	Office of Cultural Preservation	Flandreau Santee Sioux Tribe
Joyce Whiting	THPO	Oglala Sioux Tribe
Anthony Addison		Northern Arapaho Business Council
Wallace Coffey	Chairman Comanche Nation Tribe	
Lester Thompson, Jr.		Crow Creek Sioux Tribe
Byron Olson		Standing Rock Sioux Tribe
State and Local Agencies		
Alan J Ver Ploeg		Wyoming State Geological Survey
		Advisory Council on Historic Preservation
<b>Federal, State, and Local Agencies</b>		
Bill Radden-Lesage		BLM WO320
Phil Perlewitz		BLM-Montana State Office
Tom Bills		BLM Buffalo Field Office
Chris Durham		BLM Buffalo Field Office
Sarah Bucklin		BLM Casper Field Office
		BLM Library
Coal Coordinator		BLM Montana State Office
Nate Arave		BLM Powder Miles City Office
Coal Coordinator		BLM Wyoming State Office
File Copy		BLM-Wyoming High Plains District Office
Al Elser		BLM-Wyoming High Plains District Office
Don Sutherland		Bureau of Indian Affairs
		Campbell County Conservation District
		Campbell County School District I
		Campbell Cty Board of Commissioners
Executive Director		Campbell Cty Econ Dev Corp
Fred Lawrence		Carbon Recovery Technology
Russ Gilroy		Central Files - WYHPD - BLM

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Name	Title	
Russ Gilroy		Central Records - WYHPD - BLM
		Congresswoman Cynthia M. Lummis
		Converse County Commission
Superintendent		Converse County School District
Paul W. Musselman		Converse Cty, Special Projects
Judy Smith		CSU Library
		Department of Energy
		Devils Tower National Monument
		Economic Analysis Division
Tom Langston		Gillette Dept of Comm Dev
Steve Bullock		Governor of Montana
Matt Mead		Governor of Wyoming
Environmental Division		HQ-USAF/CEVP
Tom Florich		Medicine Bow National Forest
Bob Berham		Meineadair Consultants
Monte Mason		Mineral Management Service
Environmental Protection Specialist		National Park Service - Air Quality
		NPS
		NPS - Air Quality
		NPS Air Resources Division
		NPS 2310
		NWU Policy Research Inst
James Bennett		Office of natural Resources Revenue
Karen Garza		Office of Natural Resources Revenue
Mike Throckmorton		Office of Natural Resources Revenue
		Office of State Lands and Investments
		Office of the State Treasurer
		OPEC : Denver Region
		Rocky Mtn Region Solicitor

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Name	Title	
Ryan Lance		State Land Commissioner - State of Wyoming
Wendy Hutchinson		Thunder Basin Coal Company
Mayor		Town of Wright
Laurie Hall		U.S. Government Printing Office
Chandler Peter		US Army Corps of Engineers
BLM		US Department of the Interior
		US EPA
		US EPA Region VIII
Pat Carter		US Fish & Wildlife Service
Ecological Services		US Fish and Wildlife Service
		US Geological Survey
		US Senator John Barrasso
		US Senator John Barrasso
Robin Bailey		US Senator Mike Enzi
Jason M. Ryan - Business Analytics Director		US Western Surface Operations
Melody Holm		USDA Forest Service
BLM Cooperator Lead		USDA-FS Douglas Ranger District
Jeff Sorkin		USDA-FS Rocky Mtn Region
		USGS Water Resources Division
Tamsen Hert		UW Libraries
David Waterstreet		WDEQ - Water Quality Division
Mark Rogaczewski		WDEQ Land Quality Division
David Waterstreet		WDEQ Water Quality Division
Jeremy Lyon		WDEQ: Water Quality Division
Tim Stark		WY Dept of Transportation
Dave Spencer		WY Business Council/NE Region
Jim McBride		WY Department of Education
		WY Dept of Employment Research & Planning
John Corra		WY Dept of Environmental Quality

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Name	Title	
Kelly Bott		WY DEQ Air Quality Division
Don Likwartz		WY O&G Conservation Comm
Milward Simpson		WY Parks & Cultural Res Dept
Pat Tyrrell		WY State Engineer's Office
Joan Binder		WY State Geological Survey
Sarah Needles		WY State Historic Pres Office
Steve Furtney		WY State Planning Office
Bill Schilling		Wyoming Business Alliance
Natural Resources & Policy Section		Wyoming Dept of Agriculture
Mark Gillette		Wyoming Dept. of Transportation
John Emmerich		Wyoming Game and Fish Department
Kyle Wendtland		Wyoming LQD - DEQ
Darrell Zlomke		Wyoming Public Service Comm
Harry LaBonde		Wyoming Water Dev Comm
<b>Businesses and Individuals</b>		
Kyle Wendtland		Antelope Coal Company
Doug Downing		Ark Land Company
Managing Editor		Associated Press
Robert Stamp		Belle Fourche Pipeline Company
Huntington Walker - Sr. VP Land		Bill Barrett Corporation
		Biodiversity Conservation Alliance
		BNSF Railway Company
		Buckskin Mine
Dustin Bleizeffer		Casper Star Tribune
Amy M. Atwood		Center for Biological Diversity
Bret Jones		City of Gillette
John Trummel		Cloud Peak
Russ Hallcroft		Cloud Peak Energy
Dick Turpin		Cloud Peak Energy

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Name	Title	
		Cordero Rojo Mine
		Defenders of Wildlife
		Douglas Budget
Valerie J. Randall		ENSR
		Environmental Policy and Culture Program
Dennis McGirr		Environmental Solutions Inc
		Fdn for N American Wild Sheep
Laurel Vicklund		Foundation Coal
Energy Reporter		Gillette News-Record
Scott Child		Interwest Mining Company
Joe Mehl		Kiewit Mining Group Inc
John Corkery		M&K Oil Company Inc
Bob Yarkosky		Marston & Marston
Marion Loomis		Mining Associates of Wyoming
Hal Quinn		National Mining Association
		National Wildlife Federation
		Natural Resources Defense Council
		P&M Coal
		P&M Coal Mining Co
		Peabody Energy
		Petroleum Association of Wyoming
Shannon Anderson		Powder River Basin Resource Council
Phil Dinsmoor		Powder River Coal Company
Janet Pasque		Resolute Wyoming
		Rockpile Museum
Peter Morgan		Sierra Club
Cathy Pruves, Technical Advisor		Trout Unlimited
		Union Pacific Railroad
		US West Communications

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Name	Title	
		WildEarth Guardians
Mike Evers		WWC Engineering
Matt Grant		Wyoming Mining Association
Gary Wilmont		Wyoming Outdoor Council
Niels Hansen		Wyoming Stock Growers Assoc
Steve Kilpatrick		Wyoming Wildlife Federation
Liz Philp		Wyoming Wool Growers Assoc
Managing Editor		Wyoming-Tribune Eagle
Land Department		Yates Petroleum Corp et al

Appendix B

BAN Public Outreach (Scoping) Comments Summary

Comment Date	Comment Topic											# of Comments
	Water Quality	Air Quality	Wildlife	Level of NEPA/NEPA Process	Noise	Reclamation/Self Bonding	Bankruptcy	Climate Change/Global Warming	Economy	Pro Mining	Notes	
10/6/2015												
10/8/2015												
10/8/2015												
10/8/2015												
10/8/2015												
9/25/2015												
10/10/2015												
10/9/2015												
10/1/2015											Did not specifically address Belle Ayr expansion	
10/10/2015												
10/9/2015												
10/7/2015*	3217	3217	3217	3217				3217			WEG template comments	<b>3217</b>
10/10/2015												
3/15/2015											Did not specifically address Belle Ayr expansion	
10/2/2015												
10/6/2015												
	<b>3218</b>	<b>3221</b>	<b>3220</b>	<b>3223</b>	<b>1</b>	<b>4</b>	<b>3</b>	<b>3220</b>	<b>6</b>	<b>9</b>		<b>3232</b>

\* Comments received over extended period

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Public Outreach (Scoping) Comments Categorized by Key Resource Category

Comment Topic	Count <sup>1</sup>	Percent	Count <sup>2</sup>	Percent
Pro Mining	9	0.1%	9	20%
Level of NEPA/NEPA Process	3,223	20%	7	15%
Economy	6	0.04%	6	13%
Air Quality	3,221	20%	5	11%
Wildlife	3,220	20%	4	9%
Climate Change/ Global Warming	3,220	20%	4	9%
Reclamation/ Self Bonding	4	0.02%	4	9%
Bankruptcy	3	0.02%	3	7%
Water Quality	3,218	20%	2	4%
Noise	1	0.01%	2	4%
<b>Total</b>	<b>16,125</b>	<b>100%</b>	<b>46</b>	<b>100%</b>

1. <sup>1</sup> Count includes WEG comment template letters as individual comments

2. <sup>2</sup> Count includes WEG comment template letters as one comment

Add a Summary of EA Public Comments as well as a table showing the comments Categorized by Key Resource Category

## **APPENDIX C**

AIR QUALITY MODELING FOR BAM PERMIT P0014896  
McVEHIL-MONNETT ASSOCIATES, INC.

