

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

**Environmental Assessment
Caballo Mine
Campbell County, Wyoming
Mining Plan
for
Federal Coal Lease WYWI72657**

August 2019



Prepared by:
U.S. Department of the Interior
Office of Surface Mining Reclamation and Enforcement Program Support Division
1999 Broadway, Suite 3320
Denver, CO 80202
PH: 303-293-5000 / FAX: 303-293-5032

TABLE OF CONTENTS

1.0 Purpose and Need	1-1
1.1 Introduction.....	1-1
1.2 Background.....	1-1
1.3 Purpose and Need	1-6
1.4 Regulatory Framework and Necessary Authorizations.....	1-6
1.5 Outreach and Issues	1-6
1.6 Crosswalk of Resource Areas.....	1-7
1.7 Public Involvement.....	1-7
2.0 Proposed Action and Alternatives	2-1
2.1 Description of Alternatives.....	2-1
2.2 Existing Conditions (Conditions Common to the Proposed Action and the No Action Alternative)	2-4
3.0 Affected Environment	3-1
3.1 General Setting	3-1
3.2 Topography and Physiography	3-1
3.3 Geology, Mineral Resources, and Paleontology	3-1
3.4 Air Quality and Climate Change.....	3-2
3.5 Water Resources	3-10
3.6 Alluvial Valley Floors	3-16
3.7 Wetlands	3-16
3.8 Soils	3-16
3.9 Vegetation.....	3-16
3.10 Wildlife	3-18
3.11 Land Use and Recreation	3-21
3.12 Cultural Resources	3-21
3.13 Visual Resources.....	3-22
3.14 Noise.....	3-22
3.15 Transportation.....	3-22
3.16 Hazardous and Solid Waste.....	3-22
3.17 Socioeconomics.....	3-22
4.0 Environmental Consequences/Cumulative Impacts	4-1
4.1 Introduction.....	4-1
4.2 Topography and Physiography.....	4-2

TABLE OF CONTENTS (Continued)

4.3	Geology, Mineral Resources, and Paleontology.....	4-3
4.4	Air Quality and Climate Change.....	4-4
4.5	Water Resources	4-15
4.6	Alluvial Valley Floors	4-24
4.7	Wetlands/Aquatic Features.....	4-24
4.8	Soil.....	4-25
4.9	Vegetation.....	4-26
4.10	Wildlife	4-26
4.11	Land Use and Recreation.....	4-29
4.12	Cultural Resources	4-30
4.13	Visual Resources.....	4-31
4.14	Noise.....	4-31
4.15	Transportation Facilities	4-32
4.16	Hazardous and Solid Waste	4-33
4.17	Socioeconomics.....	4-34
4.18	Short-Term Uses and Long-Term Productivity.....	4-36
4.19	Unavoidable Adverse Effects.....	4-36
5.0	Consultation and Coordination	5-1
5.1	Public Comment Process	5-1
5.2	Preparers and Contributors	5-1
5.3	Distribution of the EA.....	5-1
6.0	References	6-1

LIST OF TABLES

Table 1-1.	Crosswalk of Resources Analyzed in the SGAC EIS and This EA.....	1-8
Table 2-1.	Comparison of Coal Production, Surface Disturbance, Mine Life, and Employees for the No Action Alternative and Proposed Action	2-1
Table 2-2.	Summary of Phased Bond Release Acreages in the Project Area	2-6
Table 3-1.	Average Annual and Maximum 24-hr PM ₁₀ Concentrations (µg/m ³) for the Caballo Mine.....	3-2
Table 3-2.	Measured PM _{2.5} Concentrations in Campbell County	3-4
Table 3-3.	Estimated Average Annual and Maximum 24-hr PM _{2.5} Concentrations (µg/m ³) for the Caballo Mine.....	3-4
Table 3-4.	Measured NO ₂ Concentrations (ppb) in Campbell County	3-6

TABLE OF CONTENTS (Continued)

Table 3-5.	Measured O ₃ Concentrations (ppm) in Campbell County	3-6
Table 3-6.	Measured SO ₂ Concentrations (µg/m ³) in Campbell County	3-6
Table 3-7.	Measured Annual Pb Air Emissions from Three Campbell County Power Stations and One Campbell County Coal Mine	3-6
Table 3-8.	Measured Annual Hg Stack (Air) Emissions from Power Stations in Campbell County (Pounds).....	3-7
Table 3-9.	Estimated Annual PM ₁₀ , PM _{2.5} , SO ₂ , NO _x , and Hg Contributions (tons) from Caballo Mine Coal Combustion.....	3-8
Table 3-10.	Measured Hydrogen Ion (H ⁺) Concentrations at Monitoring Site WY99	3-9
Table 3-11.	Estimated Caballo Mine Direct and Indirect CO ₂ e Emissions at the Caballo Mine from Coal Combustion.....	3-10
Table 3-12.	Recent and Historical TDS Concentrations from the Caballo Mine Groundwater Monitoring Network.....	3-13
Table 3-13.	Campbell County and City of Gillette Population Change, 2010-2017	3-23
Table 3-14.	Wyoming and Campbell County Employment Rate Change, 2011-2017.....	3-23
Table 4-1.	Comparison of Direct to Wyoming Particulate Matter Emissions	4-4
Table 4-2.	PM ₁₀ Concentration Values (24-Hr, First Maximum Value - µg/m ³) for 2010-2017	4-5
Table 4-3.	McVehil-Monnett and Redhorse Annual PM ₁₀ and NO ₂ Dispersion Modeling Results	4-6
Table 4-4.	Comparison of Direct to Wyoming NO _x Emissions	4-7
Table 4-5.	Comparison of Direct to Wyoming SO ₂ , Hg, Pb and Other Non-GHG Emissions.....	4-9
Table 4-6.	Estimated Annual PM ₁₀ , PM _{2.5} , SO ₂ , NO _x , and Hg Contributions from Combustion of Coal Mined at the Caballo Mine for 2013-2017 and 2018-2051, Compared to Campbell County and U.S. Total Emissions	4-10
Table 4-7.	Average Annual Campbell County Air Quality Index Values.....	4-11
Table 4.8.	Estimated Annual Average 2013-2017 and 2018-2051 Direct and Indirect CO ₂ e Emissions at the Caballo Mine	4-12
Table 4-9.	LOM Federal and State Revenues from Federal Coal Recovery within the Caballo Mine (millions of dollars).....	4-34
Table 4-10.	LOM Federal and State Revenues from Federal Coal Recovery within the Caballo West Tract (millions of dollars).....	4-35
Table 4-11.	Unavoidable Adverse Effects of the Proposed Action.....	4-37
Table 5-1.	OSMRE Personnel.....	5-1
Table 5-2.	Third Party Contractor Personnel.....	5-1

TABLE OF CONTENTS (Continued)

LIST OF FIGURES

Figure 3-1.	Visibility in the Wind Cave National Park.....	3-8
-------------	--	-----

LIST OF MAPS

Map 1-1.	General Location Map with Federal Coal Leases.....	1-2
Map 1-2.	Caballo Mine's Federal Coal Leases.....	1-3
Map 3-1.	Wind Rose and Air Quality and Meteorological Monitoring Stations at the Caballo Mine and Surrounding Mines.....	3-3
Map 3-2.	Regional Air Quality Monitoring Sites.....	3-5
Map 3-3.	Active Groundwater Monitoring Locations and Water Supply Wells at the Caballo Mine.....	3-12
Map 3-4.	Surface Water Monitoring Sites at the Caballo Mine.....	3-15
Map 3-5.	Wetlands within and Surrounding the Caballo West Tract.....	3-17
Map 3-6.	Raptor Nest Sites and Greater Sage-grouse Leks within and Adjacent to the Caballo West Tract.....	3-19
Map 4-1.	Modeled Drawdown for the Wyodak Coal Seam.....	4-17
Map 4-2.	Cumulative Impact Area for Potential Surface Water and Groundwater Impacts.....	4-19

LIST OF APPENDICES

Appendix A	Legal Notices for Federal Coal Lease Modification Approval WYWI72657
Appendix B	Public Scoping and Notice of Availability Mailing Lists and Public Scoping Comment Summaries and EA Review Comment Summaries and Responses (Individual Letters Received Have Not Been Included)
Appendix C	Greenhouse Gas Emissions Calculations, PM ₁₀ , PM _{2.5} , SO ₂ , NO _x , Hg, CO, and CO ₂ Contributions from Coal Combustion Calculations (Completed by WWC Engineering)
Appendix D	Revenue Calculations (Completed by WWC Engineering)
Appendix E	Caballo Mine Special Status Species Summary Tables for Federal Lease Modification Approval – WYWI72657
Appendix F	Climate Change Discussion

I.0 Purpose and Need

I.1 Introduction

This Environmental Assessment (EA) for the Caballo Mine Federal Mining Plan Modification for Federal Coal Lease WYW172657 (Caballo West tract) 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) and Mineral Leasing Act (MLA), OSMRE will prepare a mining plan decision document (MPDD) in support of its recommendation to the Assistant Secretary, Lands and Minerals Management (ASLM) regarding federal mining plan modifications (OSMRE 1999). The ASLM will decide whether the mining plan modification is approved, disapproved, or approved with conditions. 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 Regulation [CFR] 1500-1508), OSMRE determined that this EA could incorporate by reference analyses included in the 2009 South Gillette Area Coal Lease Applications Final Environmental Impact Statement (hereafter 2009 SGAC EIS [BLM 2009]) prepared by the Bureau of Land Management (BLM) because the EIS included the Caballo West tract as part of its analysis. This approach is consistent with Secretarial Order 3355, which is intended to streamline the NEPA process.

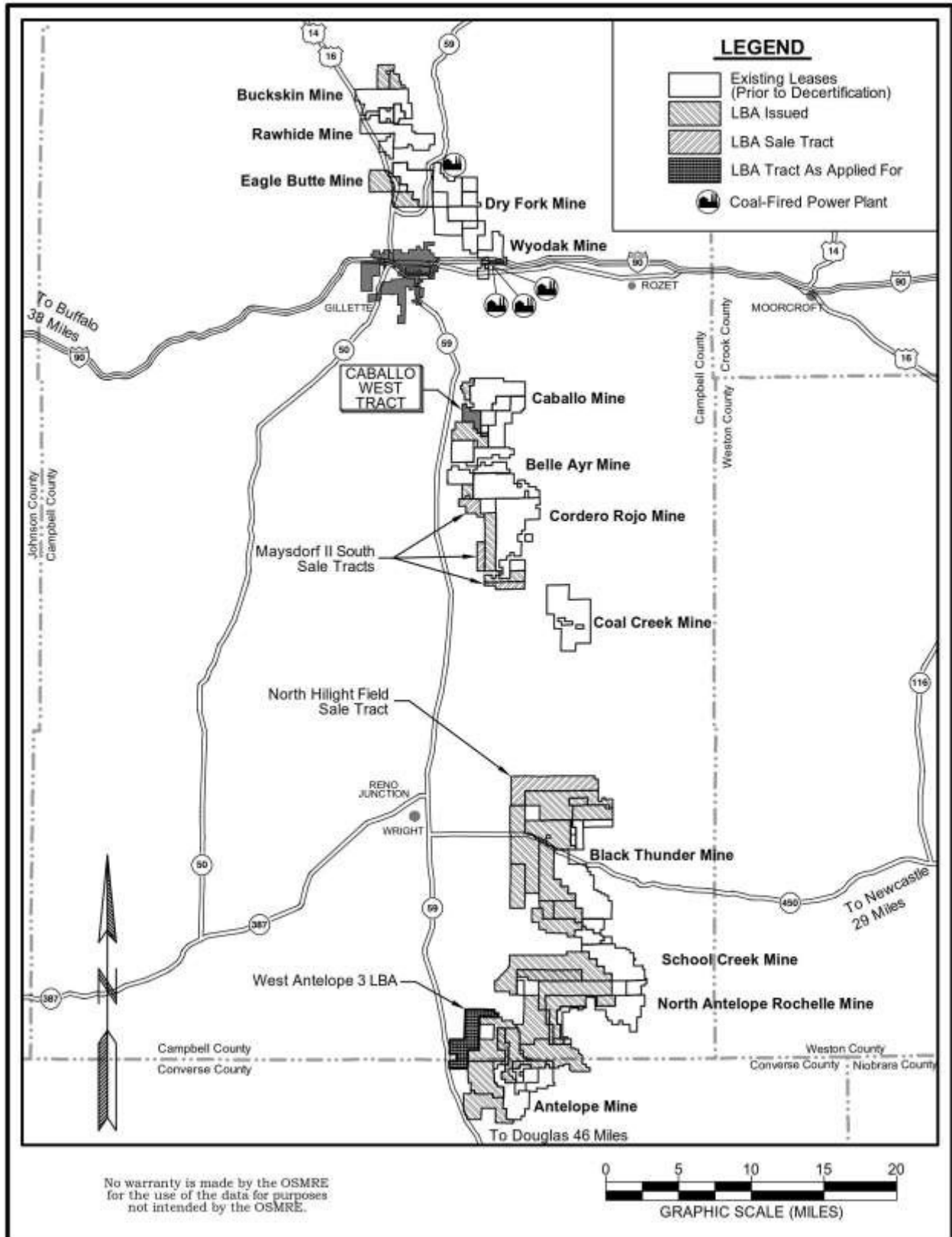
This EA review has been conducted in accordance with the NEPA and the CEQ regulations for implementing NEPA (40 CFR 1500-1508); the DOI's regulations for implementation of NEPA (43 CFR Part 46); the DOI's Departmental Manual Part 516; Secretarial Order 3355; and OSMRE's Directive REG-1, Handbook on Procedures for Implementing the National Environmental Policy Act of 1969 (OSMRE 1989). Information gathered from federal, state, and local agencies, Peabody Caballo Mining, LLC (PCM), publicly available literature, and in-house OSMRE sources, such as the Caballo Mine Permit Application Package (PAP), was used in the preparation of this EA.

I.2 Background

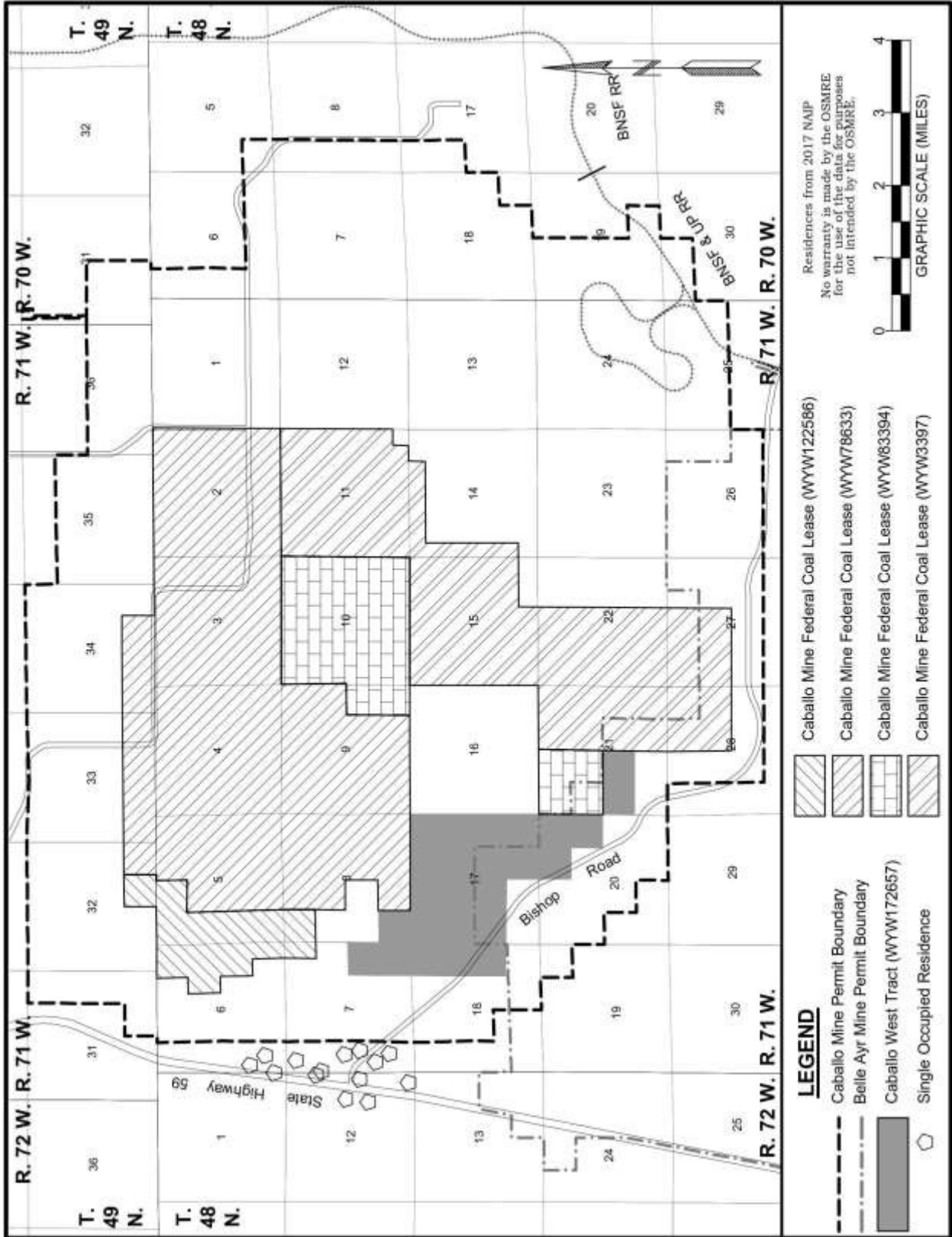
I.2.1 Site History

The Caballo Mine is operated by PCM, a subsidiary of Peabody Energy Corporation. The mine is located in Campbell County, Wyoming, approximately 10 miles south-southeast of Gillette (**map I-1**). According to information provided by PCM, the Caballo Mine is currently authorized to recover coal under four distinct federal coal leases, state leases, and various private coal leases, as indicated below. The federal leases are shown on **map I-2**.

1. Federal Coal Lease WYW3397
2. Federal Coal Lease WYW78633
3. Federal Coal Lease WYW83394
4. Federal Coal Lease WYW122586
5. State Lease (various)
6. Private Coal Lease (various)



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



Map I-2. Caballo Mine's Federal Coal Leases

The Caballo Mine is currently seeking approval from the ASLM to recover coal associated with Federal Coal Lease WYWI72657, which was leased to Alpha Wyoming Land Company on August 17, 2011. The lease was subsequently transferred from Alpha Wyoming Land Company to BTU Western Resources, which is a subsidiary of Peabody Energy Corporation.

The Caballo Mine is located in the middle of the Wyoming Powder River Basin (PRB), a coal basin that spans from northeast Wyoming to southeast Montana. In 2017, Campbell County produced approximately 77 percent of the coal mined from federal government-owned coal leases in the U.S. (DOI Natural Resources Revenue Data 2019). The region also has been heavily developed for oil and gas recovery, including coal bed natural gas (CBNG). The Caballo West tract is bordered on the north, east, and south by leased federal coal and some privately-owned coal. The area to the west of the Caballo West tract includes unleased federal coal. The southwest portion of the Caballo Mine permit area overlaps with the Belle Ayr Mine permit area. The Bishop Road (Campbell County Road 12) currently runs through a portion of the Caballo West tract (**map I-2**).

Coal at the Caballo Mine is mined using conventional surface mining methods and shipped from an onsite railroad loading facility to electric utilities and industrial customers in the U.S. In 2018, 100 percent of coal from the Caballo Mine was shipped to U.S. markets. Based on existing federal coal leases, mining operations (mining, processing, and shipping coal) could continue at the Caballo Mine through approximately 2042.

PCM operates the Caballo Mine under WDEQ-LQD Permit No. 433 in accordance with the approved Wyoming State Coal Regulatory Program (30 CFR Part 950). The currently approved permit boundary includes the entire Caballo West tract. WDEQ-LQD approved the most recent version of Permit No. 433 with the condition that PCM 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 5 years (Wyoming Statute [W.S.]. § 35-11-405 (c)). This EA considers potential effects from mining the Caballo West tract and does not reevaluate existing federal mining areas and operation, except for cumulative effects.

The Resource Recovery and Protection Plan (R2P2) for the Caballo Mine breaks the resource into nine different areas. The BLM Casper Field Office approved the R2P2 for the Caballo Mine in April 2018. This area breakdown 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 (e.g., 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 necessary to optimize the coal haul distances and to improve coal drying at the benches. This mine design has been approved by the BLM in the R2P2 and is needed to 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.

1.2.2 Project Background

In anticipation of needed additional coal reserves, PCM filed an application with BLM on March 15, 2006 to lease federal coal reserves in a tract southwest of and immediately adjacent to the Caballo Mine, under leasing by application regulations (also known as LBA regulations) at 43 CFR § 3425.1 and the provisions of the Energy Policy Act of 2005 (Public Law No. 109-58). The lease request area, which was referred to as the Caballo West tract, was assigned case file number WYWI72657. PCM applied for the federal coal reserves as a maintenance tract for the Caballo

Mine. The Caballo West tract and associated federal coal, as approved for lease by the BLM in relation to the Caballo Mine are shown on **map I-2**.

PCM submitted the Southwest Amendment PAP to the WDEQ-LQD for Permit No. 433 to include the Caballo West tract (PCM 2014). The PAP included modifications to include coal from lease WYWI72657. WDEQ-LQD determined PCM's application to be administratively complete on March 19, 2014 and approved the PAP on November 30, 2015 (WDEQ-LQD 2015a). The approved permit contains a condition that the PCM may not mine coal from any federal coal lease prior to receiving approval from the ASLM.

PCM also submitted a federal mining plan modification request to OSMRE for federal coal related to lease WYWI72657. Using criteria outlined in OSMRE's NEPA Handbook, OSMRE determined that an EA that incorporates by reference the 2009 SGAC EIS will fulfill OSMRE's responsibilities under NEPA for evaluating potential impacts resulting from mining the Caballo West tract.

1.2.3 Statutory and Regulatory Background

For existing, approved federal mining plans that are proposed to be modified, pursuant to 30 CFR Part 746, OSMRE prepares a federal MPDD for a federal mining plan modification. The MPDD recommends approval, disapproval, or approval with conditions of a federal mining plan modification (OSMRE 1999). The ASLM reviews the MPDD and decides whether or not to approve the federal mining plan modification, and if approved, what, if any, conditions may be needed. Under 30 CFR § 746.13, OSMRE will prepare and submit a recommendation regarding the federal mining plan modification, which will be based, at a minimum, on:

1. the PAP,
2. the R2P2,
3. information prepared in compliance with NEPA, including this EA,
4. documentation demonstrating compliance with the applicable requirements of federal laws, regulations, and executive orders (EOs) other than NEPA,
5. comments and recommendations or concurrence of other federal agencies and the public,
6. findings, recommendations, and contractual commitments and requirements of BLM with respect to lease WYWI72657, the R2P2, and MLA,
7. findings and recommendations of WDEQ-LQD with respect to the mine permit amendment application and the Wyoming State program, and
8. findings and recommendations of OSMRE with respect to the additional requirements of 30 CFR Chapter VII, Subchapter D (30 CFR Parts 740 to 746).

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 U.S. Fish and Wildlife Service (USFWS) Section 7 consultation for threatened and endangered species potentially affected by the proposed mining plan under the Endangered Species Act of 1973 (ESA) and Section 106 consultation under the National Historic Preservation Act (NHPA).

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 include in Permit No. 433 and new information specific to this action.

1.3 Purpose and Need

As described in 40 CFR § 1502.13, the purpose and need statements briefly specify the purpose and need to which the agency is responding in proposing the alternatives including the Proposed Action.

1.3.1 Purpose

The purpose of the action is established by the MLA and SMCRA, which require the evaluation of PCM's proposed mining plan modification before conducting surface mining and reclamation operations to develop the Caballo West tract federal coal lease WYWI72657. 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 PCM the opportunity to exercise its valid existing rights granted by the BLM under federal coal lease WYWI72657 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.

1.4 Regulatory Framework and Necessary Authorizations

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

1. MLA,
2. NEPA,
3. Mining and Minerals Policy Act of 1970,
4. Federal Coal Leasing Act Amendment, 1976,
5. Federal Land Policy Management Act of 1976,
6. SMCRA,
7. Multiple-Use Sustained Yield Act of 1960,
8. ESA,
9. Clean Air Act (CAA),
10. Clean Water Act,
11. Safe Drinking Water Act,
12. NHPA,
13. American Indian Religious Freedom Act,
14. Paleontological Resources Preservation Act of 2009, and
15. Migratory Bird Treaty Act (MBTA).

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

1.5 Outreach and Issues

Following a review of the 2009 SGAC EIS, OSMRE determined that further analyses were appropriate, based on newly available information and changes to the environmental consequences of the Proposed Action that have occurred since the 2009 analysis. Internal discussions within OSMRE identified a preliminary set of issues to be considered during the NEPA analysis. OSMRE also published a notice of intent (NOI) to prepare this EA in the *Gillette News*

Record on December 19, 2018 (**appendix A**), initiating a comment period ending on January 19, 2019. The public scoping period was initially conducted between December 19, 2018 and January 18, 2019; however, the OSMRE Western Region website was inaccessible from late December 2018 through January 2019 due to the government shutdown. Therefore, OSMRE extended the scoping period from February 7, 2019 through February 22, 2019. Substantive issues identified during public scoping were considered during the document preparation. The public scoping comment letters are summarized in **appendix B**. The further summarized issues and the number of comments received associated with each issue (in parentheses) include:

1. water quality (4),
2. air quality (3),
3. wildlife (1),
4. level of NEPA/ NEPA process (2),
5. reclamation (1),
6. climate change/global warming (2), and
7. transportation (1).

I.6 Crosswalk of Resource Areas

Table I-1 identifies the location of resource discussions presented in the 2009 SGAC EIS and their location in this EA, where present. While all of the resources have been considered, not all 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 or that new information will not affect the decision-making process. Information presented in the 2009 SGAC EIS that adequately described the affected environment for specific resources is incorporated by reference into this EA.

I.7 Public Involvement

On December 19, 2018, OSMRE posted an announcement of the EA on their *Initiatives* webpage (OSMRE 2019a). The announcement initiated a comment period that extended from December 19, 2018 through January 19, 2019. OSMRE also published a notice of intent (NOI) to prepare this EA in the Gillette News Record on December 19, 2018 (**appendix A**) initiating a comment period, ending on January 19, 2019. However, the OSMRE Western Region website was inaccessible from late December 2018 through January 2019 due to the government shutdown. Therefore, OSMRE extended the scoping period from February 7, 2019 through February 22, 2019. Public outreach and Tribal consultation letters were also sent out to stakeholders and tribes that could be affected by the project. OSMRE received written and e-mailed comments from eight entities. Lists of agencies, tribes, and individuals included on mailing lists, and a summary of the public scoping comment letters received are included in **appendix B**.

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

Resource	SGAC EIS ¹		Caballo West EA	
	Affected Environment	Environmental Consequences	Affected Environment	Environmental Consequences
General Setting	3.1	3.1	3.1	4.1
Topography and Physiography	3.2.1	3.2.2	3.2	4.2
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	3.3	4.3
Air Quality and Climate Change	3.4.2.1 3.4.3.1 3.4.4.1.1 3.4.4.2.1	3.4.2.2 3.4.3.2 3.4.4.1.2 3.4.4.2.2	3.4	4.4
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	3.5	4.5
Alluvial Valley Floors	3.6.1	3.6.2	3.6	4.6
Wetlands	3.7.1	3.7.2	3.7	4.7
Soils	3.8.1	3.8.2	3.8	4.8
Vegetation	3.9.1	3.9.2	3.9	4.9
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	3.10.1.2 3.10.2.2 3.10.3.2 3.10.4.2 3.10.5.2 3.10.6.2 3.10.7.2	3.10	4.10
Land Use and Recreation	3.11.1	3.11.2	3.11	4.11
Cultural Resources	3.12.1 3.12.1.3 3.12.3	3.12.2 3.12.3	3.12	4.12
Visual Resources	3.13.1	3.13.2	3.13	4.13
Noise	3.14.1	3.14.2	3.14	4.14
Transportation	3.15.1	3.15.2	3.15	4.15
Hazardous and Solid Waste	3.16.1	3.16.2	3.16	4.16
Socioeconomics	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	3.17	4.17

¹ SGAC EIS – South Gillette Area Coal Lease Applications EIS (BLM2009)

2.0 Proposed Action and 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). 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 Description of Alternatives

The Proposed Action and No Action Alternative reflect the proposal for a federal mining plan modification to add approximately 130.2 Mt of federal coal to the federal mining plan within the 1,024 acre Caballo West tract. This EA reflects the modified alternative selected by BLM when approving the lease of the federal coal associated with lease WYW172657 (BLM 2010) and incorporates WDEQ-LQD’s written findings to PCM’s PAP for a permit revision to include lease WYW172657 (WDEQ-LQD 2015a). **Table 2-1** summarizes coal production, surface disturbance, mine life, and employees for the No Action Alternative and the Proposed Action. The No Action Alternative would leave operations as described in the currently approved federal mining plan. The Proposed Action would add additional coal associated with federal lease WYW172657.

Table 2-1. Comparison of Coal Production, Surface Disturbance, Mine Life, and Employees for the No Action Alternative and Proposed Action

Item	No Action Alternative (Existing Mine)	Proposed Action
Mineable Federal Coal	363.9 Mt	494.1 Mt (130.2 Mt added)
Recoverable Federal Coal	324.1 ¹ Mt	443.9 ² Mt (119.8 ² Mt added)
Coal Lease Area - Federal Coal Leases Only	7,501.5 acres	8,525.5 acres (1,024.0 acres added)
Total Affected Area	13,395.5 acres	14,262.2 acres (866.7 acres added)
Approved Permit Area	21,268.7 acres	21,268.7 acres (no change)
Average Annual Coal Production	13.5 Mtpy	13.5 Mtpy (no change)
LOM of Federal Coal	24 years	32.9 years (8.9 years added)
Average Number of Employees	156	156 (no change)

¹ Assumes a weighted average recovery factor of 89.1 percent of mineable coal; recovery differs by lease.

² Assumes a 92.0 percent recovery factor of mineable coal.

2.1.1 Proposed Action

The Proposed Action would modify the federal mining plan and authorize PCM to conduct coal removal on approximately 1,024 acres of federal coal, with approximately 866.7 acres of surface disturbance, to recover approximately 119.8 Mt of federal coal. PCM estimates that at the

projected average annual production rate of 13.5 million tons per year (Mtpy), mining this coal would extend the mine's life by about 8.9 years. All of the federal coal included in the Proposed Action would be shipped to electric utilities and industrial customers in the U.S. (PCM 2018a).

The Caballo West tract consists of a single block of federal coal and includes 1,024 surface acres. However, not all of the coal included in the Caballo West tract is considered mineable at this time. 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 would be protected [30 CFR § 761.11(d)]. PCM estimated that the Caballo West tract contains approximately 130.2 million tons (Mt) of mineable coal reserves if the Bishop Road is moved. In the 2009 SGAC EIS, the BLM estimated that if Bishop Road is not relocated, approximately 33.3 Mt of coal would be bypassed. The potential impacts related to this EA are evaluated assuming that Bishop Road is moved to recover coal under the ROW and existing buffer (100 feet on either side of the ROW) as well as coal that would be isolated west of Bishop Road. For this EA, Bishop Road is assumed to be relocated to land within the existing Caballo Mine or the existing Belle Ayr Mine permit boundaries, and potential impacts from the road relocation in the Caballo West tract are captured in the total disturbance acreage.

Under the Proposed Action, the Caballo West tract would be mined as an integral part of the Caballo Mine. Because the tract would be an extension of the existing Caballo Mine, the facilities and infrastructure would be the same as those identified in Permit No. 433, as revised on November 2015, and the BLM R2P2, which was approved April 2018.

2.1.2 No Action Alternative

Under the No Action Alternative, OSMRE would not recommend and the ASLM would not approve PCM's proposed mining plan modification request, and 119.8 Mt of federal coal related to WYW172657 would not be recovered. Under this alternative, PCM would mine its remaining 324.1 Mt of recoverable coal reserves on the existing Caballo Mine federal leases in approximately 24 years, at an average annual production rate of approximately 13.5 Mtpy.

The No Action Alternative discloses the potential consequences of not mining the Caballo West tract, under the assumption that the additional coal within the tract would not be mined in the foreseeable future if the No Action Alternative is selected. Under the No Action Alternative, PCM would be limited to recovering the remaining federal coal reserves associated with existing federal, state, and private leases. All of the federal coal included in the No Action Alternative would continue to be shipped to electric utilities and industrial customers in the U.S. Selection of the No Action Alternative would not preclude approval of a federal mining plan modification in the future to include mining the coal within the Caballo West tract.

2.1.3 Alternatives Considered but Eliminated from Detailed Analysis

OSMRE considered alternative scenarios to the approval, denial, or approval with conditions of the federal mining plan modification. However, because OSMRE's decision would be limited to recommending approval, approval with conditions, or denial of the mining plan modification, OSMRE concluded that there are no other reasonable action alternatives to the Proposed Action that would meet the agency's purpose and need. The following alternatives were considered but eliminated from detailed analysis. The discussions include reasons the alternatives were eliminated from detailed analysis.

2.1.3.1 Underground Mining Alternative

Public comments on other EAs in the Powder River Basin suggested an alternative to use underground mining methods to extract the coal. OSMRE eliminated this alternative 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 WDEQ-LQD-approved surface mining permit. An underground mining alternative would, thus, be inconsistent with the Purpose and Need for this action.

Also, lease WYWI72657 is a surface reserve lease only. The lease was sold by the federal government and purchased and held by PCM with the clear understanding by all parties concerned that the lease would be mined by surface mining methods only (BLM 2011).

This alternative is also economically infeasible at current permitted production rates. Initiating an underground longwall mining operation in the Caballo Mine is 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 Caballo Mine, new infrastructure for underground mining would need to be constructed. The capital expenditure to develop an underground mine would be prohibitive. In addition, 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, a longwall mining system, conveyor systems/drives/power stations, vehicles for transporting employees and supplies, 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. It would take years for PCM to design and engineer a new underground mine and for WDEQ-LQD to process a new permit application. These factors also support the conclusion that this potential alternative is economically unreasonable.

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

2.1.3.2 Low or No Pollutant Emitting Equipment

Public comments on other PRB EAs suggested considering an alternative that required reduced air emissions by changing or modifying mining related equipment to that which would produce lower air emissions. The Caballo Mine is a relatively small contributor of the emissions related to engine combustion (primarily carbon dioxide [CO₂] and oxides of nitrogen [NO_x]) in the region.

The cost to make the switch to equipment powered by a different fuel (such as natural gas or solar powered equipment) for approximately 130 Mt of federal coal would be prohibitive and would only minimally 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 emission control devices would be expensive and would have 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 Caballo Mine and would likely have substantially similar effects to an alternative that is analyzed.

2.1.3.3 Air Quality Mitigation Alternatives

Some public comments on other PRB EAs suggested that OSMRE consider alternatives that mitigate air quality impacts, specifically by imposing more stringent emission limits at power plants fueled by coal from the Caballo Mine 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 and No Action Alternative because they are considered to be indirect effects. CEQ regulations at 40 CFR § 1508.8(b) define indirect effects as those “which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable.” These indirect effects would occur as a result of burning the coal that is mined. The analysis concludes there would not be significant impacts to air resources under the Proposed Action, and no mitigation is recommended. 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. Given these factors, bringing this alternative forward for further review would not be reasonable.

2.2 Existing Conditions (Conditions Common to the Proposed Action and the No Action Alternative)

The 2009 SGAC EIS presented a thorough description of the existing conditions to support the analysis presented therein. The following summary of updated existing conditions, including ongoing permitted mining operations, describes 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 at the Caballo Mine as approved by WDEQ-LQD Permit No. 433 since the 2009 SGAC EIS was prepared and federal coal lease WYWI72657 was issued. 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.

PCM currently employs 156 people at the Caballo Mine (PCM 2018a). From 2011-2017, the mine produced an average of 13.1 Mt of coal per year (Wyoming Department of Workforce Services [WDWS] 2011, 2012, 2013, 2014, 2015, 2016, 2017). In the future, PCM anticipates mining 13.5 Mt annually, which is under the 35 Mt of coal per year permitted by WDEQ Air Quality Division (AQD) air quality permit MD-1477. Approximately 324.1 Mt remain to be recovered in the federal mining plan area after January 1, 2018, excluding the federal coal identified in Proposed Action. PCM continues to use conventional surface mining techniques described in section 2.3.1 of the 2009 SGAC EIS. PCM estimates that the Caballo Mine currently recovers approximately 89 percent of mineable coal. Coal is shipped from an onsite railroad loading facility to electric utilities and industrial customers in the U.S. (PCM 2019).

In 1975, in response to the requirements set forth in SMCRA and in the WEQA, WDEQ-LQD published a set of rules and regulations that require 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 used at the Caballo Mine. Mined-out areas would be reclaimed according to an approved postmining plan and would be reclaimed to reestablish the drainage system. 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 would be reclaimed to support the approved postmining land uses.

2.2.1 Current Bonding and Bond Release Status

SMCRA provides that, as a prerequisite for obtaining or modifying a coal mining permit, permittees must post a reclamation bond to ensure that the regulatory authority would have sufficient funds to reclaim the site if the permittee fails to complete obligations set forth in the approved reclamation plan (OSMRE 2019b). The current bond amount for the Caballo Mine is \$151.9 million in the form of a surety bond. It was approved by WDEQ-LQD on November 13, 2018.

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

1. Area Bond Release - Rough backfill verification;
2. Phase 1 - Partial Incremental, which includes stream channel reconstruction verification and soil depth verification;
3. Phase 2 - Partial Incremental, which includes vegetation establishment verification, surficial stability verification, and permanent impoundment construction/renovation and SEO approval verification; and
4. Phase 3 - Full Incremental or Final release, which includes mitigation wetlands verification, revegetation success verification, and tree establishment verification.

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 plant species prior to the Phase 3 final 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 has been submitted to the WDEQ. In 2017, the OSMRE Denver Field Division evaluated reclamation plans of four 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 2017). According to Caballo Mine's 2018 Annual Report (PCM 2018b), the mine had disturbed approximately 8,619 acres, of which approximately 1,470 acres (17.1 percent) are needed for long-term mining activities and, as such, are considered land not available for reclamation. The areas listed as needed for long-term mining activities include main facilities (buildings, coal handling facilities, and ancillary facilities) and mining operations (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). As of March 2018, the mine had backfilled and graded approximately

5,111 acres of the remaining 7,149 acres. Thus, the mine had backfilled and graded approximately 59.3 percent of the total disturbance and approximately 71.5 percent of land available for reclamation. A summary of phased bond release acreages in the project area is included in **table 2-2**.