AIR QUALITY MODELING FOR CORDERO ROJO PERMIT #MD-9943  
REDHORSE CORPORATION

### **Selection of Worst-Case Years - McVehil-Monnett Associates, Inc.**

WDEQ-AQD issued air quality permit P0014896 for the Belle Ayr Mine (BAM) on June 3, 2015, based partially on an analysis using emission factors, estimation methods, and model selection consistent with Wyoming Department of Environmental Quality (WDEQ)-Air Quality Division (AQD) policy. Fugitive and point source emission inventories for PM<sub>10</sub> for the years 2014 through 2031 were developed for BAM based on site-specific information provided by the mine. The resultant PM<sub>10</sub> inventories were used to determine the years that would be modeled. Maximum PM<sub>10</sub> emission rates were predicted to occur during 2016 and 2017, based on estimated emissions of 1,486 and 1,443 tpy, respectively. The selection of these years should ensure that the maximum potential PM<sub>10</sub> impacts on ambient air quality are addressed. PM<sub>10</sub> inventories for the mining activities at the BAM were modeled for all years in the currently anticipated Life of Mine (LOM). Fugitive emission sources, such as overburden and coal blasting events and truck dumps, and point sources, such as baghouse dust, were modeled using the Industrial Source Complex Long-term (ISCLT3) model to estimate average annual PM<sub>10</sub> concentrations. McVehil-Monnett Associates, Inc. (McVehil-Monnett) reviewed regulatory modeling techniques to select the most appropriate air quality dispersion model to simulate dispersion of air pollutants emitted by the proposed project for a near-field air quality impact analyses (AQIA). Following WDEQ-AQD guidance, the ISCLT3 model was used in all modeling analysis (McVehil-Monnett 2014). The model evaluated overall maximum PM<sub>10</sub> emissions resulting from mining activities at the Caballo, Belle Ayr, Cordero Rojo, and Coal Creek mines (middle group of mines).

Wyoming Department of Environmental Quality (WDEQ)-Air Quality Division (AQD) policy requires that the maximum PM<sub>10</sub> and NO<sub>x</sub> impacts (during the life-of-mine) from all mine sources be identified and compared to the applicable air quality standards. Because it is not practical to model all of the years in the life-of-mine, years with maximum annual emissions from mining operations are determined and then modeled. Model results for these "worst-case" emission years are then compared to the applicable ambient air quality standards. If the maximum impact is below the air quality standard, it can be assumed that the standard will be achieved throughout the LOM.

Impacts on ambient air from Belle Ayr (and other mines) are not solely dependent on emission rate. Yearly variations in mining activities, emission density, and pit proximity to "lands necessary to conduct mining" (LNCM) boundaries also influence ambient air impacts. As such, it was necessary to apply a set of semi-objective criteria to select as many "worst-case" years as practical for detailed modeling. The process involves a year-to-year comparison of fugitive PM<sub>10</sub> emissions from the applicant mine. Annual fugitive emissions for each year are ranked and candidate worst-case years are further evaluated regarding their proximity to the LNCM boundary, as the LNCM defines the location of ambient air and therefore the placement of model receptors. If the distance between mining and the LNCM boundary is small, air quality impacts at the LNCM boundary can be more significant than impacts in years with higher emission rates that are further from the LNCM boundary. Therefore, special attention was given to those years when mining will be conducted in close proximity to LNCM boundaries.

The annual PM<sub>10</sub> emissions from Belle Ayr and the other Middle Group mines are summarized on **page C-3**. Based on mine plan parameters, emission inventories, and discussions with AQD personnel, years 2016 and 2017 were chosen as worst-cases to be modeled. Year 2016 was selected as the BAM's highest emission year and the second-highest regional emission year. Year 2017 was selected as the Middle Group's highest emission year and BAM's second-highest year.

## Appendix C

Coal removal areas will be near LNCM boundaries during these years, with Caballo pits near their west and east LNCM, Belle Ayr pits near their west and northeast LNCM, Cordero Rojo pits near their west and northwest LNCM, and Coal Creek pits near their west LNCM. The selection of these years should ensure that the maximum potential  $PM_{10}$  impacts on ambient air quality are addressed.

The table on **page C-3** summarizes life-of-mine  $NO_x$  emissions from Belle Ayr.  $NO_x$  modeling was performed for years 2016 and 2017; the years were selected as described above.

Appendix C

McVehil-Monnett Associates, Inc. BAM and Regional Mines Annual PM<sub>10</sub> Emission Summary (tpy)

Year	Belle Ayr	Caballo	Cordero Rojo	Coal Creek	Total
2014	1,062	1,695	2,736	1,112	6,603
2015	1,097	1,435	2,506	1,097	6,136
2016	1,486	1,635	2,484	1,257	6,861
2017	1,443	1,732	2,470	1,234	6,879
2018	1,294	1,512	2,206	1,149	6,161
2019	1,112	1,574	2,164	1,210	6,060
2020	1,168	1,689	327	1,249	4,433
2021	1,281	1,618	316		3,215
2022	1,269	1,554			2,823
2023	1,262	1,611			2,872
2024	1,306				1,306
2025	1,350				1,350
2026	1,199				1,199
2027	960				960
2028	173				173
2029	138				138
2030	101				101
2031	61				61

McVehil-Monnett Associates, Inc. BAM and Regional Mines Annual NO<sub>x</sub> Emission Summary (tpy)

Year	Belle Ayr	Caballo	Cordero Rojo	Coal Creek	Mainline Railroad	Power Plants	Highways	Miscellaneous Point Sources	Total
2014	1,053								
2015	1,090								
2016	1,409	1,893	3,642	1,493	775	11,961	202	1,327	22,702
2017	1,373	1,887	3,726	1,434	775	11,961	202	1,327	22,685
2018	1,249								
2019	1,082								
2020	1,107								
2021	1,194								
2022	1,173								
2023	1,165								
2024	1,202								
2025	1,280								
2026	1,184								
2027	1,049								
2028	86								
2029	89								
2030	89								
2031	89								

### Selection of Worst-Case Years – Redhorse Corporation

Redhorse Corporation (Redhorse) also conducted air quality modeling in 2016 for the Cordero Rojo Mine located immediately adjacent (south) of the BAM. Redhorse also used the ISCLT3 model to estimate average annual  $PM_{10}$  concentrations for the years 2016 through 2035, for the Caballo, Belle Ayr, Cordero Rojo, and Coal Creek mines (middle group of mines) (Redhorse 2016).

Because of the nature of surface coal mining, air emissions will vary from year to year, both in magnitude and location. Dispersion modeling was completed to evaluate compliance with air quality standards based on selected worst-case emissions years. Because it is not feasible to develop modeling for all mine years, two worst-case years were selected for modeling that represent the maximum potential for off-site impacts.

Off-site impacts are primarily affected by the magnitude of emissions from the mine, and the proximity of the emission sources to the ambient air boundary. The first worst-case modeling scenario was selected based on the mine year that had the maximum projected particulate matter emissions. From Table 5-1 of the Redhorse modeling report, the mine year with the highest projected  $PM_{10}$  emissions from Cordero Rojo Mine is mine year 2023. This mine year also has pit operations that are in close proximity to the western and eastern borders of the LNCM. Therefore, mine year 2023 was selected as the first mine year for the modeling analysis.

Based on guidance from WDEQ personnel at a pre-application meeting held on May 16, 2016, one of the worst-case years selected should be based on the maximum projected cumulative  $PM_{10}$  emissions from all Middle Group mines and at least one of the one of the worst-case years should be within 5 years of the application submittal. An examination of projected emissions shown in the  $PM_{10}$  table on **page C-5** shows that mine year 2017 represents the highest cumulative  $PM_{10}$  emissions from the Middle Group mines and is also within 5 years. Therefore, mine year 2017 was selected as the second worst-case modeling scenario.

Mine years 2017 were also used for the  $NO_2$  modeling analysis. These mine years represent high Cordero Rojo Mine and cumulative projected  $NO_x$  emissions. Mine year 2017 is 99 percent of the maximum cumulative  $NO_x$  emission year and mine year 2023 is 97 percent of the maximum Cordero Rojo Mine  $NO_x$  emission year (see  $NO_x$  table on **page C-5**).