Table 2-2. Summary of Phased Bond Release Acreages in the Project Area

Phased Bond Releases Status¹	Mine Wide	Percent
Total Areas Disturbed	8,619	--
Acres of Long-term Mining or Facilities and Percent of Total Disturbance	1,470	17.1
Acres Available for Backfilling or Reclamation and Percent of Total Disturbance	7,149	82.9
Acres of Active Mining and Percent of Available Acres	2,038	28.5
Acres Backfilled and Graded and Percent of Available Acres	5,111	71.5
Total Areas Reclaimed (Soiled and Seeded/Planted) and Percent of Backfilled and Graded	4,212	82.4
Areas Which Have Achieved Phase 1 Bond Release and Percent of Reclaimed Acres	4,060	96.4
Areas Which Have Achieved Phase 2 Bond Release and Percent of Reclaimed Acres	3,921	93.1
Areas Which Have Achieved Phase 3 Bond Release and Percent of Reclaimed Acres	0	0

¹ As of March 31, 2018
 Source: PCM 2018b

It should be noted that neither state nor federal regulations require a permittee to file for bond release at any prescribed time. Therefore, only using bond release statistics to evaluate reclamation success can be misleading. Typically, permittees do not file for Phase 2 or Phase 3 bond release until completion of the entire mining operation. As a result, the number of acres released from Phase 1 and Phase 3 bond in Wyoming is relatively small compared to the number of acres actually regraded, topsoiled, and seeded. The standard for determining if mines are meeting their reclamation obligations is related to compliance with contemporaneous reclamation permit commitments. Contemporaneous reclamation specifically refers to the timeliness in which reclamation is occurring. An evaluation is conducted annually by OSMRE. According to the 2017 Annual Evaluation Report for the WDEQ Regulatory Program, all coal mines evaluated were found to be in compliance that evaluation year (OSMRE 2017).

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**. **Table I-1** in chapter I is a crosswalk table between resource discussions presented in the 2009 SGAC EIS and this EA. The determination of adequacy of the description of baseline conditions in the 2009 SGAC EIS, as related to the Caballo West tract was made if 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 in the 2009 SGAC EIS that has not substantively changed is incorporated by reference. Updated baseline information is presented in this chapter, when applicable.

3.1 General Setting

The general setting of the Caballo West tract is described in section 3.1 of the 2009 SGAC EIS. The tract is located in the PRB, which has a semi-arid, high plains environment with relatively large seasonal and diurnal variations in temperature and seasonal variation in precipitation.

3.2 Topography and Physiography

Topography and physiography of the Caballo West tract are described in section 3.2.1 and section S3-1 of the Supplementary Information volume of the 2009 SGAC EIS. The tract lies within the unglaciated Missouri Plateau subregion of the Great Plains Province, within the east-central portion of the PRB. The structural basin is an elongated, asymmetrical syncline approximately 120 miles east to west and 200 miles north to south, which is bounded in Wyoming by the Black Hills on the east; the Big Horn Mountains on the west; and the Hartville Uplift, Casper Arch, and Laramie Mountains on the south. Geologic strata along the eastern limb of the structural PRB dip to the west at 1 to 2 degrees toward the axis of the basin.

3.3 Geology, Mineral Resources, and Paleontology

General geology and coal resources are described in section 3.3.1.1 and section S3-2 of the Supplementary Information volume of the 2009 SGAC EIS. Stratigraphic units within the Caballo West tract include, in descending order, recent (Holocene age) alluvial and eolian deposits, Eocene age Wasatch Formation (overburden), and Paleocene age Fort Union Formation. The targeted coal seam lies within the Tongue River Member of the Fort Union Formation. Locally, this coal zone is referred to as the Wyodak. Within the tract, the Wyodak coal seam thickness averages about 74 feet.

Mineral resources are described in Section 3.3.2.1 of the 2009 SGAC EIS. According to the Wyoming Oil and Gas Conservation Commission (WOGCC), as of July 2018, 66 CBNG wells and 1 oil and gas well had been permitted within 2 miles of the tract (WOGCC 2018). Nine CBNG wells have been completed within the tract, six of which are currently producing gas. As of July 2018, there are no oil and gas wells other than CBNG permitted within the tract. CBNG wells located on the Caballo West tract would be abandoned and mined through as mining progresses.

Paleontology is described in section 3.3.3.1 and section S3-3 of the Supplementary Information volume of the 2009 SGAC EIS. No significant or unique paleontological resource localities were recorded on federal lands in the 2009 SGAC EIS resource report area. In 2008, a reconnaissance

for outcrops that might contain paleontological remains was conducted within and adjacent to the Caballo West tract. No outcrops or paleontological remains were identified (PCM 2014).

3.4 Air Quality and Climate Change

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 Caballo Mine is included in PCM’s Air Permit MD-1477 (WDEQ- AQD 2006). Since the completion of the 2009 SGAC EIS, a permit waiver was issued for the air permit to reduce the maximum permitted annual production level from 50 to 35 Mt (WDEQ-AQD 2014).

Section 3.4 and appendix K of the 2009 SGAC EIS include detailed air quality discussions regarding the leasing and mining of coal related to the Caballo West tract. The analysis presented herein includes discussion of attainment/non-attainment areas; updated to recent air quality monitoring findings; revised air quality modeling results; updated discussions on fine particulate matter (PM_{2.5}), nitrogen dioxide (NO₂), ozone (O₃), air quality related values (AQRVs), and hazardous air pollutants (HAPs); and discussion of greenhouse gases (GHGs).

3.4.1 Existing Caballo Mine Air Quality Summary

Baseline air quality data for the surface facilities area at the Caballo Mine are found in the section 3.4 and section S3-4 of the Supplementary Information volume of the 2009 SGAC. The climate in the general area is semi-arid with relatively short, warm summers and longer cold winters. Evaporation exceeds annual precipitation. The following discussions include updated (2013-2017) air quality monitoring results.

3.4.1.1 Air Quality-Monitoring Values

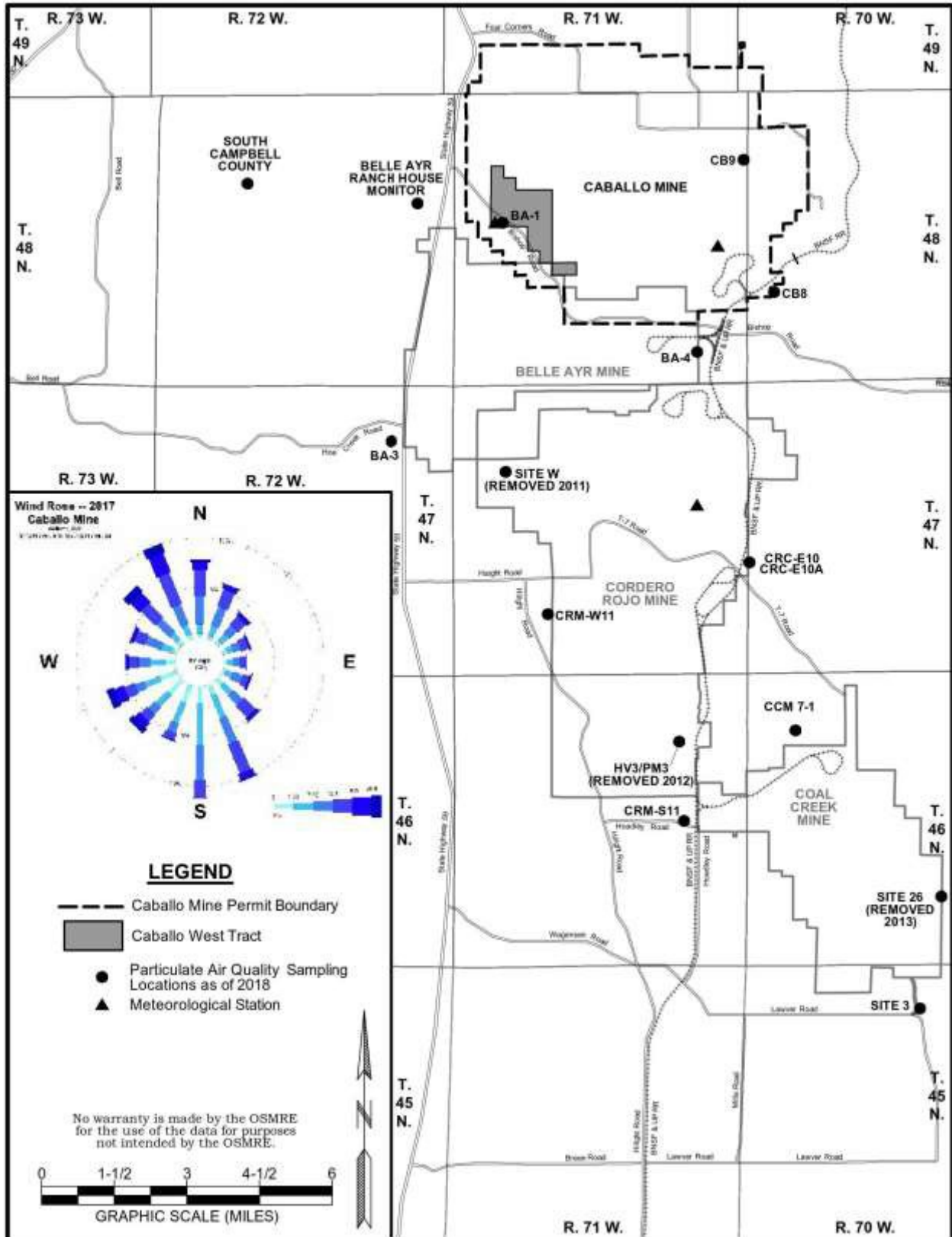
PCM has monitored particulate matter levels around the mine throughout its life. Current air monitoring consists of two sites that monitor continuous concentrations of PM₁₀ (**map 3-1**). **Table 3-1** lists the recent annual mean and high PM₁₀ concentrations for the Caballo Mine. Site BA-1 is a Belle Ayr Mine sampler, located within the Caballo Mine permit boundary. The average annual PM₁₀ concentration from 2013-2018 ranged between 8.1 and 18.2 µg/m³ (about 16 to 36 percent of the annual WAAQS of 50 µg/m³). The 24-hour high PM₁₀ values ranged between 27.0 and 131.7 µg/m³, or about 18 to 88 percent of the WAAQS and NAAQS of 150 µg/m³.

Table 3-1. Average Annual and Maximum 24-hr PM₁₀ Concentrations (µg/m³) for the Caballo Mine

Site Name ¹	2013		2014		2015		2016		2017		2018	
	Avg Annual	Max 24-hr	Avg Annual	Max 24-hr	Avg Annual	Max 24-hr	Avg Annual	Max 24-hr	Avg Annual	Max 24-hr	Avg Annual	Max 24-hr
CB8	17.7	84.1	16.7	55.6	18.2	80.8	16.2	121.0	16.9	131.7	14.3	55.3
CB9	16.1	64.2	14.9	54.0	17.4	72.1	15.6	102.8	16.2	117.0	13.5	53.0
BA-1	8.1	27.0	9.7	28.0	10.7	49.0	9.3	44.0	9.0	71.0	8.8	28.2

¹ See **map 3-1** for site locations.

Source: IML 2013, 2014, 2015, 2016, 2017, 2018



Map 3-1. Wind Rose and Air Quality and Meteorological Monitoring Stations at the Caballo Mine and Surrounding Mines

Because PM_{2.5} monitoring is not required by WDEQ-AQD, data were not gathered onsite. Therefore, PM_{2.5} data gathered from three Campbell County sites from 2013-2018 were used to assess potential PM_{2.5} emissions at the Caballo Mine (**table 3-2**). Regional monitoring demonstrated that ambient concentrations of PM_{2.5}, as determined by the 98th percentile 24-hour standard and annual average NAAQS and WAAQS values, were below the established 24-hour (35 µg/m³) and annual (12 µg/m³) standards.

Table 3-2. Measured PM_{2.5} Concentrations in Campbell County

Site ID ¹	Year	24-hour (µg/m ³)	Annual (µg/m ³)
Btm-36-2 (Black Thunder Mine) (56-005-0891)	2013	14	4.2*
	2014	10	3.9
	2015	22	4.9*
	2016	12	3.3*
	2017	26	5.5*
	2018	21	4.8*
Belle Ayr Ba-4, 5n, 5s (56-005-0892)	2013	14	6.4*
	2014	10	5.2
	2015	18	5.0
	2016	14	4.6*
	2017	23	5.4
	2018	20	3.5*
Buckskin Mine North Site (56-005-1899)	2013	14	4.8
	2014	12	5.5
	2015	21	2.2
	2016	10	2.5*
	2017	26	5.6
	2018	23	5.3*

¹ See **map 3-2** for locations.

* Indicates the mean does not satisfy minimum data completeness criteria.

Source: EPA 2019a

To further evaluate potential PM_{2.5} emissions at the Caballo Mine, PM₁₀ monitoring data from the Caballo Mine were used to estimate PM_{2.5} ambient concentrations by applying a 0.2 factor, as determined by Pace (2005). The estimated annual average and maximum 24-hour PM_{2.5} values are shown in **table 3-3**. The estimated PM_{2.5} concentrations were below the prescribed 24-hour WAAQS and NAAQS (35 µg/m³) and the annual WAAQS and NAAQS (15 µg/m³ and 12 µg/m³, respectively). These estimates are supported by the regional PM_{2.5} data presented in **table 3-2**.

Table 3-3. Estimated Average Annual and Maximum 24-hr PM_{2.5} Concentrations (µg/m³) for the Caballo Mine

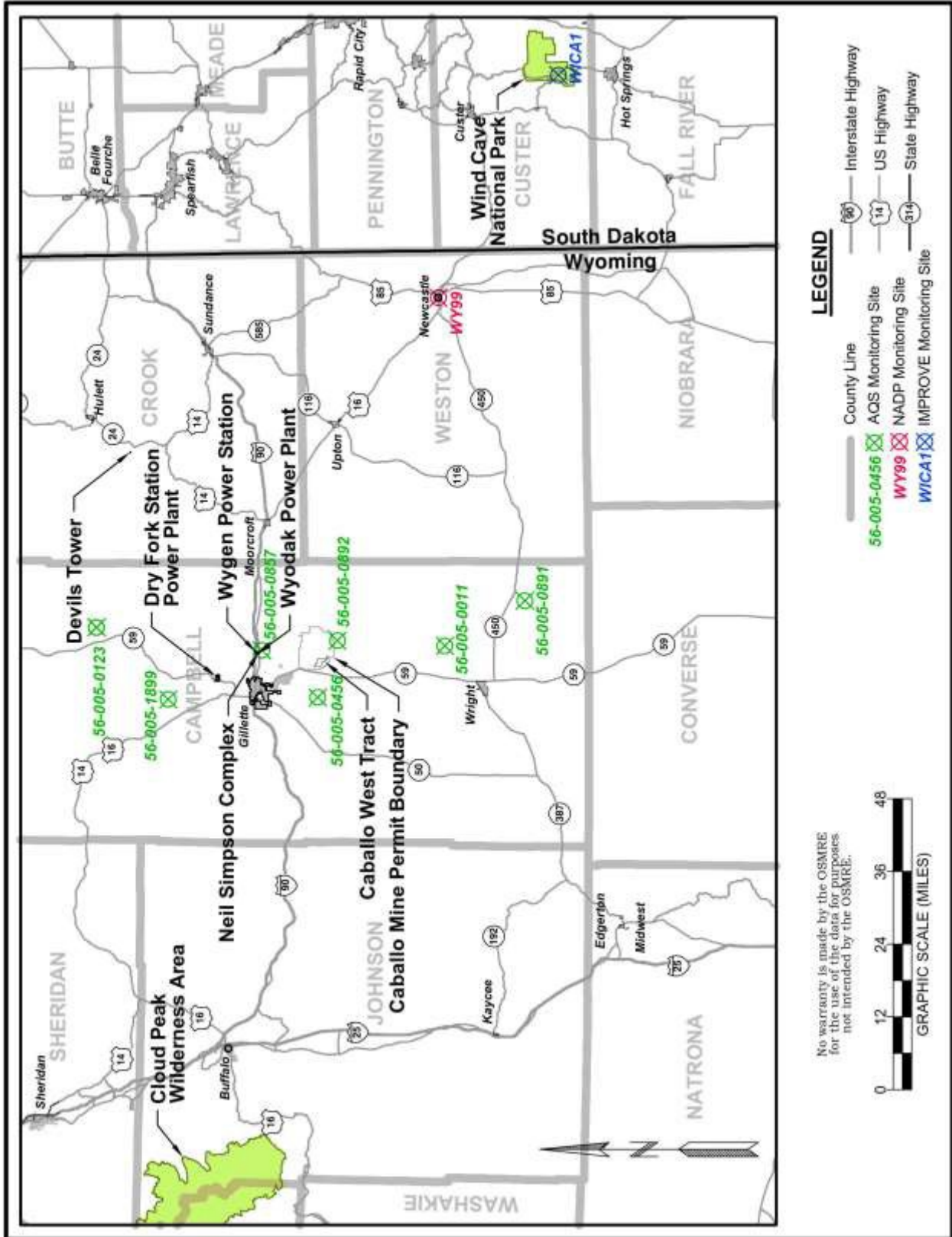
Site Name ¹	2013		2014		2015		2016		2017		2018	
	Avg Annual	Max 24-hr	Avg Annual	Max 24-hr	Avg Annual	Max 24-hr	Avg Annual	Max 24-hr	Avg Annual	Max 24-hr	Avg Annual	Max 24-hr
CB8	3.5	16.8	3.3	11.1	3.6	16.2	3.2	24.2	3.4	26.3	2.9	11.0
CB9	3.2	12.8	3.0	10.8	3.5	14.4	3.1	20.1	3.2	23.4	2.7	10.6

¹ See **map 3-1** for site locations.

Source: Calculated (PM₁₀ values from table 3-2 multiplied by 0.2)

3.4.1.2 Emissions of Nitrogen Dioxide (NO₂), Ozone (O₃), Sulfur Dioxide (SO₂), Mercury (Hg), and Lead (Pb)

NO₂ concentrations (98th percentile, 1-hour) have been monitored in Campbell County at four Air Quality System (AQS) monitoring sites (**table 3-4**). These monitoring sites are the closest to the Caballo Mine, between 3 and 36 miles from the Caballo West tract (**map 3-2**). All monitored NO₂ values were well below the WAAQS of 100 ppb.



Map 3-2. Regional Air Quality Monitoring Sites

Table 3-4. Measured NO₂ Concentrations (ppb) in Campbell County

AQS Site ID ¹	Sampler ID	2013	2014	2015	2016	2017	2018
56-005-0123	Thunder Basin Grassland Site	9	10	8	6	8	7
56-005-0456	South Campbell County	32	32	32	28	31	32
56-005-0892	Belle Ayr Ba-4, Ba-5n, and Ba-5s	35	35	32	26	28	30
56-005-0011	Hilight-Reno Junction Gas Plant	52	55	41	No data	No data	No data

¹ See map 3-2 for site locations.