Appendix C

Redhorse Corporation Cordero Rojo Mine and Regional Mines Annual PM<sub>10</sub> Emission Summary (tpy)

Year	Belle Ayr <sup>1</sup>	Caballo <sup>2</sup>	Coal Creek <sup>3</sup>	Cordero Rojo	Total
2017	1443	1730	1231	1822	6226
2018	1294	1511	1146	1885	5836
2019	1112	1573	1207	1930	5822
2020	1168	1688	1247	1730	5833
2021	1281	1616	---	2013	4910
2022	1269	1552	---	2097	4918
2023	1262	1609	---	2111	4982
2024	1306	---	---	2100	3406
2025	1350	---	---	2110	3460
2026	1199	---	---	1786	2985
2027	960	---	---	1779	2739
2028	173	---	---	1283	1456
2029	138	---	---	837	975
2030	101	---	---	880	981
2031	61	---	---	1058	1119

- <sup>1</sup> The Belle Ayr Mine plan includes mining through 2031  
<sup>2</sup> The Caballo Mine plan includes mining through 2023  
<sup>3</sup> The Coal Creek Mine plan includes mining through 2020

Redhorse Corporation Cordero Rojo Mine and Regional Mines Annual NO<sub>x</sub> Emission Summary (tpy)

Year	Belle Ayr <sup>1</sup>	Caballo <sup>2</sup>	Coal Creek <sup>3</sup>	Cordero Rojo	Total
2017	1373	1892	1493	2758	7516
2018	1249	1887	1434	2789	7359
2019	1082	1892	1248	2830	7052
2020	1107	1872	1365	2621	6965
2021	1194	1865	1426	3126	7611
2022	1173	1872	---	3164	6209
2023	1165	1887	---	3226	6278
2024	1202	1862	---	3253	6317
2025	1280	---	---	3331	4611
2026	1184	---	---	2901	4085
2027	1049	---	---	2910	3959
2028	86	---	---	1861	1947
2029	89	---	---	1241	1330
2030	89	---	---	1340	1429
2031	89	---	---	1722	1811

- <sup>1</sup> The Belle Ayr Mine plan includes mining through 2031  
<sup>2</sup> The Caballo Mine plan includes mining through 2023  
<sup>3</sup> The Coal Creek Mine plan includes mining through 2020

## **APPENDIX D**

BAM SPECIAL STATUS SPECIES SUMMARY TABLES  
FOR FEDERAL LEASE MODIFICATION APPROVAL - WYWI61248

Appendix D

BAM Species of Concern

Group	Common Name	Scientific Name	Observed in Study Area <sup>1</sup>	Bird of Conservation Concern <sup>2</sup>	USFWS <sup>2</sup>	WY_BLM <sup>2</sup>	USFS <sup>2</sup>	WGFD <sup>2</sup>	STATE RANK <sup>2</sup>	GLOBAL RANK <sup>2</sup>
Amphibians	Tiger Salamander	<i>Ambystoma mavortium</i>	No	NA					S4	G5
Amphibians	Great Plains Toad	<i>Anaxyrus cognatus</i>	No	NA				NSSU (U); Tier 3	S3	G5
Amphibians	Northern Leopard Frog	<i>Lithobates pipiens</i>	Yes	NA	Not Warranted for Listing (NW)	Sensitive	Region 2 Sensitive	NSSU (U); Tier 3	S3	G5
Amphibians	Plains Spadefoot	<i>Spea bombifrons</i>	Yes	NA				NSSU (U); Tier 3	S4	G5
Birds	Northern Goshawk	<i>Accipiter gentilis</i>	No	Yes	Not Warranted for Listing (NW)	Sensitive	Region 2 Sensitive; Region 4 Sensitive	NSSU (U); Tier 1	S2B;S3N	G5
Birds	Western Grebe	<i>Aechmophorus occidentalis</i>	Yes	No						
Birds	Baird's Sparrow	<i>Ammodramus bairdii</i>	Yes	No		Sensitive			S1?B	G4
Birds	Grasshopper Sparrow	<i>Ammodramus savannarum</i>	Yes	Yes			Region 2 Sensitive	NSS4 (Bc); Tier 2	S4	G5
Birds	Golden Eagle	<i>Aquila chrysaetos</i>	Yes	Yes					S4B;S4N	G5
Birds	Sagebrush Sparrow	<i>Artemisiospiza nevadensis</i>	No	No		Sensitive	Region 2 Sensitive	NSS4 (Bc); Tier 2	S3	G5
Birds	Short-eared Owl	<i>Asio flammeus</i>	Yes	Yes			Region 2 Sensitive	NSS4 (Bc); Tier 2	S2	G5
Birds	Burrowing Owl	<i>Athene cucularia</i>	Yes	Yes		Sensitive	Region 2 Sensitive	NSSU (U); Tier 1	S4B	G4
Birds	Ring-necked Duck	<i>Aythya collaris</i>	Yes	No					S4B	G5
Birds	Upland Sandpiper	<i>Bartramia longicauda</i>	Yes	Yes						
Birds	American Bittern	<i>Botaurus lentiginosus</i>	No	Yes						
Birds	Bufflehead	<i>Bucephala albeola</i>	No	No					S2B	G5
Birds	Common Goldeneye	<i>Bucephala clangula</i>	No	No					S3B	G5
Birds	Ferruginous Hawk	<i>Buteo regalis</i>	Yes	Yes		Sensitive	Region 2 Sensitive	NSSU (U); Tier 1	S4B;S5N	G4

Appendix D

Group	Common Name	Scientific Name	Observed in Study Area <sup>1</sup>	Bird of Conservation Concern <sup>2</sup>	USFWS <sup>2</sup>	WY_BLM <sup>2</sup>	USFS <sup>2</sup>	WGFD <sup>2</sup>	STATE RANK <sup>2</sup>	GLOBAL RANK <sup>2</sup>
Birds	Swainson's Hawk	<i>Buteo swainsoni</i>	Yes	Yes						
Birds	Chestnut-collared Longspur	<i>Calcarius ornatus</i>	Yes	No			Region 2 Sensitive	NSS4 (Bc); Tier 2	S1	G5
Birds	Greater Sage-Grouse	<i>Centrocercus urophasianus</i>	Yes	Yes	Candidate Warranted but Precluded (C)	Sensitive	Region 2 Sensitive; Region 4 Sensitive	NSS2 (Ba); Tier 1	S4	G3G4
Birds	Mountain Plover	<i>Charadrius montanus</i>	No	Yes	Not Warranted for Listing (NW)	Sensitive	Region 2 Sensitive	NSSU (U); Tier 1	S2B;S3B	G3
Birds	Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	No	No		Sensitive	Region 2 Sensitive; Region 4 Sensitive	NSSU (U); Tier 3	S1	G5
Birds	Bobolink	<i>Dolichonyx oryzivorus</i>	No	No				NSS4 (Bc); Tier 2	S2	G5
Birds	Willow Flycatcher	<i>Empidonax traillii</i>	No	Yes						
Birds	Merlin	<i>Falco columbarius</i>	No	No				NSSU (U); Tier 3	S3B;S4N	G5
Birds	Prairie Falcon	<i>Falco mexicanus</i>	Yes	Yes						
Birds	Peregrine Falcon	<i>Falco peregrinus</i>	Yes	Yes	Delisted; formally monitored (DM)	Sensitive	Region 2 Sensitive; Region 4 Sensitive	NSS3 (Bb); Tier 2	S2	G4
Birds	Common Loon	<i>Gavia immer</i>	No	No			Region 4 Sensitive	NSSI (Aa); Tier 1	S1B;S2N	G5
Birds	Whooping Crane	<i>Grus americana</i>	No	No	Listed Endangered (LE); and Endangered - Nonessential Experimental Population (LEXN)				S1N	G1

Appendix D

Group	Common Name	Scientific Name	Observed in Study Area <sup>1</sup>	Bird of Conservation Concern <sup>2</sup>	USFWS <sup>2</sup>	WY_BLM <sup>2</sup>	USFS <sup>2</sup>	WGFD <sup>2</sup>	STATE RANK <sup>2</sup>	GLOBAL RANK <sup>2</sup>
Birds	Sandhill Crane	<i>Grus canadensis</i>	No	No				NSS4 (Bc); Tier 3	S3B;S5N	G5
Birds	Bald Eagle	<i>Haliaeetus leucocephalus</i>	Yes	Yes	Delisted; formally monitored (DM)	Sensitive	Region 2 Sensitive; Region 4 Sensitive	NSS2 (Ba); Tier 1	S3B;S5N	G5
Birds	Black-necked Stilt	<i>Himantopus mexicanus</i>	No	No					S3B	G5
Birds	Dark-eyed Junco	<i>Junco hyemalis</i>	No	No					S5B;S5N	G5
Birds	White-winged Junco	<i>Junco hyemalis aikeni</i>	No	No					S3	G5T4
Birds	Loggerhead Shrike	<i>Lanius ludovicianus</i>	Yes	Yes		Sensitive	Region 2 Sensitive		S3	G4
Birds	Herring Gull	<i>Larus argentatus</i>	No	No					SNA	G5
Birds	California Gull	<i>Larus californicus</i>	No	No					S2B	G5
Birds	Ring-billed Gull	<i>Larus delawarensis</i>	No	No					S2	G5
Birds	Eastern Screech-Owl	<i>Megascops asio</i>	No	No					S3	G5
Birds	Red-headed Woodpecker	<i>Melanerpes formicivorus</i>	Yes	Yes						
Birds	Lewis's Woodpecker	<i>Melanerpes lewis</i>	No	No			Region 2 Sensitive	NSSU (U); Tier 2	S2	G4
Birds	Long-billed Curlew	<i>Numenius americanus</i>	Yes	Yes		Sensitive	Region 2 Sensitive	NSS3 (Bb); Tier 2	S3B	G5
Birds	Sage Thrasher	<i>Oreoscoptes montanus</i>	Yes	Yes		Sensitive		NSS4 (Bc); Tier 2	S5	G5
Birds	Osprey	<i>Pandion haliaetus</i>	No	No					S3B	G5
Birds	American White Pelican	<i>Pelecanus erythrorhynchos</i>	No	No					S1B	G4
Birds	Red-necked Phalarope	<i>Phalaropus lobatus</i>	No	No					S3N	G4G5
Birds	Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>	No	No					S1	G5

Appendix D

Group	Common Name	Scientific Name	Observed in Study Area <sup>1</sup>	Bird of Conservation Concern <sup>2</sup>	USFWS <sup>2</sup>	WY_BLM <sup>2</sup>	USFS <sup>2</sup>	WGFD <sup>2</sup>	STATE RANK <sup>2</sup>	GLOBAL RANK <sup>2</sup>
Birds	White-faced Ibis	<i>Plegadis chihi</i>	Yes	No		Sensitive		NSS3 (Bb); Tier 2	S1B	G5
Birds	Virginia Rail	<i>Rallus limicola</i>	No	No				NSS3 (Bb); Tier 2	S3B	G5
Birds	American Avocet	<i>Recurvirostra americana</i>	No	No					S3B	G5
Birds	Golden-crowned Kinglet	<i>Regulus satrapa</i>	No	No					S3B;S4N	G5
Birds	McCown's Longspur	<i>Rhynchophanes mccownii</i>	No	Yes			Region 2 Sensitive	NSS4 (Bc); Tier 2	S2	G4
Birds	Dickcissel	<i>Spiza americana</i>	No	No				NSS4 (Bc); Tier 2	S1	G5
Birds	Brewer's Sparrow	<i>Spizella breweri</i>	Yes	Yes		Sensitive	Region 2 Sensitive	NSS4 (Bc); Tier 2	S5	G5
Birds	Clay-colored Sparrow	<i>Spizella pallida</i>	Yes	No					S3B	G5
Birds	Common Tern	<i>Sterna hirundo</i>	No	No					S1	G5
Birds	Barn Owl	<i>Tyto alba</i>	No	No					S2	G5
Mammals	Plains Bison	<i>Bos bison bison</i>	No	NA	Not Warranted for Listing (NW)				S1	G4TU
Mammals	Gray Wolf	<i>Canis lupus</i>	Yes	NA	Proposed for Delisting (PD)		Region 2 Sensitive; Region 4 Sensitive		S1	G4G5
Mammals	Black-tailed Prairie Dog	<i>Cynomys ludovicianus</i>	No	NA	Not Warranted for Listing (NW)	Sensitive	Region 2 Sensitive		S2	G4
Mammals	Thirteen-lined Ground Squirrel	<i>Ictidomys tridecemlineatus</i>	Yes	NA					S5	G5
Mammals	Northern River Otter	<i>Lontra canadensis</i>	No	NA			Region 2 Sensitive	NSSU (U); Tier 2	S3	G5
Mammals	Black-footed Ferret	<i>Mustela nigripes</i>	No	NA	Listed Endangered (LE); and Endangered - Nonessential Experimental Population			NSSI (Aa); Tier 1	S1	G1

Appendix D

Group	Common Name	Scientific Name	Observed in Study Area <sup>1</sup>	Bird of Conservation Concern <sup>2</sup>	USFWS <sup>2</sup>	WY_BLM <sup>2</sup>	USFS <sup>2</sup>	WGFD <sup>2</sup>	STATE RANK <sup>2</sup>	GLOBAL RANK <sup>2</sup>
					(LEXN)					
Mammals	Western Small-footed Myotis	<i>Myotis ciliolabrum</i>	No	NA				NSS4 (Cb); Tier 2	S3B	G5
Mammals	Little Brown Myotis	<i>Myotis lucifugus</i>	No	NA	Petition Under Review (UR)			NSS4 (Cb); Tier 2	S5	G3
Mammals	Olive-backed Pocket Mouse	<i>Perognathus fasciatus</i>	No	NA				NSS4 (Cb); Tier 2	S4	G5
Mammals	White-footed Deermouse	<i>Peromyscus leucopus</i>	No	NA					S3	G5
Mammals	Dwarf Shrew	<i>Sorex nanus</i>	No	NA				NSS3 (Bb); Tier 2	S4	G4
Mammals	Plains Spotted Skunk	<i>Spilogale putorius interrupta</i>	No	NA	Petition Under Review (UR)				S3	G4T4
Mammals	Eastern Cottontail	<i>Sylvilagus floridanus</i>	Yes	NA					S3	G5
Mammals	Grizzly Bear	<i>Ursus arctos arctos</i>	No	NA	Listed Threatened (LT)				S1	G4T4
Mammals	Swift Fox	<i>Vulpes velox</i>	No	NA	Not Warranted for Listing (NW)	Sensitive	Region 2 Sensitive	NSS4 (Cb); Tier 2	S2	G3
Mammals	Bear Lodge Meadow Jumping Mouse	<i>Zapus hudsonius campestris</i>	Yes	NA					S1	G5T3
Reptiles	Eastern Spiny Softshell	<i>Apalone spinifera spinifera</i>	No	NA				NSS4 (Bc); Tier 3	S4	G5T5
Reptiles	Eastern Yellow-bellied Racer	<i>Coluber constrictor flaviventris</i>	No	NA					S4	G5T5
Reptiles	Pale Milksnake	<i>Lampropeltis triangulum multistriata</i>	No	NA				NSS3 (Bb); Tier 2	S3	G5TNR
Reptiles	Bullsnake	<i>Pituophis catenifer sayi</i>	No	NA					S4	G5T5
Reptiles	Plains Gartersnake	<i>Thamnophis radix</i>	No	NA				NSSU (U); Tier 2	S5	G5
Plants	Barr's milkvetch	<i>Astragalus barrii</i>	Yes	NA			Region 2 Sensitive		S3	G3

<sup>1</sup> Study area is BAM permit boundary and 0.5-mile buffer

<sup>2</sup> Blank cells indicate the information is not applicable

## Appendix D

Highlights indicates species has been documented in the same T/R as the BAM

MBCC – Migratory Birds of Conservation Concern

USFS:

Region 2 Sensitive, R2 - In Wyoming, sensitive in Bighorn, Black Hills, Medicine Bow, and Shoshone National Forests, and Thunder Basin National Grassland

Region 4 Sensitive, R4 - In Wyoming, sensitive in Bridger-Teton, Caribou, Targhee, Wasatch-Cache, and Ashley (including Flaming Gorge National Recreation Area) National Forests

WGFD:

NSSI-NSS4:

The NSS rank of the species is subtracted from 5 and multiplied by 6:  $[(5-NSS) \times 6]$ . This would result in scores of NSS1 = 24, NSS2 = 18, NSS3 = 12, NSS4 = 6.

The species is assigned a score of 1-10 based on the variable "Wyoming's contribution to the species' overall conservation"; 10 being the highest contribution and 1 being the lowest contribution. The WYNDD G rank (global chance of extinction) and Wyoming Conservation Contribution score were consulted in determining this score. The species is assigned a score of 1-5; 5 being the highest and 1 the lowest for each of the following variables:

Regulatory/monetary impacts of the species' listing under the Endangered Species Act.

Urgency of conservation action.

Ability to implement effective conservation actions.

The species' ecological or management role as a keystone, indicator, or umbrella species.