Source: EPA 2019a

Under the CAA, EPA has set protective health-based standards for O₃. O₃ monitoring is not required by WDEQ-AQD at the mines evaluated in the 2009 SGAC EIS, but levels have been monitored at two WDEQ-AQD monitoring sites in Campbell County since 2001. An exceedance of the current O₃ 8-hour standard occurs if the 4th-highest daily maximum value is above the level of the current NAAQS and WAAQS standard (0.075 ppm prior to October 2015, 0.070 ppm after October 2015). **Table 3-5** shows no violations of the NAAQS or WAAQS 8-hour O₃ standards at the two regional monitoring sites, during 2013-2017.

Table 3-5. Measured O₃ Concentrations (ppm) in Campbell County

AQS Site ID ¹	Sampler ID	2013	2014	2015	2016	2017	2018
56-005-0123	Thunder Basin Grassland Site	0.061	0.058	0.059	0.057	0.064	0.064
56-005-0456	South Campbell County	0.061	0.059	0.062	0.060	0.068	0.055

¹ See map 3-2 for site locations.

Source: EPA 2019a

SO₂ concentrations (99th percentile, 1-hour) are currently being monitored in Campbell County at one AQS monitoring site (**table 3-6**). This site is approximately 9 miles north of the Caballo West tract (**map 3-2**). All monitored SO₂ values were well below the NAAQS and WAAQS of 75 ppb.

Table 3-6. Measured SO₂ Concentrations (µg/m³) in Campbell County

AQS Site ID ¹	Sampler ID	2013	2014	2015	2016	2017	2018
56-005-0857	Wyodak Site 4	37	32	16	14	11	No data

¹ See map 3-2 for site locations.

Source: EPA 2019a

Annual Pb (a criteria pollutant), Hg (a HAP), and CO (an indirect GHG) monitoring values are not collected at the Caballo Mine. **Table 3-7** shows the Pb emissions from three coal-fired power plants and one AQS monitoring site in Campbell County. The Pb values from the Thunder Basin site were well below the NAAQS and WAAQS of 0.15 µg/m³.

Table 3-7. Measured Annual Pb Air Emissions from Three Campbell County Power Stations and One Campbell County Coal Mine

Power Station or AQS Site	2013	2014	2015	2016	2017
Wyodak Plant (pounds)	43.1	35.3	33.2	19.7	27.3
Dry Fork Station (pounds)	9.0	21.0	8.6	14.0	10.0
Neil Simpson Complex (pounds)	60.0	31.0	24.0	24.0	23.0
Thunder Basin (56-005-0123) (µg/m ³) ¹	0.002	0.001	0.002	0.002	0.001

¹ Pb monitoring at the Thunder Basin AQS site is presented as annual 1st maximum value.

Source: EPA 2019b

Table 3-8 shows the Hg emissions from three coal-fired power plants in Campbell County.

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

Power Station ¹	2013	2014	2015	2016	2017
Wyodak Plant					
Total Emissions	338.3	347.2	319.0	261.7	464.3
Stack (Air) Emissions	204.3	301.1	111.2	22.6	28.3
Percent of Total Emission Emitted to Air	60%	87%	35%	9%	6%
Dry Fork Station					
Total Emissions	86.0	69.0	66.7	45.0	48.0
Stack (Air) Emissions	67.0	50.0	38.3	28.0	29.0
Percent of Total Emission Emitted to Air	78%	72%	57%	62%	60%
Neil Simpson Complex					
Total Emissions	13,086.0 ²	653.0	711.0	759.0	1,017.0
Stack (Air) Emissions	378.0	354.0	351.0	358.0	433.0
Percent of Total Emission Emitted to Air	3% ¹	54%	49%	47%	43%
Total of Three Campbell County Power Stations					
Total Emissions	13,510.3 ²	1,069.2	1,096.7	1,065.7	1,529.3
Stack (Air) Emissions	649.3	705.1	500.5	408.6	490.3
Percent of Total Emission Emitted to Air	5% ²	66%	46%	38%	32%

¹ See **map 3-2** for site locations.

² 2013 Neil Simpson total emissions value on the EPA website appears to be incorrect given the significantly lower values compared to other years, so the percent of stack emissions compared to total emissions for 2013 calculations appears to be invalid.

Source: EPA 2019b

CO is created when carbon-containing fuels are burned incompletely. Through natural processes in the atmosphere, it is eventually oxidized to CO₂. CO is not monitored in Campbell County.

3.4.1.3 Air Quality Related Values (AQRVs)

AQRVs, as related to the Caballo West tract, were discussed in section 3.4.4 of the 2009 SGAC EIS. Updated information regarding AQRVs is included below. AQRVs are evaluated by the land management agency responsible for a PSD 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 Class II areas. They are the land management agency’s policy and are not legally enforceable as a standard. WDEQ-AQD WAAQS do include a standard for visibility. Class I areas are afforded specific AQRV protection under the CAA. The Class I designation allows very little deterioration of air quality. The nearest Class I area is approximately 100 miles east-southeast of the tract at Wind Cave National Park in South Dakota (**map 3-2**). The AQRVs associated with this action include visibility and acidification of lakes.

3.4.1.3.1 Visibility

Surface coal mines are not considered to be major emitting facilities in accordance with the WDEQ Rules and Regulations (chapter 6, section 4). Therefore, the State of Wyoming does not require mines to evaluate their impacts on Class I areas, though the BLM does consider such issues during leasing. The current visibility discussions have been inferred from the currently permitted mining activities related to the existing coal leases at the Caballo Mine. Visibility can be defined as the distance one can see and the ability to perceive color, contrast, and detail. PM_{2.5} is the main cause of visibility impairment. Visibility impairment is expressed in terms of

deciview (dv). The dv index was developed as a linear perceived visual change (Pitchford and Malm 1994) and is the unit of measure used in the EPA’s Regional Haze Rule to achieve the National Visibility Goal. A change in visibility of 1.0 dv represents a “just noticeable change” by an average person under most circumstances. Increasing dv values represent proportionately larger perceived visibility impairment. **Figure 3-1** shows the clearest days, the haziest days, and the natural conditions (i.e., the visibility conditions as they were before human activities) for the Wind Cave monitoring site for 2000-2017 (IMPROVE 2019). The long-term trend in visibility at Wind Cave National Park appears to be relatively stable, if not improving slightly.

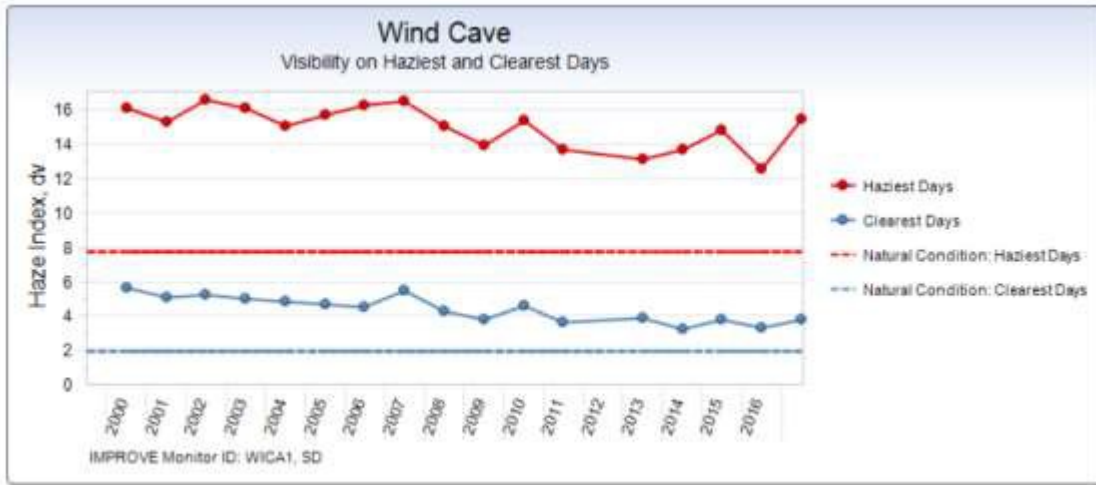


Figure 3-1. Visibility in the Wind Cave National Park

3.4.1.3.2 AQRVs Related to Coal Combustion

Emissions that affect air quality also result from combustion of fossil fuels. **Table 3-9** presents the estimated PM₁₀, PM_{2.5}, SO₂, NO_x, and Hg emissions estimates for coal mined at the Caballo Mine that was utilized for power generation.

Table 3-9. Estimated Annual PM₁₀, PM_{2.5}, SO₂, NO_x, and Hg Contributions (tons) from Caballo Mine Coal Combustion

Source	2013	2014	2015	2016	2017
Mt Coal Recovered	9.0	8.0	11.4	11.2	11.1
PM ₁₀	6,239.0	5,552.4	7,922.6	7,797.1	7,730.7
PM _{2.5}	1,902.9	1,693.5	2,416.4	2,378.1	2,357.9
SO ₂ Emissions	78,567.2	69,921.1	99,768.9	98,188.6	97,352.1
NO _x Emissions	32,324.8	28,767.5	41,047.8	40,397.6	40,053.4
Hg Emissions	0.4	0.3	0.6	0.5	0.5

Source: WWC 2019, calculations are provided in **appendix C**

3.4.1.3.3 Acidification of Lakes/Acid Deposition

Acid deposition causes acidification of lakes and streams, which can have direct impacts on aquatic habitats and contribute to the damage of trees at high elevation and many sensitive forest soils. Acid rain is measured as acidity and alkalinity using a pH which for which 7.0 is neutral. The lower a substances pH, the more acidic it is. Normal rain has a pH of about 5.6 (EPA 2019c). The National Atmospheric Deposition Program (NADP) monitors precipitation chemistry at various sites around the U.S. The nearest site to the Caballo Mine is Site WY99 in Newcastle

(map 3-2), which measures free acidity (H^+ as pH). Table 3-10 provides the measured pH for 2013-2017. The trend in pH at monitoring site WY99 appears to be relatively stable.

Table 3-10. Measured Hydrogen Ion (H^+) Concentrations at Monitoring Site WY99

Parameter	2013	2014	2015	2016	2017
pH	5.9	5.8	5.9	5.9	5.8

Source: NADP 2014-2018

3.4.1.4 Greenhouse Gases (GHGs) and Climate Change

GHGs include CO_2 , methane (CH_4), nitrous oxide (N_2O), and fluorinated gases (hydrofluorocarbons, perfluorocarbons, nitrogen trifluoride, and sulfur hexafluoride) (EPA 2019d). For consistency between projects, OSMRE describes GHG emissions in terms of “ CO_2 -equivalents” (CO_2e). For climate, climate change, and GHG analysis, there is no specific analysis area and project emissions are used as a proxy.

CO_2 is emitted from the combustion of fossil fuels, including coal. CH_4 can be emitted during the production and transport of coal. N_2O is emitted during agricultural and industrial activities, as well as during combustion of fossil fuels and solid waste. Fluorinated gases are synthetic, powerful GHGs that are emitted from a variety of industrial processes. CO_2 and other GHGs are naturally occurring gases in the atmosphere; their status as a pollutant is not related to their toxicity, but instead is due to the added long-term impacts they may have on climate because of their increased incremental levels in the earth’s atmosphere. Because they are non-toxic and non-hazardous at normal ambient concentrations, CO_2 and other naturally occurring GHGs do not have applicable ambient standards or emission limits under the major environmental regulatory programs. 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 CO_2e 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_2 , which is used as a reference gas. The CO_2e for a gas is derived by multiplying the amount of gas emitted by its 100-year GWP conversion factor (CEC 2011).

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, methane released [vented] from exposed coal seams), and coal combustion. Direct CO_2e emissions include emissions directly related to the recovery of coal. Indirect emissions result from the transportation of the coal to and combustion of the coal at power plants. Although the Caballo Mine has not completed CO_2e emissions inventories resulting from current coal recovery, these emissions were estimated by applying CO_2e emission ratios (CO_2e per Mt of coal produced, per Mt cubic yards of overburden moved, and CO_2e per acre of disturbance) from adjacent mines to recent Caballo Mine production (tonnages). This assumes that because mining methods and circumstances are similar, the estimated CO_2e emission ratios for the Caballo Mine would be similar to the calculated ratios at adjacent mines. Annual direct CO_2e emissions estimates for the Caballo Mine from 2013-2017 are shown in table 3-11. The estimated annual amount of direct CO_2e emissions ranged between 56,614 and 80,781 metric tons per year, averaging approximately 71,867 metric tons per year from mining an annual average of 10.1 Mt of coal.

The amount of CO_2e emitted from combustion of the coal was calculated using an emission factor that considered the carbon content and heating value of the fuel used (EPA 2019e). Table 3-11

shows that the estimated annual amount of Caballo Mine indirect CO₂e emissions, including transportation and combustion, ranged between 13,691,252 and 19,500,302 metric tons, averaging 17,393,594 metric tons per year from 2013-2017.

Table 3-11. Estimated Caballo Mine Direct and Indirect CO₂e Emissions at the Caballo Mine from Coal Combustion

	2013	2014	2015	2016	2017	Average
General						
Mt of Coal Recovered	8.98	7.99	11.40	11.22	11.10	10.14
Average Transport Miles (One Way)	1,052	1,098	1,009	1,238	1,260	1,131
Number of Train Trips (One Way)	580	516	737	725	718	655
Direct Emissions Sources¹						
Fuel ¹	29,334	26,106	37,250	36,660	36,347	33,139
Electricity Consumed in Mining Process ¹	23,975	21,337	30,445	29,963	29,707	27,085
Mining Process ¹	10,305	9,171	13,086	12,879	12,769	11,642
Total Direct Emissions¹	63,614	56,614	80,781	79,501	78,824	71,867
Indirect Emissions Sources						
Rail Transport ²	329,811	306,350	401,692	485,053	489,467	402,475
From Coal Combustion ¹	15,040,011	13,384,902	19,098,610	18,796,108	18,635,965	16,991,119
Total Indirect Emissions¹	15,369,822	13,691,252	19,500,302	19,281,161	19,125,431	17,393,594
Total Estimated CO₂e Emissions¹	15,433,436	13,747,866	19,581,083	19,360,663	19,204,255	17,465,460

¹ In metric tons

² Coal haulage emissions based on 130-car trains with four locomotives; 488.2 kg CO₂e per mile per loaded train, 96.1 kg CO₂e 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 2019, calculations are provided in **appendix C**

Total CO₂e emissions from coal mined at the Caballo Mine from 2013-2017 ranged between 13,747,866 and 19,581,083 metric tons, averaging 17,465,460 metric tons per year. Combustion of coal from the Caballo Mine used for electricity generation accounted for approximately 99.6 percent of the total CO₂e emissions from coal mined.

3.5 Water Resources

Sections 3.5.1.1, 3.5.2.1, and 3.5.3.1 and section S3-5 of the Supplementary Information volume of the 2009 SGAC EIS include detailed discussions of water resources related to the leasing and mining of coal within the Caballo West tract. The analyses included herein serve to update discussions with recent groundwater and surface water quality monitoring results and update water rights discussions.

3.5.1 Groundwater

Section 3.5.1.1 and section S3-5.1 of the Supplementary Information volume of the 2009 SGAC EIS provide a detailed discussion of the groundwater resources of the Caballo West tract. The 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 Caballo West 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 coal seam. A chart showing the stratigraphic relationships of the surface and subsurface geologic units in the analysis area is provided as figure 3-2 in the 2009 SGAC EIS.

As indicated in the 2009 SGAC EIS, the underlying, sub-coal Fort Union Formation and the Fox Hills Sandstone are used for water supply at local coal mines within the general Caballo West tract analysis area, at depth between 850 and 4,000 feet. At these depths, the sources of these supply wells would not be physically disturbed by mining activities. Figure 2 in the 2015 Cumulative Hydrologic Impact Assessment (2015 CHIA; WDEQ-LQD 2015b) shows that clinker is present within the Caballo Mine permit area; however, the Caballo West tract contains no appreciable clinker deposits and therefore is not addressed in this EA. Active groundwater monitoring well locations are depicted on **map 3-3**.

The 35-year Gillette Area Groundwater Monitoring Organization (GAGMO) report indicates that 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 2016). The finding was based on groundwater data collected through 2015 by the coal companies.

Since the publication of the 2009 SGAC EIS, seven new monitoring wells (two alluvial, two overburden, two backfill, and one coal) have been completed within the Caballo Mine permit boundary and added to the WDEQ-WQD approved groundwater monitoring network. Twelve monitoring wells (four overburden, one coal, one backfill, and six alluvial) have been removed from the WDEQ-WQD monitoring network since the publication of the 2009 SGAC EIS. The removal of these wells resulted from pit advancement and was approved by WDEQ-WQD.

The following discussions on groundwater monitoring was taken from the 2018 Caballo Mine Annual Report (PCM 2018b). **Table 3-12** provides the most recent and historic total dissolved solids (TDS) concentrations from the groundwater monitoring network.

Alluvial Wells – Groundwater in the alluvium exhibited generally declining water levels due to a relatively dry spring.

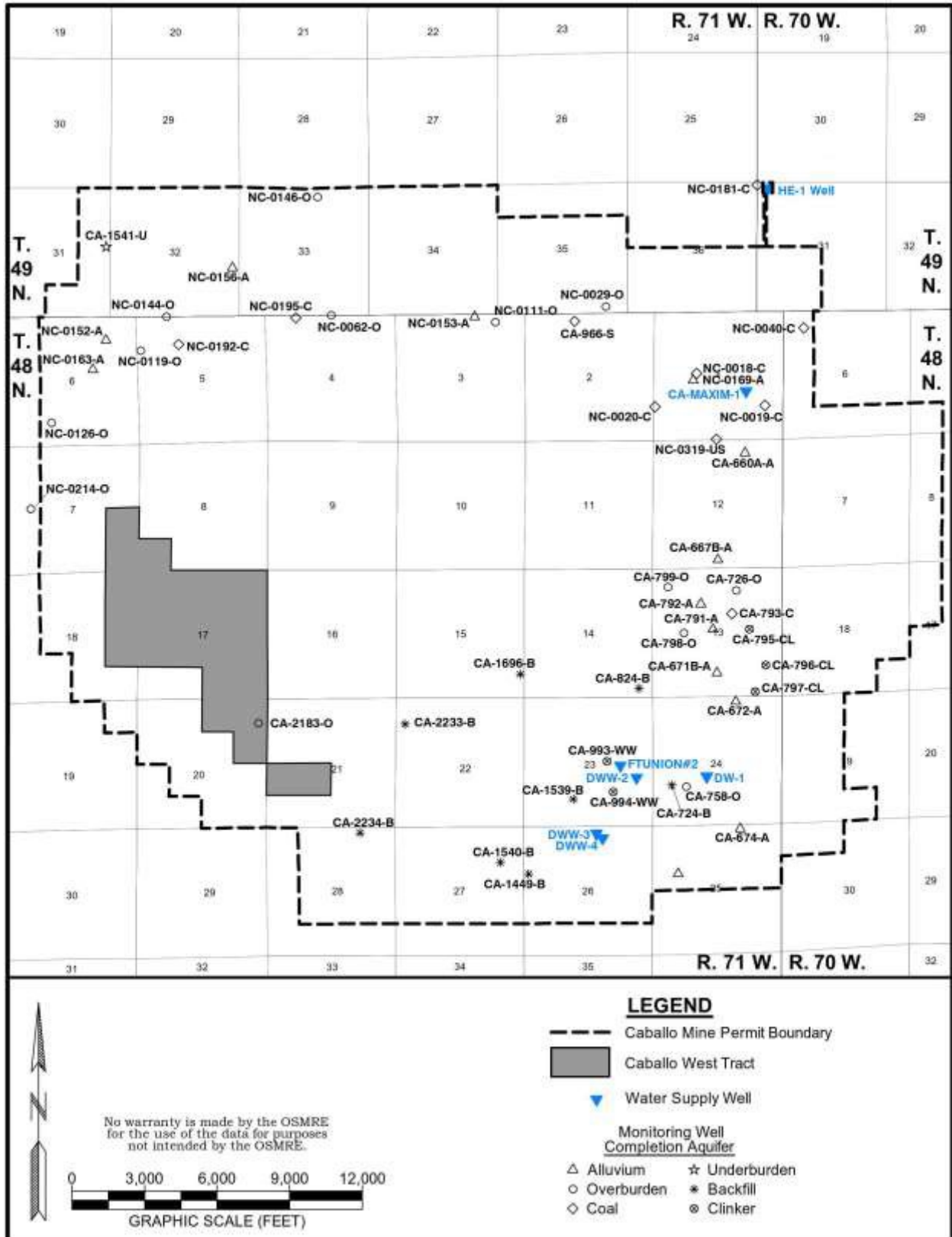
Seven alluvial wells are included in the water quality portion of the Caballo Mine groundwater monitoring program. The TDS concentrations from the samples collected in 2017-2018 were consistent with historic TDS concentrations. Well NC-0152-A historically has had high TDS concentrations. With the exception well NC-0152-A, the water quality in the alluvial wells meets WDEQ-WQD Class III livestock standards.