Rank:

G = Global rank assigned by NatureServe: range-wide probability of extinction for a species

S = Subnational (state/jurisdiction) rank assigned by WYNDD biologists for Wyoming

T = Trinomial rank: refers to the range-wide probability of extinction for a subspecies or variety

**These letters are each followed by a numeric, 1-5 score:**

1 = critically imperiled

2 = imperiled

3 = vulnerable

4 = apparently secure

5 = secure

Source: WYNDD (2017) and USFWS (2017) for Birds of Conservation Concern

# **APPENDIX E**

## GREENHOUSE GAS EMISSIONS CALCULATIONS

PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, NO<sub>x</sub>, Hg, CO, and CO<sub>2</sub> CONTRIBUTIONS FROM COAL COMBUSTION  
CALCULATIONS

## REVENUE CALCULATIONS

(Completed by WWC Engineering)

GHG Calculations Assumptions

Direct Emissions Variables

Source	CO <sub>2</sub> e/Mt Coal Mined
FUEL subtotal	3,266.9
ELECTRICITY subtotal	2,670.1
PROCESS subtotal	1,147.7

Source: SGAC Calculations (BLM 2009)

Indirect Emissions Assumptions

- Train: 130 Cars/Train, 1/2 aluminum rotary, 1/2 aluminum bottom dump (From BAM)
- 23 Tons/car empty - 1/2 are 21 tons and 1/2 are 25 tons (BNSF 2016)
- 119 Tons of Coal/Car (BNSF 2016)
- 15,470 Tons of Coal/Train (calculated)
- 200 Tons/locomotive – four per train (BNSF 2016)
- 3,790 Weight of empty 130-car train (tons) (calculated)
- 19,260 Weight of loaded coal train (tons) (calculated)

Transportation Emissions Variables

Emission Rate	(kg/gal)	CO <sub>2</sub> e Conversion Rate	Kg CO <sub>2</sub> e/Gal Diesel	Kg CO <sub>2</sub> e/Mile/Ton
CO <sub>2</sub>	10.21	1	10.21	0.023417431
CH <sub>4</sub>	0.0000112	25	0.00028	0.000001
N <sub>2</sub> O	0.0000224	298	0.0066752	0.000015
<b>Total</b>			<b>10.2169552</b>	<b>0.0234</b>

Source: Conversion Rate – EPA 2017a  
Emission Rate – EPA 2017a

Transportation Variables

	Miles/gal/l Ton <sup>1</sup>	Miles	Kg CO <sub>2</sub> e/Mile/Ton <sup>2</sup>	Tons	Gal/Train	Kg CO <sub>2</sub> e/Mile	Kg CO <sub>2</sub> e/Trip	Metric Tons CO <sub>2</sub> e/Trip
Loaded	436	1,090	0.0234	19,260.0 (Calculated)	451.3 (Calculated)	4,611.2 (Calculated)	5,026,194.3 (Calculated)	5,026.2 (Calculated)
Empty	436	1,090	0.0234	3,790.0	88.8	907.4	989,059.0	989.1

<sup>1</sup> FactCheck 2008  
<sup>2</sup> EPA 2017a

BAM Production, 2009-2016

	2009	2010	2011	2012	2013	2014	2015	2016	Average
Production (Tons)	28,655,953	25,766,025	24,582,007	24,227,846	18,258,922	15,796,556	18,318,629	14,833,778	21,300,000

Source: WDWS (2009 through 2016)

## Appendix E

Estimated 2009 Belle Ayr Mine Equivalent CO<sub>2</sub>e (in metric tons)

Source	Coal (Mt)	Ave. Known Ratio (tons/Mt coal)	Tons
Direct			
Fuel	28.7	3266.9	93,616
Electricity		2670.1	76,514
Mining Process		1147.7	32,888
<b>Total Direct</b>			<b>203,019</b>
Indirect			
Rail Transport			
2009 Coal Production	28,655,953		
2009 Coal Shipped by Rail	28,655,953		
Tons Coal/Train	15,470		
Empty Train Tons	3,790		
Loaded Train Tons	19,260		
# Loaded Trains/year	1,852		
# Empty Trains/year	1,852		
Average Rail Miles to Power Plant	1,090		
Kg CO <sub>2</sub> e/Mi/Loaded Train	451.3		
Kg CO <sub>2</sub> e/Mi/Empty Train	88.8		
Kg CO <sub>2</sub> e/year Empty	179,318,563		
Kg CO <sub>2</sub> e/year Loaded	911,260,033.2		
Kg CO <sub>2</sub> e/year Total	1,090,578,596		
Total Rail Transportation (Metric Tons)	1,090,577		
Combustion (CO <sub>2</sub> e)	47,998,721		
<b>Total Indirect CO<sub>2</sub>e</b>	<b>49,089,300</b>		
<b>Total Direct + Indirect CO<sub>2</sub>e</b>	<b>49,292,319</b>		

100% Coal shipped to U.S. power plants

## Appendix E

Estimated 2010 Belle Ayr Mine Equivalent CO<sub>2</sub>e (in metric tons)

Source	Coal (Mt)	Ave. Known Ratio (tons/Mt coal)	Tons
Direct			
Fuel	25.8	3266.9	84,175
Electricity		2670.1	68,798
Mining Process		1147.7	29,572
<b>Total Direct</b>			<b>182,545</b>
Indirect			
Rail Transport			
2010 Coal Production	25,766,025		
2010 Coal Shipped by Rail	25,766,025		
Tons Coal/Train	15,470		
Empty Train Tons	3,790		
Loaded Train Tons	19,260		
# Loaded Trains/year	1,666		
# Empty Trains/year	1,666		
Average Rail Miles to Power Plant	1,090		
Kg CO <sub>2</sub> e/Mi/Loaded Train	451.3		
Kg CO <sub>2</sub> e/Mi/Empty Train	88.8		
Kg CO <sub>2</sub> e/year Empty	161,234,442		
Kg CO <sub>2</sub> e/year Loaded	819,360,249		
Kg CO <sub>2</sub> e/year Total	980,594,691		
Total Rail Transportation (Metric Tons)	980,595		
Combustion (CO <sub>2</sub> e)	43,158,092		
<b>Total Indirect CO<sub>2</sub>e</b>	<b>44,138,687</b>		
<b>Total Direct + Indirect CO<sub>2</sub>e</b>	<b>44,321,231</b>		

100% Coal shipped to U.S. power plants

## Appendix E

Estimated 2011 Belle Ayr Mine Equivalent CO<sub>2</sub>e (in metric tons)

Source	Coal (Mt)	Ave. Known Ratio (tons/Mt coal)	Tons
Direct			
Fuel	24.6	3266.9	80,307
Electricity		2670.1	65,636
Mining Process		1147.7	28,213
<b>Total Direct</b>			<b>174,156</b>
Indirect			
Rail Transport			
2011 Coal Production	24,582,007		
2011 Coal Shipped by Rail	24,582,007		
Tons Coal/Train	15,470		
Empty Train Tons	3,790		
Loaded Train Tons	19,260		
# Loaded Trains/year	1,589		
# Empty Trains/year	1,589		
Average Rail Miles to Power Plant	999		
Kg CO <sub>2</sub> e/Mi/Loaded Train	451.3		
Kg CO <sub>2</sub> e/Mi/Empty Train	88.8		
Kg CO <sub>2</sub> e/year Empty	140,982,992		
Kg CO <sub>2</sub> e/year Loaded	716,446,549		
Kg CO <sub>2</sub> e/year Total	857,429,541		
Total Rail Transportation (Metric Tons)	857,430		
Combustion (CO <sub>2</sub> e)	41,174,862		
<b>Total Indirect CO<sub>2</sub>e</b>	<b>42,032,291</b>		
<b>Total Direct + Indirect CO<sub>2</sub>e</b>	<b>42,206,447</b>		

100% Coal shipped to U.S. power plants

Appendix E

Estimated 2012 Belle Ayr Mine Equivalent CO<sub>2</sub>e (in metric tons)

Source	Coal (Mt)	Ave. Known Ratio (tons/Mt coal)	Tons
<b>Direct</b>			
Fuel	24.2	3266.9	79,150
Electricity		2670.1	64,691
Mining Process		1147.7	27,806
<b>Total Direct</b>			<b>171,647</b>
<b>Indirect</b>			
Rail Transport			
2012 Coal Production	24,227,846		
2012 Coal Shipped by Rail	24,227,846		
Tons Coal/Train	15,470		
Empty Train Tons	3,790		
Loaded Train Tons	19,260		
# Loaded Trains/year	1,566		
# Empty Trains/year	1,566		
Average Rail Miles to Power Plant	1,009		
Kg CO <sub>2</sub> e/Mi/Loaded Train	451.3		
Kg CO <sub>2</sub> e/Mi/Empty Train	88.8		
Kg CO <sub>2</sub> e/year Empty	140,342,713		
Kg CO <sub>2</sub> e/year Loaded	713,192,783		
Kg CO <sub>2</sub> e/year Total	853,535,495		
Total Rail Transportation (Metric Tons)	853,535		
Combustion (CO <sub>2</sub> e)	40,581,642		
<b>Total Indirect CO<sub>2</sub>e</b>	<b>41,435,178</b>		
<b>Total Direct + Indirect CO<sub>2</sub>e</b>	<b>41,606,825</b>		