Overburden Wells – Groundwater levels in the overburden wells were generally steady or declining. The water level in one well (NC-0062-O) dropped by approximately 30 feet during the reporting period for an unknown reason. Two wells (NC-0111-O and NC-0019-O) had increasing water levels due to recharge.

Five overburden wells were sampled for water quality during 2017-2018. TDS concentrations were consistent with historic concentrations. The water quality in the overburden wells meets Class III livestock standards.

Coal Wells – Groundwater levels in the coal were generally stable. One well (NC-0040-C) demonstrated declining water levels, although water levels in the well have fluctuated since 1981.

Two coal wells were sampled for water quality during 2017-2018. TDS concentrations were consistent with historic concentrations. The water quality in the coal wells meets Class III livestock standards.



Map 3-3. Active Groundwater Monitoring Locations and Water Supply Wells at the Caballo Mine

Table 3-12. Recent and Historical TDS Concentrations from the Caballo Mine Groundwater Monitoring Network

Well	2017-2018 TDS (mg/L)	No. Samples Collected to Date	Minimum TDS (mg/L)	Maximum TDS (mg/L)	Mean TDS (mg/L)
<i>Alluvial</i>					
CA-657-A	3,180	33	2,460	4,092	3,267
CA-660A-A	470	41	168	11,000	3,113
CA-667B-B	3,160	32	1,011	4,190	2,617
CA-791-A	850	42	311	2,960	1,207
NC-0152-A	20,400	37	566	101,900	27,895
NC-0153-A	950	14	3,940	8,552	5,834
NC-0169-A	2,330	29	392	4,035	1,393
<i>Overburden</i>					
CA-726-O	2,640	54	2,640	3,800	3,390
CA-758-O	1,220	59	1,140	1,450	1,251
CA-799-O	1,670	27	1,450	1,920	1,683
CA-0111-O	3,590	24	3,582	5,050	4,404
NC-0119-O	940	32	846	1,090	940
<i>Coal</i>					
CA-793-C	810	41	570	1,164	777
NC-0018-C	840	34	840	1,090	930
<i>Backfill</i>					
CA-1449-B	650	57	590	1,260	713
CA-1539-B	1,300	54	1,035	1,610	1,243
CA-1540-B	1,1130	37	337	2,640	1,604
CA-2233-B	520	27	520	3,670	2,637
CA-2234-B	3,440	38	500	3,770	1,126
CA-724-B	5,080	69	2,690	7,000	5,925
CA-824-B	1,200	75	70	2,440	1,303

Source: PCM 2018b

Backfill Wells – Most of the groundwater levels in the backfill wells have exhibited significant resaturation. One well (CA-724-B) has exhibited a slight decline since 2014. Two backfill wells (CA-1538-B and CA-1696-B) were dry.

Seven backfill wells were sampled for water quality during 2017-2018. The water quality meets Class III livestock standards, with the exception of well CA-724-B, which is located in the backfill of the very saline reclaimed North Tisdale Creek alluvium. TDS in all backfills was consistent with historic concentrations.

3.5.2 Surface Water

A description of surface water related to the Caballo West tract is provided in section 3.5.2.1 and section S3-5.2 of the Supplementary Information volume of the 2009 SGAC EIS. The tract is located within the Tisdale Creek drainage, a tributary of Caballo Creek. Tisdale Creek drains the northern and eastern portions of the tract, and a large playa drains the southern and western portions of the tract. Tisdale Creek is currently interrupted to the north of the tract by Caballo Mine’s Big Hole Reservoir (a total containment reservoir; State Engineers Office (SEO) Permit No. P13451R). Water from Tisdale Creek upstream of the tract is diverted to the reservoir, where it is pumped around the mine operations to Gold Mine Draw, another tributary to Caballo Creek.

Tisdale Creek and Gold Mine Draw are ephemeral stream channels that are listed in the WDEQ-WQD Surface Water Classification List as Class 3B streams. Streamflow and surface water quality associated with the Caballo Mine are currently monitored at two sites on Gold Mine Draw (**map 3-4**). PCM previously operated three surface water monitoring stations on Tisdale Creek. The Lower Tisdale Creek station was active from 1978 to 1989, the Upper Tisdale Creek station was operational from 1979 to 1995, and the Tisdale West station was active from 1991 to 2009. The Lower and Upper Tisdale Creek stations were discontinued due to pit advancement and the Tisdale West station was discontinued due to lack of flow.

Baseline water quality data for Tisdale Creek is provided in the CHIA. The flow data recorded at both sites confirmed the ephemeral regime of Tisdale Creek. Flow occurred during only about 4 percent of the baseline period (1978-1983) at Upper Tisdale and 11 percent of the baseline period (1977-1983) at Lower Tisdale. The maximum flows recorded at the Upper Tisdale and Lower Tisdale stations were 20.5 cubic feet per second (cfs) and 225 cfs, respectively. A total of 12 samples were collected at Upper Tisdale Creek and 17 samples at the Lower Tisdale Creek. The water type at Upper Tisdale Creek was magnesium sulfate, while the water type at Lower Tisdale Creek varied. Few dissolved metals exceeded the WDEQ-WQD Class 3B water quality standard. The 2015 CHIA also provided data collected on Tisdale Creek from 1984 to when the stations were discontinued to characterize during-mining hydrologic conditions. The occasional exceedances of Class 3B standards at the lower station appear related to natural factors and are not attributable to mining, since the same constituents showed exceedances at the upstream station. The 2015 CHIA concluded that there have been no obvious changes in water quality conditions over the short period of record on Tisdale Creek.

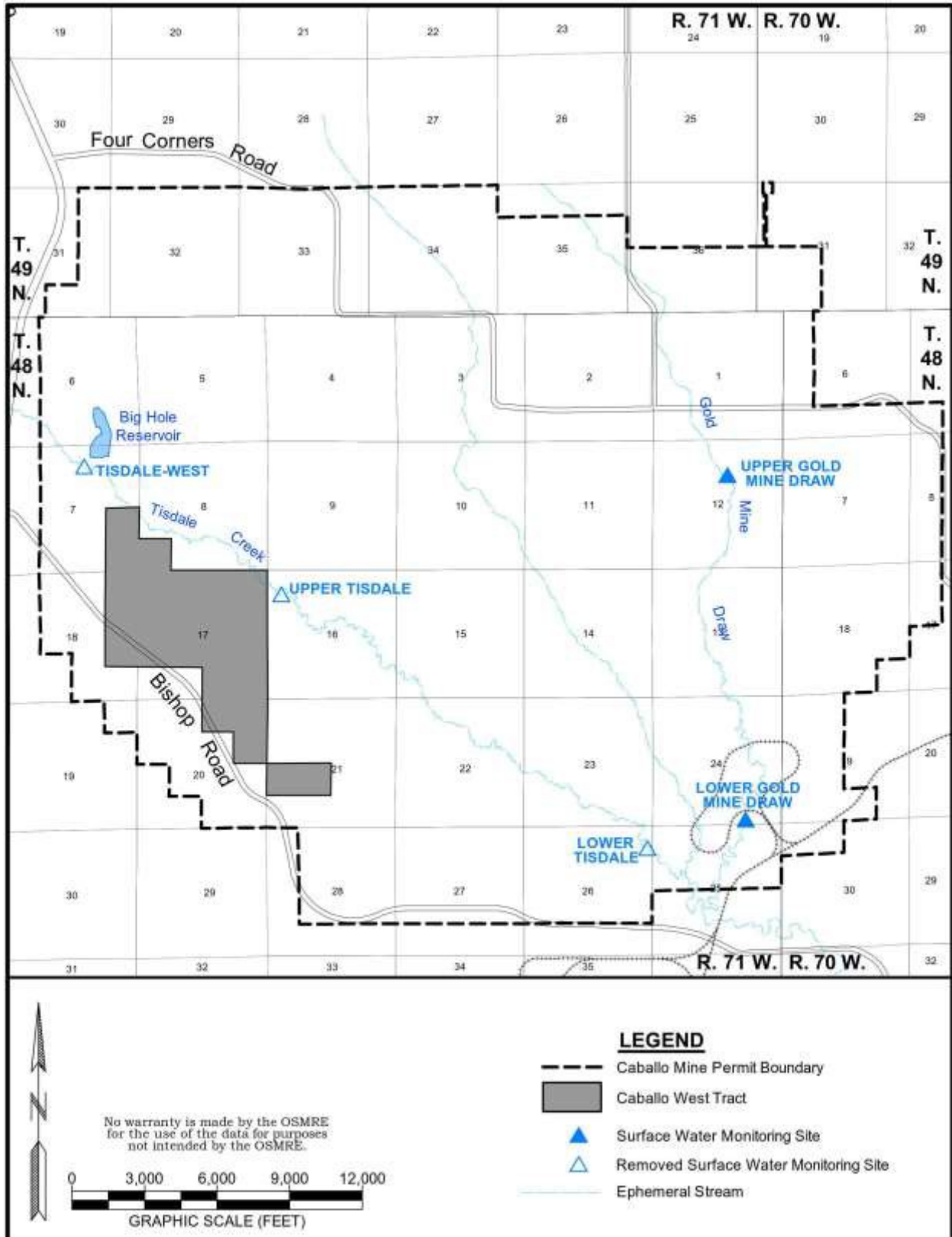
3.5.3 Water Rights

Section 3.5.3.1 and section S3-5.3 of the Supplementary Information volume of the 2009 SGAC EIS provide a detailed discussion of the water rights within and surrounding the Caballo West tract.

SEO records indicate that as of February 2019, there were 49 surface-water rights within the 2-mile search area, of which 42 were owned by coal mining companies and were related to industrial, livestock, wetlands, or flood control uses (SEO 2019). Of the other permitted surface water rights, four were permitted for livestock, two were permitted for irrigation, and one was permitted for livestock and domestic use.

SEO records indicate that, as of February 2019, there were 469 permitted groundwater wells within the 2-mile search area, of which 390 are owned by coal mining companies (SEO 2019). The other 179 are permitted for the following uses:

- 61 CBNG
- 61 CBNG, Stock
- 2 CBNG, Miscellaneous, Stock
- 16 Domestic
- 8 Domestic, Stock
- 4 Industrial
- 5 Industrial, Miscellaneous
- 4 Miscellaneous
- 1 Miscellaneous, Stock
- 17 Stock



Map 3-4. Surface Water Monitoring Sites at the Caballo Mine

Subcoal aquifers continue to be utilized regionally for municipal, industrial, and domestic water supply by the City of Gillette, residential subdivisions, and coal mines.

3.6 Alluvial Valley Floors

Alluvial valley floors (AVFs) within the Caballo West tract are described in section 3.6.1.3 and section S3-6 the Supplementary Information volume of the 2009 SGAC EIS. On April 25, 2008, the WDEQ-LQD declared that there are no AVF units within the Caballo West tract (PCM 2014). The only portion of Tisdale Creek determined to be an AVF is at the confluence with Gold Mine Draw, approximately 4 miles downstream of the tract.

3.7 Wetlands

As described in section 3.7.1.3 of the 2009 SGAC EIS, a portion of the Caballo West tract within the Caballo Mine permit area was previously delineated for wetlands. The information provided in the 2009 SGAC EIS on wetlands was based on preliminary wetlands mapping conducted in 2007 and on a partial wetland delineation. The remaining portion of the tract and an area adjacent to the tract have subsequently been surveyed for wetlands (PCM 2014). A formal wetland determination was issued by the U.S. Army Corps of Engineers (USACE) in 2010 and reissued by the USACE in 2017 (USACE 2010 and USACE 2017). As determined by the USACE, the only waters of the U.S. within the approved Caballo Mine permit boundary, which includes the Caballo West tract, are associated with Gold Mine Draw. This amount differs from 2009 SGAC EIS, which indicated approximately 15.0 acres of water of the U.S., including a total of 8.63 acres of jurisdictional waters of the U.S. within and adjacent to the Caballo West tract. As a result of the 2017 reanalysis of potential impacts to jurisdictional wetlands within the permit boundary, the USACE determined that agency authorization is not required for coal mining activities at the Caballo Mine (USACE 2017).

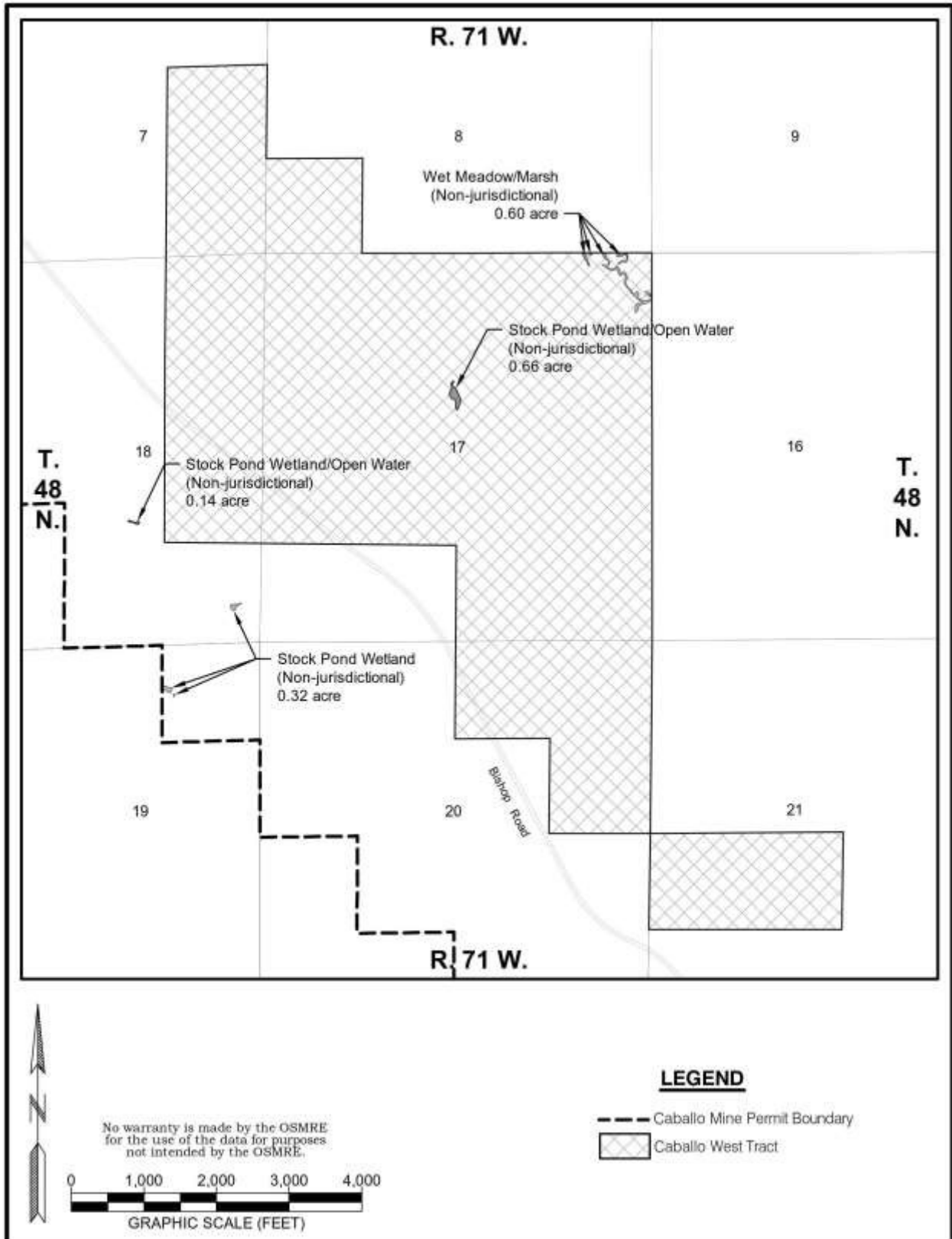
As shown on **map 3-5**, there are approximately 1.79 acres of non-jurisdictional aquatic features within and adjacent to the tract (PCM 2014). As of March 2018, approximately 0.60 acre of these non-jurisdictional aquatic features (open water marsh, wet meadow, and stock pond) have been disturbed from mining at the Caballo Mine unrelated to coal recovery within the tract (PCM 2018b).

3.8 Soils

Soils within the Caballo West tract are described in section 3.8.1 and section S3-8 of the Supplementary Information volume of the 2009 SGAC EIS. The soil depths and types on the tract are similar to soils currently being salvaged and utilized for reclamation at the Caballo Mine. The amount of suitable topsoil that would be available for redistribution on all disturbed acres within the tract has an average depth of 3.6 feet. No prime farmland was indicated within the tract based on a reconnaissance survey by the NRCS (NRCS 2008). As of March 2018, 174.2 acres within the tract have been disturbed from mining at the Caballo Mine unrelated to coal recovery within the tract (PCM 2018b).

3.9 Vegetation

Vegetation within the Caballo West tract is described in section 3.9.1 and section S3-9 of the Supplementary Information volume of the 2009 SGAC EIS. The predominant vegetation types within the tract are big sagebrush and cropland. As described above, 174.2 acres within the tract have been disturbed from mining at the Caballo Mine unrelated to coal recovery within the tract.



Map 3-5. Wetlands within and Surrounding the Caballo West Tract

3.9.1 Threatened, Endangered, Proposed, and Candidate Plant Species

Plant T&E species were discussed in section 3.9.1 of the 2009 SGAC EIS. The current USFWS list of plant T&E species that may occur in Campbell County includes the Ute ladies'-tresses (*Spiranthes diluvialis*) (USFWS 2018a). In 2009 and 2010, surveys for Ute ladies'-tresses were conducted on the Caballo Mine permit area and the tract. No Ute ladies'-tresses were identified (PCM 2014). In addition, the USFWS has not designated any "critical" habitat for this species in the vicinity of the Caballo Mine at this time (USFWS 2018b).