100% Coal shipped to U.S. power plants

Appendix E

Estimated 2013 Belle Ayr Mine Equivalent CO<sub>2</sub>e (in metric tons)

Source	Coal (Mt)	Ave. Known Ratio (tons/Mt coal)	Tons
<b>Direct</b>			
Fuel	18.3	3266.9	59,650
Electricity		2670.1	48,753
Mining Process		1147.7	20,956
<b>Total Direct</b>			<b>129,359</b>
<b>Indirect</b>			
Rail Transport			
2013 Coal Production	18,258,922		
2013 Coal Shipped by Rail	18,258,922		
Tons Coal/Train	15,470		
Empty Train Tons	3,790		
Loaded Train Tons	19,260		
# Loaded Trains/year	1,180		
# Empty Trains/year	1,180		
Average Rail Miles to Power Plant	1,003		
Kg CO <sub>2</sub> e/Mi/Loaded Train	451.3		
Kg CO <sub>2</sub> e/Mi/Empty Train	88.8		
Kg CO <sub>2</sub> e/year Empty	105,138,061		
Kg CO <sub>2</sub> e/year Loaded	534,289,987		
Kg CO <sub>2</sub> e/year Total	639,428,048		
Total Rail Transportation (Metric Tons)	639,428		
Combustion (CO <sub>2</sub> e)	30,583,694		
<b>Total Indirect CO<sub>2</sub>e</b>	<b>31,223,122</b>		
<b>Total Direct + Indirect CO<sub>2</sub>e</b>	<b>31,352,481</b>		

100% Coal shipped to U.S. power plants

## Appendix E

Estimated 2014 Belle Ayr Mine Equivalent CO<sub>2</sub>e (in metric tons)

Source	Coal (Mt)	Ave. Known Ratio (tons/Mt coal)	Tons
Direct			
Fuel	15.8	3266.9	51,606
Electricity		2670.1	42,178
Mining Process		1147.7	18,130
<b>Total Direct</b>			<b>111,914</b>
Indirect			
Rail Transport			
2014 Coal Production	15,796,556		
2014 Coal Shipped by Rail	15,796,556		
Tons Coal/Train	15,470		
Empty Train Tons	3,790		
Loaded Train Tons	19,260		
# Loaded Trains/year	1,021		
# Empty Trains/year	1,021		
Average Rail Miles to Power Plant	1,073		
Kg CO <sub>2</sub> e/Mi/Loaded Train	451.3		
Kg CO <sub>2</sub> e/Mi/Empty Train	88.8		
Kg CO <sub>2</sub> e/year Empty	97,307,436		
Kg CO <sub>2</sub> e/year Loaded	494,496,364		
Kg CO <sub>2</sub> e/year Total	591,803,800		
Total Rail Transportation (Metric Tons)	591,804		
Combustion (CO <sub>2</sub> e)	26,459,231		
<b>Total Indirect CO<sub>2</sub>e</b>	<b>27,051,035</b>		
<b>Total Direct + Indirect CO<sub>2</sub>e</b>	<b>27,162,949</b>		

100% Coal shipped to U.S. power plants

## Appendix E

Estimated 2015 Belle Ayr Mine Equivalent CO<sub>2</sub>e (in metric tons)

Source	Coal (Mt)	Ave. Known Ratio (tons/Mt coal)	Tons
Direct			
Fuel	18.3	3266.9	59,845
Electricity		2670.1	48,913
Mining Process		1147.7	21,024
<b>Total Direct</b>			<b>129,782</b>
Indirect			
Rail Transport			
2015 Coal Production	18,318,629		
2015 Coal Shipped by Rail	18,318,629		
Tons Coal/Train	15,470		
Empty Train Tons	3,790		
Loaded Train Tons	19,260		
# Loaded Trains/year	1,184		
# Empty Trains/year	1,184		
Average Rail Miles to Power Plant	1,009		
Kg CO <sub>2</sub> e/Mi/Loaded Train	451.3		
Kg CO <sub>2</sub> e/Mi/Empty Train	88.8		
Kg CO <sub>2</sub> e/year Empty	106,112,862		
Kg CO <sub>2</sub> e/year Loaded	539,243,728		
Kg CO <sub>2</sub> e/year Total	645,356,590		
Total Rail Transportation (Metric Tons)	645,357		
Combustion (CO <sub>2</sub> e)	30,683,704		
<b>Total Indirect CO<sub>2</sub>e</b>	<b>31,329,060</b>		
<b>Total Direct + Indirect CO<sub>2</sub>e</b>	<b>31,458,842</b>		

100% Coal shipped to U.S. power plants

## Appendix E

Estimated 2016 Belle Ayr Mine Equivalent CO<sub>2</sub>e (in metric tons)

Source	Coal (Mt)	Ave. Known Ratio (tons/Mt coal)	Tons
Direct			
Fuel	14.8	3266.9	48,460
Electricity		2670.1	39,608
Mining Process		1147.7	17,025
<b>Total Direct</b>			<b>105,093</b>
Indirect			
Rail Transport			
2016 Coal Production	14,833,778		
2016 Coal Shipped by Rail	14,833,778		
Tons Coal/Train	15,470		
Empty Train Tons	3,790		
Loaded Train Tons	19,260		
# Loaded Trains/year	959		
# Empty Trains/year	959		
Average Rail Miles to Power Plant	1,030		
Kg CO <sub>2</sub> e/Mi/Loaded Train	451.3		
Kg CO <sub>2</sub> e/Mi/Empty Train	88.8		
Kg CO <sub>2</sub> e/year Empty	87,714,804		
Kg CO <sub>2</sub> e/year Loaded	445,748,580		
Kg CO <sub>2</sub> e/year Total	533,463,384		
Total Rail Transportation (Metric Tons)	533,463		
Combustion (CO <sub>2</sub> e)	24,846,578		
<b>Total Indirect CO<sub>2</sub>e</b>	<b>25,380,042</b>		
<b>Total Direct + Indirect CO<sub>2</sub>e</b>	<b>25,485,134</b>		

100% Coal shipped to U.S. power plants

## Appendix E

Summary of Estimated BAM 2009-16 CO<sub>2</sub>e Emissions

CO <sub>2</sub> e Source	2009	2010	2011	2012	2013	2014	2015	2016	Ave.	% From Indirect
Direct Emissions										
Fuel	93,616	84,175	80,307	79,150	59,650	51,606	59,845	48,460	69,601	0.0%
Electricity	76,514	68,798	65,636	64,691	48,753	42,178	48,913	39,608	56,886	0.0%
Mining Process	32,888	29,572	28,213	27,806	20,956	18,130	21,024	17,025	24,452	0.0%
<b>Total Direct Emissions</b>	<b>203,019</b>	<b>182,545</b>	<b>174,156</b>	<b>171,647</b>	<b>129,359</b>	<b>111,914</b>	<b>129,782</b>	<b>105,093</b>	<b>150,939</b>	<b>0.0%</b>
Indirect Emissions										
Rail Transport	1,090,579	980,595	857,430	853,535	639,428	591,804	645,357	533,463	774,024	2.1%
Power Plant Combustion (CO <sub>2</sub> e)	47,998,721	43,158,092	41,174,862	40,581,642	30,583,694	26,459,231	30,683,704	24,846,578	35,685,816	97.9%
<b>Total Indirect Emissions</b>	<b>49,089,300</b>	<b>44,138,687</b>	<b>42,032,291</b>	<b>41,435,178</b>	<b>31,223,122</b>	<b>27,051,035</b>	<b>31,329,060</b>	<b>25,380,042</b>	<b>36,459,839</b>	<b>100.0%</b>
<b>Total Emissions</b>	<b>49,292,319</b>	<b>44,321,231</b>	<b>42,206,447</b>	<b>41,606,825</b>	<b>31,352,481</b>	<b>27,162,949</b>	<b>31,458,842</b>	<b>25,485,134</b>	<b>36,610,779</b>	<b>99.6%</b>

Appendix E

Estimated 2017-2027 Belle Ayr Mine Equivalent CO<sub>2</sub>e (in metric tons)

Source	Coal (Mt)	Ave. Known Ratio (tons/Mt coal)	Tons
<b>Direct</b>			
Fuel	20.0	3266.9	65,338
Electricity		2670.1	53,402
Mining Process		1147.7	22,954
<b>Total Direct</b>			<b>141,694</b>
<b>Indirect</b>			
<b>Rail Transport</b>			
2017-2027 Coal Production	20,000,000		
2017-2027 Coal Shipped by Rail	20,000,000		
Tons Coal/Train	15,470		
Empty Train Tons	23		
Loaded Train Tons	15,493		
# Loaded Trains/year	1,293		
# Empty Trains/year	1,293		
Average Rail Miles to Power Plant	1,038		
Kg CO <sub>2</sub> e/Mi/Loaded Train	451.33		
Kg CO <sub>2</sub> e/Mi/Empty Train	88.81		
Kg CO <sub>2</sub> e/year Empty	119,182,158		
Kg CO <sub>2</sub> e/year Loaded	605,659,199		
Kg CO <sub>2</sub> e/year Total	724,841,357		
Total Transportation (Metric Tons)	724,841		
Combustion (CO <sub>2</sub> e)	33,500,000		
<b>Total Indirect</b>	<b>34,224,841</b>		
<b>Total Direct + Indirect CO<sub>2</sub>e</b>	<b>34,366,535</b>		

100% Coal shipped to U.S. power plants

Appendix E

Summary of Estimated BAM 2017-2027 CO<sub>2</sub>e Emissions (in metric tons)

<b>CO<sub>2</sub>e Source</b>	<b>2017-2027 Ave</b>	<b>% From Indirect</b>
Direct Emissions		
Fuel	65,338	0.0%
Electricity	53,402	0.0%
Mining Process	22,954	0.0%
<b>Total Direct</b>	141,694	<b>0.0%</b>
Indirect Emissions		
Rail Transport	847,886	2.5%
Power Plant Combustion	33,500,000	97.5%
<b>Total Indirect Emissions</b>	34,347,886	100.0%
<b>Total Emissions</b>	<b>34,489,580</b>	<b>99.6%</b>

Appendix E

Parameters Used to Calculate Combustion Emissions

Btu per short ton	16,890,000	CEC 2011
tons per kg	0.00110231	Conversion
tons to generate 1KW-h	0.000618735	CEC 2011
tons to generate 1 MW-h	0.61873467	Calculated
PM10 Emissions per Btu (kg/MW-h)	0.39	CEC 2011
PM10 Emissions per Btu (ton/MW-h)	0.000429901	Calculated
PM2.5 Emissions per Btu (kg/MW-h)	0.305	CEC 2011
PM2.5 Emissions per Btu (ton/MW-h)	0.00013112	Calculated
SOx emissions factor (lb/ton)	17.5	CEC 2011
NOx emission factor (lb/ton)	7.2	CEC 2011
Hg emission factor (lb/ton)	0.000083	CEC 2011
CO emission factor (lb/ton)	0.5	Calculated

Combustion Emissions Values

Years	Past Production								Proposed Action	No Action
	2009	2010	2011	2012	2013	2014	2015	2016	2017-2027	2017-2020
Tons of Coal Mined (From CCW)	28,655,953	25,766,025	24,582,007	24,227,846	18,258,922	15,796,556	18,318,629	14,833,778	20,000,000	20,000,000
mw-h from coal mined	14,901,096	13,398,333	12,782,644	12,598,480	9,494,639	25,531,467	9,525,687	7,713,565	10,400,000	10,400,000
PM10 Emissions (Tons)	6,406.0	5,760.0	5,495.3	5,416.1	4,081.8	10,976.0	4,095.1	3,316.1	4,471.0	4,471.0
PM 2.5 Emissions (Tons)	1,953.8	1,756.8	1,676.1	1,651.9	1,244.9	3,347.7	1,249.0	1,011.4	1,363.6	1,363.6
SO2 Emissions (Tons)	96,911.2	87,137.8	83,133.6	81,935.8	61,749.6	138,219.9	61,951.5	50,166.2	67,637.7	67,637.7
NOx Emissions (Tons)	45,646.8	41,043.4	39,157.3	38,593.2	29,085.1	56,867.6	29,180.2	23,629.1	31,858.5	31,858.5
Hg Emissions (Tons)	0.5	0.4	0.4	0.4	0.3	0.7	0.3	0.2	0.3	0.3
CO Emissions (Tons)	7,164.0	6,441.5	6,145.5	6,057.0	4,564.7	3,949.1	4,579.7	3,708.4	5,000.0	5,000.0

	Campbell County <sup>1</sup>	US Emissions <sup>2</sup>
	2011-2015 Avg	2015
Tons of Coal Mined	386,200,000.0	824,768,000.0
mw-h from coal mined	624,202,679	1,333,046,078.5
PM10 Emissions (Tons)	268,345.3	573,077.7
PM 2.5 Emissions (Tons)	81,845.3	174,788.7
SO2 Emissions (Tons)	3,379,250.0	7,216,720.0
NOx Emissions (Tons)	1,390,320.0	2,969,164.8
Hg Emissions (Tons)	16.0	34.2
CO Emissions (Tons)	96,550.0	206,192.0

<sup>1</sup> Coal Tonnages from WDWS 2016 - Average of 2011 through 2015 production

<sup>2</sup> Coal Tonnages from EIA 2017

Appendix E

Estimated 2016 Fiscal Revenue from 2015 Coal Production in Campbell Co. (Million U.S. Dollars)

Revenue Source	Total Collected	Federal Revenue	State Revenue
Federal Mineral Royalties	564.2	282.1	282.1
Abandoned Mine Lands Fund	95.4	67.4	28.0
Severance Tax	241.1		241.1
Bonus Bid Annual Revenues	307.9	153.9	153.9
Ad Valorem Tax	187.6		187.6
Black Lung	182.1	182.1	
Sales and Use Tax	29.8		29.8
<b>Totals</b>	<b>1608.0</b>	<b>685.5</b>	<b>922.5</b>
<b>\$/Ton</b>			<b>\$2.48</b>

Total Future Revenues from BAM (No Action Alternative) (Million U.S. Dollars)

Revenue Source	Total Collected	Federal Revenue	State Revenue
Federal Mineral Royalties	75.6	37.8	37.8
Abandoned Mine Lands Fund	12.8	6.4	6.4
Severance Tax	31.4		31.4
Bonus Bid Annual Revenues	0.0	0.0	0.0
Ad Valorem Tax	25.1		25.1
Black Lung	25.1	25.1	
Sales and Use Tax	3.6		3.6
<b>Totals</b>	<b>173.6</b>	<b>69.3</b>	<b>104.4</b>
<b>\$/Ton</b>			<b>\$2.29</b>

Future Revenues added by the BAM BAN Tract only (Million U.S. Dollars)

Revenue Source	Total Collected	Federal Revenue	State Revenue
Federal Mineral Royalties	345.2	172.6	172.6
Abandoned Mine Lands Fund	58.4	29.2	29.2
Severance Tax	134.9		134.9
Bonus Bid Annual Revenues	0.0	0.0	0.0
Ad Valorem Tax	114.7		114.7
Black Lung	114.6	114.6	
Sales and Use Tax	16.6		16.6
<b>Totals</b>	<b>784.4</b>	<b>316.4</b>	<b>468.0</b>
<b>\$/Ton</b>			<b>\$2.25</b>

Total Future Revenues from BAM (existing mine plus BAN tract) (Million U.S. Dollars)

Revenue Source	Total Collected	Federal Revenue	State Revenue
Federal Mineral Royalties	420.7	210.4	210.4
Abandoned Mine Lands Fund	71.1	35.6	35.6
Severance Tax	166.3		166.3
Bonus Bid Annual Revenues	0.0	0.0	0.0
Ad Valorem Tax	139.9		139.9
Black Lung	139.7	139.7	
Sales and Use Tax	20.3		20.3
<b>Totals</b>	<b>958.0</b>	<b>385.6</b>	<b>572.4</b>
<b>\$/Ton</b>			<b>\$2.25</b>

Appendix E

Difference Between the No Action Alternative and the Proposed Action (Million U.S. Dollars)

Revenue Source	Total Collected	Federal Revenue	State Revenue
Federal Mineral Royalties	345.2	172.6	172.6
Abandoned Mine Lands Fund	58.4	29.2	29.2
Severance Tax	134.9		134.9
Bonus Bid Annual Revenues	0.0	0.0	0.0
Ad Valorem Tax	114.7		114.7
Black Lung	114.6	114.6	
Sales and Use Tax	16.6		16.6
<b>Totals</b>	<b>784.4</b>	<b>316.4</b>	<b>468.0</b>

Estimated 2022 Campbell Co. Fiscal Revenue (Million U.S. Dollars)

Revenue Source	Total Collected	Federal Revenue	State Revenue
Federal Mineral Royalties	600.6	300.3	300.3
Abandoned Mine Lands Fund	101.5	50.8	50.8
Severance Tax	234.7		234.7
Bonus Bid Annual Revenues	0.000	0.0	0.0
Ad Valorem Tax	199.7		199.7
Black Lung	199.4	199.4	
Sales and Use Tax	29.0		29.0
<b>Totals</b>	<b>1364.9</b>	<b>550.5</b>	<b>814.4</b>
<b>\$/Ton</b>			<b>\$2.25</b>