3.10 Wildlife

The occurrence of wildlife related to the mining of the federal coal within the Caballo West tract was thoroughly discussed in section 3.10.1 and section S3.10 of the Supplementary Information volume of the 2009 SGAC EIS. The information included in the 2009 SGAC EIS was derived from the baseline data and the subsequent studies and WDEQ-LQD annual reports. No significant changes to wildlife use areas for big game, other mammals, upland game birds (excluding the Greater sage-grouse [GRSG] [*Centrocercus urophasianus*]), other birds, reptiles and amphibians, or aquatic species populations have been noted from the previous discussion presented. There have been changes in discussions related to raptors; threatened, endangered, and candidate (T&E) species; and species of special interest (SOSI). The status of GRSG has also changed since publication of the 2009 SGAC EIS. Therefore, these species discussions have been updated in this EA.

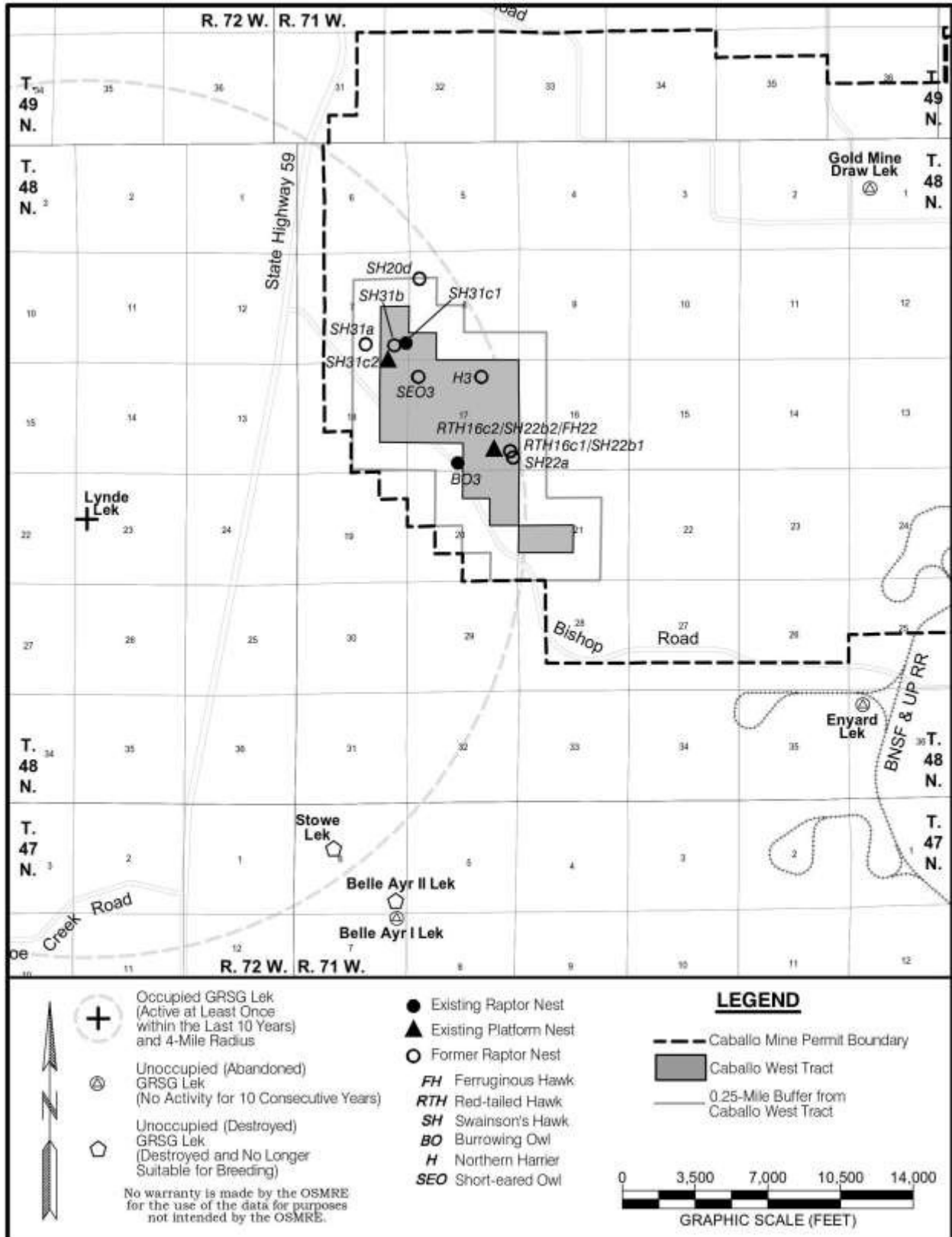
3.10.1 Raptors

Raptors that could potentially occur in the area include the burrowing owl (*Athene cunicularia*), great horned owl (*Bubo virginianus*), northern harrier (*Circus cyaneus*), red-tailed hawk (*Buteo jamaicensis*), Swainson's hawk (*Buteo swainsoni*), ferruginous hawk (*Buteo regalis*), golden eagle (*Aquila chrysaetos*), prairie falcon (*Falco mexicanus*), short-eared owl (*Asio flammeus*), bald eagle (*Haliaeetus leucocephalus*), and American kestrel (*Falco sparverius*) (**appendix E**).

The 2018 Caballo Mine Annual Report identified the location and annual status of raptor nests (PCM 2018b). The location and status of raptor nests monitored at the mine are included on **map 3-6**. Three intact raptor nests (SH31c1, SH31c2, and RTH16c/SH22b2/FH22) are located within the Caballo West tract. One other intact nest (BO3) is within 0.25 mile of the tract. SH31c1 and RTH16c/SH22b2/FH22 were active in 2018, producing three Swainson's hawks and four ferruginous hawks, respectively. SH31c2 and RTH16c/SH22b2/FH22 are platform nests erected by the PCM for mitigation purposes.

3.10.2 Greater Sage-grouse (GRSG)

EO 2015-4 established GRSG core area protection on state trust lands (Office of the Governor 2015). The GRSG core area protection concept came about because of work by the Sage-Grouse Implementation Team. The implementation team developed a core population strategy for the state "to maintain habitats and viable populations of sage-grouse in areas where they are most abundant." As part of that effort, the team delineated approximately 40 areas of state trust lands around Wyoming with a goal of maintenance and enhancement of GRSG habitats and populations within the core areas. Using mapping included in the EO, it has been determined that the closest core area is the Thunder Basin core area, approximately 8.8 miles east of the tract.



Map 3-6. Raptor Nest Sites and Greater Sage-grouse Lek within and Adjacent to the Caballo West Tract

According to the BLM Buffalo Field Office (BFO) Resource Management Plan (RMP), the Caballo West tract is within a general habitat management area (GHMA) for GRSG (BLM 2015). 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 tract (**map 3-6**).

Long-term results from annual lek monitoring suggest that the Caballo Mine area only supports larger groups of GRSG when regional populations are especially high (PCM 2018b). As indicated on **map 3-6**, six historical GRSG leks have been documented 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. The Lynde Lek is the only lek within the 4-mile radius that has an occupied WGFD management status (active during at least one strutting season within the prior 10 years). It was last confirmed active in 2009 (WGFD 2018). The remaining five GRSG leks were classified with an unoccupied/undetermined WGFD management status. All five leks have been inactive since at least 2005.

3.10.3 Vertebrate Threatened, Endangered, and Candidate Species and Species of Special Interest

The information presented in this section was obtained from the USFWS's Information for Planning and Conservation (IPaC) system and Natural Resource and Energy Explorer (NREX), which is a web GIS-based software tool that supports pre-planning development considerations that facilitates the assessment of energy, environmental, cultural, socioeconomic and infrastructural assets in Wyoming (NREX 2018).

3.10.3.1 Vertebrate Threatened, Endangered, and Candidate Species

Vertebrate T&E species were discussed in section 3.10.8 of the 2009 SGAC EIS. The current USFWS list of vertebrate T&E species that may occur in Campbell County includes the northern long-eared bat (*Myotis septentrionalis*) (USFWS 2018a). The northern long-eared bat has not been observed within the Caballo Mine permit area (PCM 2018b). In addition, the USFWS has not designated any "critical" habitat for this species in the vicinity of the Caballo Mine at this time (USFWS 2018b). The NREX list, which is specific to the Caballo West tract, does not include the northern long-eared bat.

Although USFWS information indicates that the northern long-eared bat could occur in the area, habitat (caves and mine shafts as winter habitat and caves, mine shafts, and trees for summer habitat; USFWS 2016) is not present in the tract to support the threatened bat. No northern long-eared bat populations have been documented within Campbell County but a small portion of the tract (20.1 acres) is the area of influence (AOI) for the northern long-eared bat (USFWS 2018a). In addition, the USFWS identified the counties within 150 miles of the boundaries of the U.S. counties or Canadian districts where white noise syndrome (WNS) or its causative fungus *Pseudogymnoascus destructans* have been detected (USFWS 2019a). Campbell County lies within the WNS zone.

3.10.3.2 Species of Special Interest

NREX information was utilized for the determination of SOSI species that could occur in the area. For the purposes of this discussion, SOSI include BLM sensitive species, Wyoming Natural Diversity Database (WYNDD) species of concern (SOC), species protected under the MBTA, and WGFD species of greatest conservation need (SGCN). USFWS T&E species are not included

in this category. There is a considerable amount of crossover between the species occurrence on the various lists included in SOSI (**appendix E**). BLM sensitive species include those species listed or proposed for listing under the ESA together with species designated internally as BLM sensitive in accordance with BLM Manual 6840 (BLM 2008). WYNDD has developed a list of SOC in Wyoming that are rare, endemic, disjunct, threatened, or otherwise biologically sensitive, and supporting documentation. The MBTA makes it illegal to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or the parts, nests, or eggs of such a bird except under the terms of a valid federal permit. WGFD SGCN include wildlife species with low and declining populations that are indicative of the diversity and health of Wyoming's wildlife (WGFD 2019). The WGFD's SGCN designation process is based upon its Native Species Status (NSS) classification system. The WGFD places each SGCN into one of three tiers of management based on its total score: Tier I (highest priority), Tier II (moderate priority), or Tier III (lowest priority).

As determined from the NREX list, 50 terrestrial-vertebrate SOSI have the potential of occurring within the Caballo West tract. As shown in **appendix E**, 46 WGFD SGCN, 33 species protected under the MBTA, 17 WYNDD SOC, 14 BLM sensitive species, and 2 WGFD-designated Tier I terrestrial-vertebrate species have the potential of occurring within the Caballo West tract. According to wildlife monitoring results, 27 of these SOSI have been confirmed as occurring within or adjacent to the tract during baseline or annual monitoring. Twelve of the BLM sensitive species and 13 of the WYNDD birds of concern have been observed during wildlife surveys within the tract. Both of the WGFD designated Tier I species (burrowing owl and mountain plover [*Charadrius montanus*]) have been observed within the tract.

3.11 Land Use and Recreation

Land use and recreation on the Caballo West tract is described in section 3.11.1 and section S3-11 of the Supplementary Information volume of the 2009 SGAC EIS. All of the surface estate on the tract is privately owned by PCM. Livestock grazing, oil and gas production, wildlife habitat, and recreation are the primary land uses.

3.12 Cultural Resources

Information regarding background cultural resources was included in section 3.12.1.3 and section S3-12 of the Supplementary Information volume of the 2009 SGAC EIS. A portion of the Caballo West tract and surrounding area had been surveyed for cultural resources at a Class III level. According to information provided in the 2009 SGAC EIS, seven cultural sites (five prehistoric, one historic, and one multi-component) were located within the Caballo West tract survey area. Four of the cultural sites (48CA5232, 48CA5324, 48CA503, and 48CA2706) were located within the Caballo West tract. All four sites were considered not eligible for listing on the National Register of Historic Places (NRHP; Wyoming State Historic Preservation Office 2012, OSMRE 2003, WDEQ-LQD 2013). A Class III cultural resource survey that included the remaining portion of the Caballo West tract and an area southwest of the tract was conducted in 2010 (PCM 2014). The Class III inventory identified one historic homesteading location, three prehistoric isolated finds, and two previously recorded cultural properties. A prehistoric isolated find is defined by the Wyoming State Historic Preservation Office (2019) as 14 or fewer spatially associated artifacts where no buried cultural materials or features are thought to exist. No mitigation measures are necessary for isolated finds. The historic homesteading location was considered not eligible for listing on the NHRP (OSMRE 2012).

3.13 Visual Resources

Visual resources on the Caballo West tract are described in section 3.13.1 of the 2009 SGAC EIS. According to the most recent BLM BFO RMP, the Caballo West tract is within visual resource management Class IV (BLM 2015). The objective of Class IV is to provide for management activities that require major modification of the existing character of the landscape. Currently, mine facilities and mining activities at the Caballo Mine are visible from State Highway 59 and Bishop Road.

3.14 Noise

Noise on the Caballo West tract is described in section 3.14.1 of the 2009 SGAC EIS. Existing noise sources in the tract vicinity include 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. The 2009 SGAC EIS describes a noise study conducted at Cordero-Rojo Mine in 2004 that found that all blasting events were in compliance with OSMRE safe blasting levels. The nearest occupied residence to the Caballo West tract is approximately 3,200 feet to the west (map I-2).

3.15 Transportation

Transportation in the vicinity of the Caballo West tract is described in section 3.15.1 of the 2009 SGAC EIS. Major roads and railroads in the general area of the tract include State Highway 59 and Bishop Road. Existing transportation facilities include roads, railroads, coal conveyors, and overhead electrical transmission lines associated with the Caballo Mine. All coal mined at the Caballo Mine is transported by rail (BNSF trackage).

3.16 Hazardous and Solid Waste

Hazardous and solid waste on the Caballo West tract is described in section 3.16.1 of the 2009 SGAC EIS. Potential sources of hazardous or solid waste on the tract include spilled, leaked, or dumped hazardous substances, petroleum products, and/or solid waste associated with coal and oil and gas exploration, oil and gas development, utility line installation and maintenance, or agricultural activities.

3.17 Socioeconomics

This section describes existing socioeconomic conditions in Wyoming and Campbell County specific to the state and local economy, population, and employment. The discussions included in section 3.17 of the 2009 SGAC described socioeconomic conditions associated with the Caballo Mine in 2009. Discussions related to housing, local government services, and environmental justice have not changed enough to require reevaluation in this EA. The following includes updated discussions on the local economy, population, and employment.

3.17.1 State and Local Economy

Wyoming's coal mines (surface and underground) produced an estimated 316.6 Mt of coal in 2017, a decrease of about 149.7 Mt (32 percent) from the record 466.3 Mt produced in 2008 but more than the 297.5 Mt produced in 2016 (WDWS 2008, 2016, 2017). 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 percent of total statewide coal production in 2017

(WDWS 2017). According to coal production numbers from the U.S. Energy Information Administration (EIA), the coal from Campbell County accounted for approximately 44 percent of the coal produced in the U.S. in 2017 (EIA 2017).

The estimated total fiscal impact from coal production in Campbell County to the State of Wyoming in 2018 was calculated based on coal produced from the county in 2017. The sale of coal from Campbell County in 2017 resulted in an estimated \$457,591,386 of federal revenues and \$649,266,546 in state revenues, for a total of \$1,106.9 million, or \$3.50 per ton (see **appendix D** for calculations).

3.17.2 Population

In 2017, Campbell County had a population of 46,242, which ranked it as the third most populous of Wyoming’s 23 counties (U.S. Census Bureau [USCB] 2018). The majority of the Campbell County mine employees and support services reside in Gillette. It is estimated that the total population in the Gillette city limits increased from 29,947 in 2010 to 30,560 in July 2017, an increase of 2.0 percent over the period (USCB 2018). **Table 3-13** presents the population changes for Campbell County and Gillette. As of July 2017, Gillette accounted for roughly 66.1 percent of the county’s residents. Gillette was the fourth largest city in the state, following Cheyenne, Casper, and Laramie (USCB 2018).

Table 3-13. Campbell County and City of Gillette Population Change, 2010-2017

	2010	2011	2012	2013	2014	2015	2016	2017	2010-2017 Increase	2010-2017 Percent Change
Campbell County	46,233	46,600	47,881	48,121	48,243	49,220	48,800	46,242	9	0.02
City of Gillette	29,947	30,432	31,423	31,732	31,920	32,649	32,290	30,560	613	2.05

Source: USCB 2018

Table 3-14 presents the employment changes for Wyoming and Campbell County for 2011-2017. The statewide total employment increased by 3,284 jobs (1.1 percent), while the Campbell County employment increased by only 5 jobs (0.02 percent) during the same time period. The average unemployment rate in Campbell County decreased from 4.9 percent in 2011 to 4.1 percent in 2017 (U.S. Bureau of Labor Statistics 2018).

Table 3-14. Wyoming and Campbell County Employment Rate Change, 2011-2017

	2011	2012	2013	2014	2015	Dec 2016	Dec 2017
Wyoming (Number Employed)	289,019	291,076	292,157	294,207	293,262	300,872	292,303
Wyoming (Number Unemployed)	17,796	16,349	14,414	12,726	12,750	14,539	12,345
Wyoming Unemployment Rate	5.8	5.3	4.7	4.1	4.2	4.8	4.2
Campbell County (Number Employed)	24,605	24,919	24,609	25,423	24,943	23,921	24,610
Campbell County (Number Unemployed)	1,267	1,213	1,087	882	987	1,446	936
Campbell County Unemployment Rate	4.9	4.6	4.2	3.4	3.8	6.2	4.1

Source: U.S. Bureau of Labor Statistics 2018

Employment in mining bottomed out in the third quarter of 2016, with slightly fewer than 18,000 jobs, the lowest level in more than 10 years. Since then, however, mining has seen over-the-month increases in each of the 6 months prior to the base period (2017Q2). Wyoming’s employment is expected to grow by 7,333 jobs (2.7 percent) from the second quarter of 2017 to second quarter of 2019, with job growth forecast for all sectors. The largest job growth is expected in mining, including oil and gas, at 2,410 jobs (12.5 percent), due to favorable oil prices (WDWS 2018).

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 resource areas in the same order as they are described in **chapter 3**.

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., major, 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.

- **Major:** Impacts that potentially could cause significant depletion, change, or stress to resources or stress within the social, cultural, and economic realm.
- **Moderate:** Impacts that potentially could cause some change or stress to an environmental resource but the impact levels are not considered significant.
- **Minor:** Impacts that potentially could be detectable but slight.
- **Negligible:** Impacts in the lower limit of detection that potentially could cause an insignificant change or stress to an environmental resource or use.
- **No Effect/Impact:** No discernible or measurable impacts.

Impacts can also be defined as direct, indirect, or cumulative. Terminology presented in this analysis includes the following:

- **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, present, 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 when the impacts of past, present, and reasonably foreseeable future actions overlap with the time period when project impacts would occur (including the coal recovery and reclamation phases).

The duration of impacts is also presented throughout this chapter, as follows:

- **Short-term** impacts generally occur over a short period and revert to pre-disturbance conditions within a few years after mining occurs.
- **Long-term** impacts are defined as those that would remain beyond mining-related activities (including reclamation), generally, lasting the life the alternative being evaluated (e.g., 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 updated descriptions of the affected environment presented in **chapter 3** that have taken place since the 2009 SGAC EIS.

The environmental and cumulative effects discussions below assume that under the Proposed Action, the federal mining plan modification to mine coal in the Caballo West tract would be approved. Coal recovery is projected to continue within the Caballo Mine permit area at an estimated annual rate of 13.5 Mt, which is consistent with the 2015-2017 average annual recovery rate. The recovery of the remaining federal coal would continue for approximately 8.9 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 to allow mining of the federal coal within the Caballo West tract would not be approved. Currently approved mining operations associated with federal coal would continue for approximately 24 years within existing federal leases, at a rate of approximately 13.5 Mtpy. The disturbance would be similar to those under the Proposed Action although the impacts to approximately 866.7 acres to recover federal coal within the tract would not occur.

Cumulative effects discussed in this chapter consider the other activities and processes in the area. The mines included in the cumulative effects analysis include the Caballo, Belle Ayr, Cordero Rojo, and Coal Creek mines, herein referred to as the central group of mines. These mines are depicted on **map I-1**.

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 section 3.2.2.1 of the 2009 SGAC EIS. The Proposed Action would impact the topography and physiography of the Caballo West tract, but these impacts would be similar to those currently occurring at the Caballo Mine. After mined-out areas are reclaimed, the land surfaces would be gentler, with more uniform slopes and restored basic drainage networks. The direct effects on topography and physiography resulting from the Proposed Action would be moderate and permanent. There would be no indirect effects under the Proposed Action.

4.2.1.2 No Action Alternative

The impacts to topography under the No Action Alternative would be similar to those under the Proposed Action although the impacts to approximately 866.7 acres to recover federal coal within the Caballo West 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 section 4.2.1 of the 2009 SGAC EIS. The cumulative effects would primarily be related to the central 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 are expected to be moderate and permanent.

4.2.3 Mitigation Measures

No mitigation measures would be necessary for topography and physiography.

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 would not be different than those described in section 3.3.1.2.1 of the 2009 SGAC EIS. Under the Proposed Action, 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. As a result, the physical characteristics of the backfill would be different from the physical characteristics of the existing layered overburden stratigraphy. The Proposed Action would result in the recovery of approximately 119.8 Mt of federal coal within the Wyodak coal seam. The direct and indirect effects on geology are expected to be moderate and permanent on the Caballo West tract.

The direct and indirect effects to other mineral resources would not be different than those described in section 3.3.2.2.1 of the 2009 SGAC EIS. CBNG wells located on the tract would be abandoned and mined through as mining progresses. The direct effects on CBNG resources resulting from the Proposed Action would be moderate and permanent on the tract due to the loss of any remaining CBNG within the Wyodak coal seam. 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.

The direct and indirect effects to paleontology would not be different than those described in section 3.3.3.2.1 of the 2009 SGAC EIS. Fossils with scientific significance could be present on the tract but not exposed at the surface. Should previously unknown, potentially significant paleontological sites be discovered, BLM imposed lease and permit conditions that require work in that area stop and measures be taken to assess and protect the site. The effects on paleontological resources resulting from the Proposed Action would be moderate and permanent.

4.3.1.2 No Action Alternative

Impacts to the geological resources have resulted from current mining activity on adjacent lands and therefore under this alternative, impacts to geological resources in the area would be similar to those under the Proposed Action. Impacts to the geological and paleontological resources, excluding CBNG, would be approximately 866.7 acres less than the Proposed Action. Impacts to CBNG resources would be moderate and permanent as a result of mining activities on adjacent lands.

4.3.2 Cumulative Effects

The cumulative impacts to geology, mineral resources, and paleontology would not be different than those described in section 4.2.2 of the 2009 SGAC EIS. Within the central group of mines, overburden and coal would be removed and replaced with backfill, resulting in a permanent change in the geology of the area and a permanent reduction of coal resources.

According to information from the WOGCC (2019), 20,897 CBNG wells have been drilled in Campbell County. The WOGCC records indicate that a majority of the wells are privately held or state minerals, with approximately 37.1 percent of the wells (7,758) being federal minerals. Status of these wells includes plugged and abandoned, dormant, completed, monitoring and notice of intent to abandon. In 2018, only 3,845 CBNG wells in Campbell County were producing.

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 of paleontological resources would continue to result from the destruction, disturbance, or removal of fossil materials from surface-disturbing activities, as well as unauthorized collection and vandalism. A beneficial impact of surface mining would 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 the geology, mineral resources, and paleontology 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

The direct and indirect effects to air quality from particulate matter would not be different than those described in section 3.4.2.2.1.3 of the 2009 SGAC EIS. Direct emissions from particulate matter from the Proposed Action would include fugitive emissions generated from coal excavation and reclamation activities and tailpipe emissions from equipment. Fugitive particulate emissions would also result from dust being generated during dragline operation, coal haulage, bulldozers, scrapers, loaders, baghouse, and other equipment operating at Caballo Mine. The Caballo Mine triennial emission inventory for 2017 was used to estimate direct particulate matter emissions for the Proposed Action. Particulate matter emissions for the Proposed Action and the State of Wyoming are tabulated in **table 4-1**.

Table 4-1. Comparison of Direct to Wyoming Particulate Matter Emissions

	Proposed Action (tons)	2017 Wyoming State Tier I (tons)	Anticipated % change to State Emissions from Proposed Action
PM _{2.5}	90	38,115	0.2
PM ₁₀	585	195,180	0.3

Source: PCM 2017, EPA 2019g

The most recent air quality modeling for the Caballo mine was completed in 2006 and described in the 2009 SGAC EIS. While not current, the modeling conducted in 2006 provides sufficient information for the assessment of impacts because mining methods have not changed and the projected annual production is less than the annual production used in the 2006 modeling. PCM is currently working on an air quality model, which is expected to be completed late-2019.

The 2006 PM₁₀ inventory for the mining activities at Caballo Mine was prepared for years 2006 through 2023. Two years were then selected for worst-case dispersion modeling of PM₁₀ based on mine plan parameters and emission inventories. As described in the 2009 SGAC EIS, fugitive

emission sources and point sources were modeled using the Industrial Source Complex 3 Long-Term (ISCLT3) dispersion model, which is the model recommended by WDEQ guidance.

As described in the 2009 SGAC EIS, worst-case years for evaluation were based on the highest modeled PM₁₀ concentrations. The 2006 ISCLT3 model predicted no exceedances of the annual PM₁₀ ambient air standard at a 50 Mtpy production rate. At the estimated average annual production rate of 13.5 Mt the particulate matter emissions from the Proposed Action would likely be less than those than those predicted in the model, since the annual production would be less than used in the model. The direct and indirect effects from particulate matter emissions resulting from the Proposed Action are expected to minor compared to Wyoming state particulate emissions and moderate and short-term on the tract because modeled particulate matter emissions would be below the NAAQS and WAAQS thresholds. The effects of particulate matter emissions from coal combustion are included in **section 4.4.5**.

4.4.1.1.2 No Action Alternative

Impacts from particulate 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 8.9 years.

4.4.1.2 Cumulative Effects

The locations of PM₁₀ and PM_{2.5} emission monitoring samplers within the central group of mines are depicted on **map 3-1**. Monitoring during the 2010-2017 period demonstrated that ambient concentrations of PM₁₀ were within established short-term (24-hour) presented in **table 4-2**. During this period, no exceedances of the PM₁₀ standards were reported.

Table 4-2. PM₁₀ Concentration Values (24-Hr, First Maximum Value - µg/m³) for 2010-2017

Location/Site Name/AQS Site ID ¹	2010	2011	2012	2013	2014	2015	2016	2017
South Campbell County/Campbell County/56-005-0456	36	41	71	39	52	135	63	113
Belle Ayr/BA-1/56-005-0802	29	51	45	27	28	49	44	71
Belle Ayr/BA-3/56-005-0893	31	46	48	34	38	52	27	105
Belle Ayr/BA-4/56-005-0892	55	69	54	39	43	66	38	71
Caballo/C-8A/B/56-005-0886	122	98	99	84	55	80	52	131
Caballo/C-9/56-005-0908	67	69	76	64	54	72	76	117
Coal Creek/CCM 7-1/56-005-0841	26	32	45	30	21	51	20	38
Coal Creek/Site 26/56-005-0890	44	38	49	**	**	**	**	**
Coal Creek/Site 3/56-005-0303	**	**	65	56	39	51	31	89
Cordero/CRC-E10A/56-005-0885	66	83	108	68	67	88	52	98
Cordero Rojo/Caballo Mine-W11 Hilight Road/56-005-1003	**	66	63	55	60	51	35	96
Cordero Rojo/Site W/56-005-0883	83	53	**	**	**	**	**	**
Cordero/Hv-3/PM-3/56-005-0889	54	27	**	**	**	**	**	**

¹ See **map 3-1** for site locations.
 ** Indicates that the site was inactive.
 Source: EPA 2019d

In 2014, McVehil-Monnett Associates, Inc. (McVehil-Monnett) conducted air quality modeling for the Belle Ayr Mine, located immediately adjacent (south) of the Caballo Mine, using the ISCLT3 model. The model evaluated overall maximum PM₁₀ emissions for years 2014-2031 resulting from mining activities at the central group of mines (McVehil-Monnett 2014). Redhorse Corporation (Redhorse) also conducted air quality modeling in 2016 for the Cordero Rojo Mine located south

of the Belle Ayr Mine. Redhorse also used the ISCLT3 model to estimate average annual PM₁₀ concentrations for years 2016-2035, for the central 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 PM₁₀ concentrations.

The results of the modeling are included in **table 4-3**. Both models predicted no future exceedances of the annual PM₁₀ WAAQS or NAAQS for the combined emissions at the central group of mines (McVehil-Monnett 2014 and Redhorse 2016). Based on the information included in **section 3.4.1.1**, the Caballo Mine would not cause or contribute to a violation of the federal 24-hour PM₁₀ NAAQS of 150 µg/m³.

Table 4-3. McVehil-Monnett and Redhorse Annual PM₁₀ and NO₂ Dispersion Modeling Results

Pollutant	Modeled Concentration (µg/m ³)	Background Concentration (µg/m ³)	Total Concentration ¹ (µg/m ³)	NAAQS/WAAQS (µg/m ³)
McVehil-Monnett				
	2016	Mine	Year	
PM ₁₀	36.78	9.00	45.78	50 ²
NO ₂	34.94	14.00	48.94	100
	2017	Mine	Year	
PM ₁₀	34.47	9.00	43.97	50 ²
NO ₂	31.99	14.00	45.99	100
Redhorse				
	2017	Mine	Year	
PM ₁₀	26.06	9.50	35.56	50 ²
NO ₂	30.67	20.00	50.67	100
	2023	Mine	Year	
PM ₁₀	15.58	9.50	25.08	50 ²
NO ₂	23.18	20.00	43.18	100

¹ The total includes modeled concentrations for the Belle Ayr, Caballo, Coal Creek, and Cordero Rojo mines plus background.

² 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

The cumulative effects from particulate matter emissions are expected to be moderate and short-term because modeled PM₁₀ emissions would be below NAAQS and WAAQS thresholds and would be extended by approximately 8.9 years.

4.4.1.3 Mitigation Measures

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

4.4.2 Emissions of Nitrogen Oxides (NO_x) and Ozone (O₃)

4.4.2.1 Direct and Indirect Effects

4.4.2.1.1 Proposed Action

Direct emissions from NO_x from the Proposed Action would include emissions generated from coal excavation and reclamation activities, tailpipe emissions from equipment, and fugitive emissions. The Caballo Mine triennial emission inventory for 2017 was used to estimate direct NO_x emissions for the Proposed Action. NO_x emissions for the Proposed Action and the State of Wyoming are tabulated in **table 4-4**.

Table 4-4. Comparison of Direct to Wyoming NO_x Emissions

	Proposed Action (tons)	2017 Wyoming State Tier I (tons)	Anticipated % change to State Emissions from Proposed Action
NO _x	484	144,241	0.3

Source: PCM 2017, EPA 2019g

Compared to total Wyoming state emissions the direct NO_x emissions from the Proposed Action would be minor.

As presented in **table 3-4**, NO₂ data collected at the currently active AQS monitoring sites in Campbell County nearest to the Caballo Mine were below the NAAQS and WAAQS, which indicates that ambient air quality within the vicinity of the Caballo West tract is currently in compliance for the NO₂.

Caballo Mine included modeled results for NO_x emissions for 2006 through 2023 as a part of the MD-1125 air quality permit in 2006, as described in section 3.4.3.1.1.3 of the 2009 SGAC EIS. NO_x emission rates for the 2008 and 2014 were estimated to be 1,597 tons per year (tpy) and 1,830 tpy, respectively. The 2006 ISCLT3 model predicted no exceedances of the NO_x ambient air standards at a 50 Mtpy production rate. At the estimated average annual production rate of 13.5 Mt the NO_x emissions from the Proposed Action would likely be less than those than those predicted in the model, because the annual production would be less than used in the model. The direct and indirect effects from NO_x emissions resulting from the Proposed Action are expected to be moderate and short-term on the tract because modeled NO_x emissions would be below the NAAQS and WAAQS thresholds.

Public exposure to NO_x 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 residences in the area could also be affected. The closest public transportation route is Bishop Road, which runs through a portion of the tract, and the nearest occupied residence is approximately 3,200 feet east of the tract. There have been no reported events of public exposure to NO₂ from blasting activities at the Caballo Mine through December 2018 (Barney 2019).

As indicated in **section 3.4.1.2**, O₃ monitoring is not required by WDEQ-AQD at PRB mines, but levels have been monitored at AQS monitoring sites in Campbell County since 2001. No violations of the 8-hour O₃ NAAQS have occurred.

As stated above, there have been no reported events of public exposure to NO₂ from blasting activities at the Caballo Mine through December 2018 and there have been no violations of the NO₂ or O₃ ambient air standards in Campbell County. Under the Proposed Action, coal recovery at the Caballo Mine would continue at an estimated annual rate of 13.5 Mt, which is less than the annual production rate that was used for modeling NO_x. While the results from ongoing monitoring show no violations of NO_x or O₃ NAAQS or WAAQS standards in Campbell County, the slight potential for exposure to NO_x and O₃ emissions suggests that the direct and indirect effects from emissions resulting from the Proposed Action would be moderate for NO_x and minor for O₃. The effects would be short-term.

4.4.2.1.2 No Action Alternative

Impacts from NO_x and O₃ emissions have resulted from current mining activity and therefore the impacts related to NO_x and O₃ emissions under the No Action Alternative would be similar to those under the Proposed Action but would not be extended for an additional 8.9 years.

4.4.2 Cumulative Effects

The central group of mines would contribute cumulative NO_x and O₃ emissions to the surrounding area. NO_x modeling conducted for the current Belle Ayr and Cordero Rojo air quality permits each included the effects from the central group of mines. The models predicted that mining activities at the central group of mines would not contribute to a violation of the NO₂ NAAQS or WAAQS (McVehil-Monnett 2014 and Redhorse 2016). Cumulative impacts from NO_x could be higher in the short-term (8.9 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_x impacts would cease to occur after mining and reclamation are complete. As previously discussed, no exceedances of the O₃ standard have occurred at the AQS monitoring sites in Campbell County. Therefore, the cumulative effects from NO_x and O₃ emissions would be moderate and short-term.

4.4.2.3 Mitigation Measures

No mitigation measures beyond those required by the Caballo Mine air quality permit would be required for emissions of NO_x or O₃.

4.4.3 Emissions of Sulfur Dioxide (SO₂), Mercury (Hg), Lead (Pb), and Other Non-Greenhouse Gases (Non-GHG)

4.4.3.1 Direct and Indirect Effects

4.4.3.1.1 Proposed Action

Direct air emissions for SO₂, Hg, Pb, and other non-GHG from the Proposed Action would include emissions generated from coal excavation and reclamation activities and tailpipe emissions from equipment. The Caballo Mine triennial emission inventory for 2017 was used to estimate direct SO₂, Hg, Pb, and other non-GHG emissions for the Proposed Action. SO₂, Hg, Pb, and other non-GHG emissions for the Proposed Action and the State of Wyoming are tabulated in **table 4-5**.

In addition, data presented in **section 3.4.1.2** show that SO₂, Hg, and Pb in Campbell County are in compliance with applicable standards. Under the Proposed Action, coal at Caballo Mine would be produced at an estimated annual rate of 13.5 Mt. Because the direct emissions from the Proposed Action would be minor when compared to Wyoming state emissions and given the results of ongoing SO₂, Hg, and Pb monitoring in the area that show no exceedances of these parameters, the effects of emissions of SO₂, Hg, Pb, and other non-GHGs from the Proposed Action would be minor and short-term.

Table 4-5. Comparison of Direct to Wyoming SO₂, Hg, Pb and Other Non-GHG Emissions

Source	Proposed Action (tons)	2017 Wyoming State Tier I (tons)	Anticipated % change to State Emissions from Proposed Action
VOC	21.87	271,481	0.01
HCOH	0.02	NA	-
CO	127.76	250,232	0.05
SO ₂	36.34	52,354	0.1
Benzene	0.03	NA	-
Toluene	0.02	NA	-
Ethyl-Benzene	0.001	NA	-
Xylene	0.01	NA	-
N-Hexane	0.05	NA	-
Lead	0.00001	NA	-
Mercury	0.00001	NA	-
Other HAPs	0.07	NA	-
Total HAPs	0.19	NA	-

NA – Not available
 Source: PCM 2017, EPA 2019g

4.4.3.1.2 No Action Alternative

Impacts from SO₂, Hg, and Pb emissions have resulted from current mining activity, and, therefore, the impacts related to SO₂, Hg, or Pb emissions under the No Action Alternative would be similar to those under the Proposed Action but would not be extended for an additional 8.9 years.

4.4.3.2 Cumulative Effects

The adjacent central group of mines would contribute additional SO₂, Hg, and Pb emissions to the surrounding area. Based on past monitoring, the permit modification request would not likely increase SO₂, Hg, or Pb emissions. While cumulative impacts from SO₂, Hg, or 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 periods of inversions. Air quality impacts from mining would cease to occur after reclamation is complete. Therefore, the cumulative effects from SO₂, Hg, and Pb emissions are expected to be minor and short-term.

4.4.3.3 Mitigation Measures

No mitigation measures beyond those required by the Caballo Mine air quality permit would be required for emissions of SO₂, Hg, or Pb.

4.4.4 Air Quality Related Values (AQRVs)

4.4.4.1 Direct and Indirect Effects

4.4.4.1.1 Proposed Action

Visibility

WDEQ-LQD has determined that the Caballo Mine is not a major stationary source, in accordance with Chapter 6, Section 4 of the Wyoming Air Quality Standards and Regulations. Therefore, the State of Wyoming does not require mines to evaluate impacts on Class I areas;

however, OSMRE considers such issues during the federal mining plan modification review process.

Although overburden is generally thicker in the tract, compared to other lease areas currently being mined, emissions from blasting are not expected to increase under the Proposed Action but the duration of potential impacts from blasting would be extended. All blasting would be conducted in compliance with all applicable local, state, and federal laws and regulations, including WDEQ-LQD Rules and Regulations, Chapter 6. All blasting operations are conducted under the direction of a certified blaster. The direct and indirect effects to visibility from blasting under the Proposed Action would be moderate and short-term because pollutants and particulates that effect visibility would be within the approved air quality permit MD-1477.