All revenues were calculated using variables presented below

Appendix E

Bonus Bids	Lease-Month	Tons	Total Bid	\$/Ton	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
WYW155132	Eagle Butte West - May	255,000,000	\$180,540,000.00	\$0.71	\$36,108,000.00	\$36,108,000.00	\$36,108,000.00	\$36,108,000.00	\$36,108,000.00					
					\$144,432,000.00	\$108,324,000.00	\$72,216,000.00	\$36,108,000.00	\$0.00					
WYW174407	South Maysdorf - August	288,100,000	\$250,800,000.00	\$0.87	\$50,160,000.00	\$50,160,000.00	\$50,160,000.00	\$50,160,000.00	\$50,160,000.00					
					\$200,640,000.00	\$150,480,000.00	\$100,320,000.00	\$50,160,000.00	\$0.00					
WYW154432	North Maysdorf - August	54,657,000	\$48,098,424.00	\$0.88		\$9,619,684.80	\$9,619,684.80	\$9,619,684.80	\$9,619,684.80	\$9,619,684.80				
						\$38,478,739.20	\$28,859,054.40	\$19,239,369.60	\$9,619,684.80	\$0.00				
WYW177903	West Antelope South	56,356,000	\$49,311,500.00	\$0.88				\$9,862,300.00	\$9,862,300.00	\$9,862,300.00				
								\$39,449,200.00	\$29,586,900.00	\$0.00				
WYW163340	West Antelope North	350,263,000	\$297,723,228.00	\$0.85				\$59,544,645.60	\$59,544,645.60	\$59,544,645.60	\$59,544,645.60	\$59,544,645.60		
								\$238,178,582.40	\$178,633,936.80	\$119,089,291.20	\$59,544,645.60	\$0.00		
WYW161248	Belle Ayr North	221,734,800	\$210,648,060.00	\$0.95				\$42,129,612.00	\$42,129,612.00	\$42,129,612.00	\$42,129,612.00	\$42,129,612.00		
								\$168,518,448.00	\$126,388,836.00	\$84,259,224.00	\$42,129,612.00	\$0.00		
WYW172657	Caballo West	130,196,000	\$143,417,403.80	\$1.10				\$28,683,480.76	\$28,683,480.76	\$28,683,480.76	\$28,683,480.76	\$28,683,480.76		
								\$114,733,923.04	\$86,050,442.28	\$57,366,961.52	\$28,683,480.76	\$0.00		
WYW174596	South Hilight	222,676,000	\$300,001,011.66	\$1.35					\$60,000,202.33	\$60,000,202.33	\$60,000,202.33	\$60,000,202.33	\$60,000,202.33	
								\$240,000,809.33	\$180,000,607.00	\$120,000,404.66	\$60,000,202.33	\$0.00		
WYW176095	South Porcupine LBA	401,830,508	\$446,031,864.00	\$1.11					\$89,206,372.80	\$89,206,372.80	\$89,206,372.80	\$89,206,372.80	\$89,206,372.80	
								\$356,825,491.20	\$267,619,118.40	\$178,412,745.60	\$89,206,372.80	\$0.00		
WYW173408	North Porcupine LBA	721,154,828	\$793,270,311.00	\$1.10					\$158,654,062.20	\$158,654,062.20	\$158,654,062.20	\$158,654,062.20	\$158,654,062.20	
								\$634,616,248.80	\$475,962,186.60	\$317,308,124.40	\$158,654,062.20	\$0.00		
Average				\$0.98	\$86,268,000.00	\$95,887,684.80	\$95,887,684.80	\$236,107,723.16	\$543,968,360.49	\$457,700,360.49	\$438,218,375.69	\$438,218,375.69	\$307,860,637.33	\$0.00

**Bonus Bid Payments, 2008-2017**

Source: BLM 2017. Bids are paid off in equal four annual payments, after the initial 1/5 amount payment attached to the bid.

**Revenue Variables**

Coal Surface #	Units of Taxable Valuation	Taxable Valuation	Taxable Valuation Per Unit	Average Tax Levy (Mills)	Estimated Ad Valorem Tax Levied	Average Tax Per Unit	Sev. Tax Rate %	Estimated Severance Tax Collectible	Average Sev. Tax Per Unit
2015 Wyoming	392,418,629	\$3,894,432,347	9.92	\$0.059925	\$233,373,858	0.5947	0.07	\$272,610,264	\$0.6947
2015 Campbell Co.	358,196,669	\$3,348,921,099	9.35	\$0.059592	\$199,568,906	0.5571	0.07	\$234,424,477	\$0.6545
2016 Wyoming	372,577,808	\$3,646,317,231	9.79	\$0.059910	\$218,450,865	0.5863	0.07	\$255,242,206	\$0.6851
2016 Campbell Co.	340,675,046	\$3,149,810,399	9.25	\$0.059554	\$187,583,809	0.5506	0.07	\$220,486,728	\$0.6472

Source: WDOR 2015 and 2016a

Appendix E

Revenue Calculations Variables

Coal Production (tons) <sup>1</sup>		Campbell	Wyoming
	2015 Tons Produced	340,675,046	372,577,808
	2022 Tons Produced (Estimated)	362,625,000	375,000,000
	BAN Tract <sup>2</sup>	From Campbell Co. (tons minable)	91.44% (tons recoverable)
	No Action Alternative	48,790,525	45,619,141
	Added by Proposed Action	221,700,000	208,400,000
	Average 2015 Sales Price (\$/ton)		
	2015 8800 Btu Coal	\$13.23 <sup>2</sup>	\$13.25 <sup>3</sup>
	2015 Price without BLT <sup>4</sup>	\$12.68	\$12.70
<b>Federal Royalties</b>			
	WY share of FR = 0.5 x FR		
	Federal Royalties <sup>3</sup>	\$564,243,044.94	
	Wyoming Share	\$282,121,522.47	
<b>Abandoned Mine Lands Funds<sup>5</sup></b>			
	Campbell AML Total	\$95,389,012.88	
	WY Share <sup>5</sup>	\$28,000,000.00	
<b>Severance Taxes<sup>7</sup></b>			
	Campbell ST Rate/Ton	\$0.6472	
	2016 Severance Taxes <sup>8</sup>	\$241,132,357.34	
<b>Lease Bonus Bids (2017 Payments)</b>			
	2016	\$307,860,637.33	
	2017	\$0.00	
	2019+	\$0.00	
	Total 2017+ Bonus Bid Payments	\$0.00	
	WY share	\$0.00	
<b>Campbell Ad Valorem Taxes<sup>7</sup></b>			
	AVT Rate/ton	\$0.55	
	AVT (Total)	\$187,575,680.33	
<b>Black Lung</b>			
	2016 BLT Rate/Ton <sup>9</sup>	\$0.534	
	2016 BLT Collected <sup>10</sup>	\$182,058,833.01	
	Future BLT Rate/Ton <sup>11</sup>	\$0.535	
	Future BLT Collected	\$194,094,683.91	
<b>2015 Campbell Co. Employment (mining)<sup>12</sup></b>			
	Buckskin	218	
	Belle Ayr	286	
	Eagle Butte	290	
	Cordero Rojo	521	
	Antelope	632	
	Caballo	133	
	NARM	1428	
	Rawhide	195	
	Black Thunder	1622	
	Coal Creek	153	
	Dry Fork	80	
	Wyodak	68	
	Total	5626	
<b>Federal Income Tax<sup>13</sup></b>			
	Head of Household income info:		
	10% on first \$12,750		
	15% on next (up to \$48,600)		
	Rate <sup>10</sup>	13.6%	
	Tax/employee	\$6,185.55	
	Fed Tax	\$34,799,904.30	
<b>Fiscal Year 2016 Sales and Use Tax<sup>14</sup></b>			
	Coal Mining	\$29,765,322	
	\$/ton	\$0.08	

1 Source: WDOR 2016a

2 CCW 2017

3 Calculated - Tons produced x 2014 sales price per ton x 12.5%

4 Black lung tax removed since it is included in the sale price

5 Calculated - AML = \$0.28 per ton produced - through 2021, WY share = 0.5 x AML (Max 28,000,000/yr as of September 2013), Price from

## Appendix E

- CREG 2016
- 6 Calculated - Wyoming's portion of 2015 + AML Funds (Max out at \$75,000,000)
- 7 WDOR 2016, recalculated using Campbell Co. numbers only
- 8 CREG 2016
- 9 Calculated - Maximum per ton rate is \$0.55  $[(.10)(12750) + (.15)(45487-12750)]$
- 10 IRS 2011
- 11 Calculated - Rate x 2022 Estimated Production
- 12 WDWS 2015
- 13 WDOE 2013 (This is the most current doc as of March 2106)
- 14 WDOR 2016b