Because WDEQ-LQD does not require the Caballo Mine to evaluate visibility impacts on Class I areas, the mine does not monitor visibility. Therefore, a direct comparison with the Wyoming standards is not possible. The impacts to visibility from mining the Caballo West tract have been inferred from the long-term trend in visibility at the Wind Cave National Park. Because the long-term visibility has been stable, the indirect effects on visibility from the Proposed Action would be minor and short-term.

Air Quality Related Values Related to Coal Combustion

Emissions that affect air quality also result from combustion of fossil fuels. **Table 4-6** presents the estimated 2018-2051 PM₁₀, PM_{2.5}, SO₂, NO₂, Hg, and CO emissions for coal mined at the Caballo Mine that would be used for power generation in comparison with 2013-2017 values. Using information from **table 4-6**, comparisons can be made between combustion emissions from coal mined at the Caballo Mine and emissions from coal mined throughout Campbell County. Total U.S. emissions are also included in the table.

Table 4-6. Estimated Annual PM₁₀, PM_{2.5}, SO₂, NO_x, and Hg Contributions from Combustion of Coal Mined at the Caballo Mine for 2013-2017 and 2018-2051, Compared to Campbell County and U.S. Total Emissions

Year	Mt Coal Recovered	PM ₁₀ (Tons)	PM _{2.5} (Tons)	SO ₂ Emissions (Tons)	NO ₂ Emissions (Tons)	Hg Emissions (Tons)	CO Emissions (Tons)
2013	9.0	6239.09	1902.9	78567.2	32324.8	0.4	2244.8
2014	8.0	5552.4	1693.5	69921.1	28767.5	0.3	1997.7
2015	11.4	7922.6	2416.4	99768.9	41047.8	0.5	2850.5
2016	11.2	7797.1	2378.1	98188.6	40397.6	0.5	2805.4
2017	11.1	7730.7	2357.9	97352.1	40053.4	0.5	2781.5
2018-2051 Annual Average	13.5	9,380.3	2,861.0	118,125.0	48,600.0	0.6	3,375.0
Annual Campbell County ¹	341.9	237,560.0	72,455.8	2,991,572.9	1,230,818.6	14.2	85,473.5
2018-2051 Average Percent of Campbell Co.	--	3.9%	3.9%	3.9%	3.9%	3.9%	3.9%
Total U.S. Coal Emissions (2017)	774.6	538,225.7	164,158.8	6,777,831.9	2,788,593.7	32.1	193,652.3
2018-2051 Average Percent of U.S.	--	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%

¹ Based on an estimated production of 341.9 Mt (average of 2013 through 2017 production). Source: WWC 2019, calculations provided in **appendix D**.

Impacts to air quality related to coal combustion under the Proposed Action would be similar to the current conditions. When compared to Campbell County emissions, direct and indirect effects would be minor (approximately 3.9 percent of the Campbell County average emissions) but would be extended by approximately 8.9 years.

The estimated Hg emissions from Caballo Mine supplied coal-fired power plants are provided in **table 4-6**. Based on an average of 13.5 Mtpy, the estimated Hg emissions resulting from the Proposed Action would contribute approximately 0.6 tons of Hg emissions per year for an additional 8.9 years (WWC 2019).

Impacts to air quality related to coal combustion under the Proposed Action would be similar to the conditions currently experienced at the Caballo Mine. When compared to emissions from Campbell County mines, direct and indirect effects of the Proposed Action would be minor and short-term.

Acidification of Lakes/Acid Deposition

As discussed in **section 3.4.1.3.3**, the pH trend at monitoring site WY99 appears to be relatively stable with values near the pH of normal rain. 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 and therefore, the effects would be negligible.

4.4.4.1.2 No Action Alternative

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 by 8.9 years.

4.4.4.2 Cumulative Effects

Mines in Campbell County would affect the cumulative AQRVs. The air quality index (AQI) for Campbell County are used to evaluate the cumulative effects of the Proposed Action on AQRVs. 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 2019). 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 CAA: ground-level ozone, particle pollution (also known as particulate matter), CO, SO₂, and NO₂. Ground-level ozone and airborne particles are the two pollutants that pose the greatest threat to human. The AQI evaluates air quality based on six levels (categories) of health concern that correspond to a different level of health concern (**table 4-7**). The table shows that approximately 99.3 percent of the days in Campbell County between 2013 and 2017 were classified as having a good or moderate AQI and no days were classified as very unhealthy or hazardous.

Table 4-7. Average Annual Campbell County Air Quality Index Values

	Days With AQI	Good	Moderate	Unhealthy for Sensitive Groups	Unhealthy	Very Unhealthy	Hazardous
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	366	262	103	1	0	0	0
2017	365	240	118	4	3	0	0
Average	--	247.6	115.0	1.8	0.8	0	0
Percent of Total Average	--	67.8%	31.5%	0.5%	0.2%	0.0%	0.0%

Source: EPA 2019f

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. The cumulative effects on AQRVs are expected to be minor and short-term because estimated emissions would be below the NAAQS and WAAQS thresholds and cumulative effects would only be extended by approximately 8.9 years.

4.4.4.3 Mitigation Measures

No mitigation measures beyond those required by the Caballo Mine air quality permit would be required to protect AQRVs.

4.4.5 Greenhouse Gas Emissions

4.4.5.1 Direct and Indirect Effects

4.4.5.1.1 Proposed Action

OSMRE has elected to quantify direct and indirect GHG emissions and has evaluated these emissions in the context of national GHG emission inventories. 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 CO₂e emissions. Annual CO₂e emissions from combined sources based on annual coal recovered from 2013-2017 at the Caballo Mine were estimated (section 3.4.1.4). Other than production, the same variables were used to calculate annual CO₂e emissions for 2018-2051. The CO₂e emissions for the Proposed Action were calculated at 13.5 Mtpy, which is more than the average annual production over the last 5 years (10.1 Mtpy).

As presented in table 4-8, the combustion of the coal is the primary contributing factor related to CO₂e emissions from the Proposed Action, accounting for approximately 97 percent of the total emissions. Therefore, the direct and indirect effects from GHG emissions when rail transport and coal combustion are included are expected to be moderate and short-term.

Table 4.8. Estimated Annual Average 2013-2017 and 2018-2051 Direct and Indirect CO₂e Emissions at the Caballo Mine

General	Estimated 2013-2017 Annual Average ¹	Estimated 2018-2051 Annual Average ¹
Mt of Coal Recovered	10.1	13.5
Average Transport Miles (One Way)	1,131	1,131
Number of Train Trips (One Way)	655	873
Direct Emissions Sources		
Fuel	33,139	44,103
Electricity Consumed in Mining Process	27,085	36,046
Mining Process	11,642	15,494
Total Direct Emissions	71,867	95,643
Indirect Emissions Sources		
Rail Transport ²	402,475	533,104
From Coal Combustion ³	16,991,119	22,612,500
Total Indirect Emissions	17,393,594	23,145,604
Total Estimated CO₂e Emissions	17,465,460	23,241,248

¹ In metric tons - see appendix C for calculations,

² Coal haulage emissions based on 130-car trains with four locomotives; 488.2 kg CO₂e per mile per loaded train, 96.1 kg CO₂e 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.

³ Based on 1.683 metric tons CO₂e per ton of coal burned for electrical generation (EPA 2008) and calculated by WWC (see appendix C).

Appendix F provides a detailed discussion of the GHG emissions from the U.S. According to the EPA (2018) in 2016 (the most recent year of available CO₂ data at this time), CO₂ emissions in the U.S. totaled 6,511.3 million metric tons. Using the 2016 U.S. estimate for comparison purposes, the estimated CO₂e contribution from the Caballo Mine coal was approximately 0.27 percent. Under the Proposed Action, the estimated CO₂e contribution would be approximately 0.36 percent of the U.S. total CO₂e emissions. The direct and indirect effects of the Proposed Action on annual CO₂e emissions would be moderate and short-term.

4.4.5.1.2 No Action Alternative

The impacts directly resulting from GHG emissions under the No Action Alternative would be less than those under the Proposed Action and would not be extended by approximately 8.9 years.

4.4.5.2 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.

4.4.5.3 Mitigation Measures

A majority (approximately 99.7 percent) of the GHG identified in this EA are from non-mining activities, not controlled by PCM (e.g., rail transportation to and combustion at power plants). The DOI generally 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 Caballo Mine) and other states' 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.

4.4.6 Climate Change Cause and Effect

4.4.6.1 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. **Appendix F** includes a discussion on climate change cause and effect.

As stated in **appendix F**, estimated CO₂ emissions in the U.S. decreased 1.9 percent from 2015 to 2016 (EPA 2018). Under the Proposed Action, PCM anticipates producing the coal included in the Caballo West tract at 13.5 Mtpy levels, using existing production and transportation facilities. This would extend the mine's current GHG emissions by approximately 8.9 years and combustion of Caballo West tract federal coal in coal-fired power plants would also continue for approximately 8.9 additional years. Because CO₂ emissions have been declining in recent years and because CO₂e resulting from coal mined at the Caballo Mine would only be slightly above current levels, climate impacts associated with direct/indirect emissions from the Proposed Action from mining, transportation, and combustion would be moderate and short-term.

A protocol to estimate what is referenced as the “social cost of carbon” (SCC) associated with GHG emissions was developed by a federal Interagency Working Group (IWG) to assist agencies in addressing EO 12866, which required federal agencies to assess the cost and the benefits of intended regulations as part of their regulatory impact analyses. The SCC protocol was also developed for use in cost-benefit analyses of proposed regulations that could impact cumulative global emissions (Shelanski and Obstfeld 2015). However, EO 13783, issued March 28, 2017, directed that the IWG be disbanded and that technical documents issued by the IWG be withdrawn as no longer representative of federal policy. The 2017 EO further directed that when monetizing the value of changes in GHG emissions resulting from regulations, agencies follow the guidance contained in Circular A-4 (Office of Management and Budget 2003). It was determined that a federal agency should ensure that its consideration of the information and other factors relevant to its decision be consistent with applicable statutory or other authorities, including requirements for the use of cost-benefit analysis.

NEPA does not require a cost-benefit analysis (40 CFR § 1502.23) or the presentation of the SCC estimates; therefore, that analysis was not undertaken here. Without a complete monetary cost-benefit analysis, which would include the social benefits of energy production to society as a whole and other potential benefits and costs, inclusion solely of a SCC analysis would be unbalanced, potentially inaccurate, and not useful.

Given the uncertainties associated with assigning a specific and accurate social cost of carbon estimate resulting from 8.9 additional years of operation under the mining plan modification, and that the SCC protocol and similar models were developed to estimate impacts of regulations over long time frames, this EA quantifies direct and indirect GHG emissions and evaluates these emissions in the context of U.S. GHG emission inventories, as discussed in **section 4.4.5**.

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.

4.4.6.2.1 Direct and Indirect Cumulative 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 could include:

1. annual mean maximum temperature increase of up to 6.5 degrees Fahrenheit,
2. annual mean minimum temperature increase of up to 6.3 degrees Fahrenheit,
3. annual mean precipitation increase of up to 0.1 inch per month,
4. annual mean snowfall decrease of up to 0.1 inch per year,
5. annual mean soil water storage decrease of up to 0.1 inch per year, and
6. annual mean evaporation deficit increase of up to 0.3 inch per month.

For analysis purposes, the EA assumes that the maximum annual mean values would be realized during the life of the mine.

Hydrology

The potential changes to the annual snowfall, precipitation levels, and streamflow could impact area surface water body levels, groundwater recharge, and soil erosion. Considering the overall climate change timeframe of centuries, it is possible that decreased snowpack may be observable locally. Likewise, decreases in streamflow may be observed, but, during the mining dewatering timeframe of 8.9 years, mine dewatering may compensate for climate change related stream flow reduction, or may have no additional influence on streamflow. Overall, the Proposed Action would have moderate, short-term impacts to 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 866.7 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 short-term. The USGS climate viewer does not predict any annual mean changes to runoff so impacts from climate changes on soils would be negligible.

Reclamation

The post-reclamation land use would be wildlife habitat and livestock grazing, consisting of 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, including the surface effects on federal lands within the State of Wyoming. Federal coal leaseholders in Wyoming are required to submit a PAP 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 Caballo Mine would require the approval of WDEQ-LQD. Climate change impacts on reclamation 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

The direct and indirect effects to groundwater would be the same as those described in section 3.5.1.2.1.3 of the 2009 SGAC EIS. 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 and the replacement of these aquifers with backfilled overburden material.
2. The lowering of static water levels in the coal and overburden aquifers around the mine due to dewatering associated with removal of these aquifers within the mine boundaries. The reduction in static water levels would be long-term, but not

permanent, and recharge to the backfill and adjacent undisturbed aquifers would occur after 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.

Under the Proposed Action additional alluvium, overburden, and Wyodak coal aquifers would be removed in the Caballo West tract during the mining process. These aquifers would be replaced with backfilled overburden materials. The physical characteristics of the reclaimed backfill material would be dependent upon premining overburden lithology.

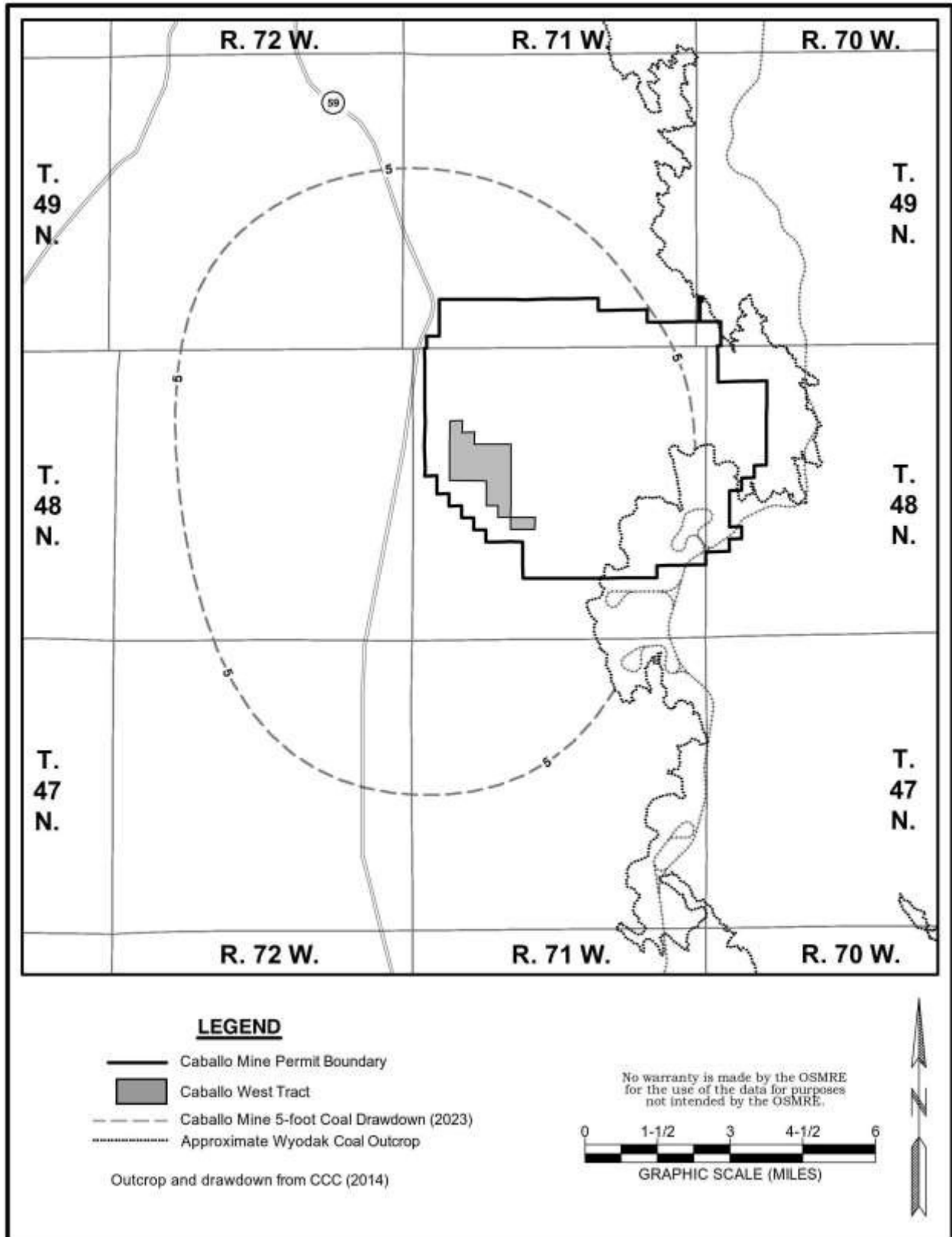
Mining at the Caballo Mine has removed Tisdale Creek alluvial deposits. Under the Proposed Action, mining would physically remove additional alluvial deposits associated with Tisdale Creek. As described in the 2009 SGAC EIS, it is unlikely that WDEQ-LQD would require Caballo Mine to selectively remove and replace the alluvial deposits within the Caballo West tract.

Mining in the tract would extend the duration and physical extent of drawdown in the overburden within the Caballo Mine. Monitoring well data used in the 2015 CHIA indicate that drawdown in the overburden aquifer extends about 2 to 3 miles from the mine pit. The Caballo Mine predicted that the extent of the 5-foot water level decline for the overburden would be a maximum of about two miles from any mine pit (PCM 2014). West of the mine pit, the overburden groundwater gradients follow the general topography.

Under the Proposed Action, the duration and physical extent of drawdown in the Wyodak coal aquifer would also be extended. In 2010, drawdown within the Wyodak seam aquifer was modeled to determine the extent of drawdown year 2023. The modeling included a portion of the Caballo West tract. The extent of drawdown (5-foot contour) in the Wyodak coal aquifer is depicted in **map 4-1**. Groundwater data from the Wyodak coal aquifer would continue to be monitored in accordance with the Permit No. 433 groundwater monitoring program and included in the annual reports submitted to WDEQ-LQD. Caballo Mine would update the extent of drawdown as mining continues.

In the 2015 CHIA, water levels from 41 monitoring wells were used to characterize current groundwater levels in the backfill aquifer. The data showed that current conditions are representative of the early stages of reclamation of mined areas. In addition, the available data show and support that the cumulative effects of mining on groundwater levels are being reduced as reclamation progresses and as the backfill aquifer saturates. This is consistent with **section 3.5.1**, which indicated that most of the groundwater levels in the backfill wells at the Caballo Mine have exhibited significant resaturation.

The underlying, sub-coal Fort Union Formation and the Fox Hills Sandstone would not be physically disturbed by mining activities due to the depths. The wells completed in these formations for water supply purposes would continue to be used under the Proposed Action. Impacts would not increase from current conditions; however, the duration and physical extent of drawdown in the Fort Union Formation and the Fox Hills Sandstone would be extended.



Map 4-1. Modeled Drawdown for the Wyodak Coal Seam

Overall, the direct and indirect effects to groundwater resources resulting from the Proposed Action would be moderate and long-term due to aquifer removal. Impacts would not increase from current conditions; however, the duration and physical extent of drawdown in the overburden and Wyodak coal aquifer would be extended. Backfill water levels and groundwater quality indicate that the groundwater would meet Class III standards for livestock use.

4.5.1.1.2 No Action Alternative

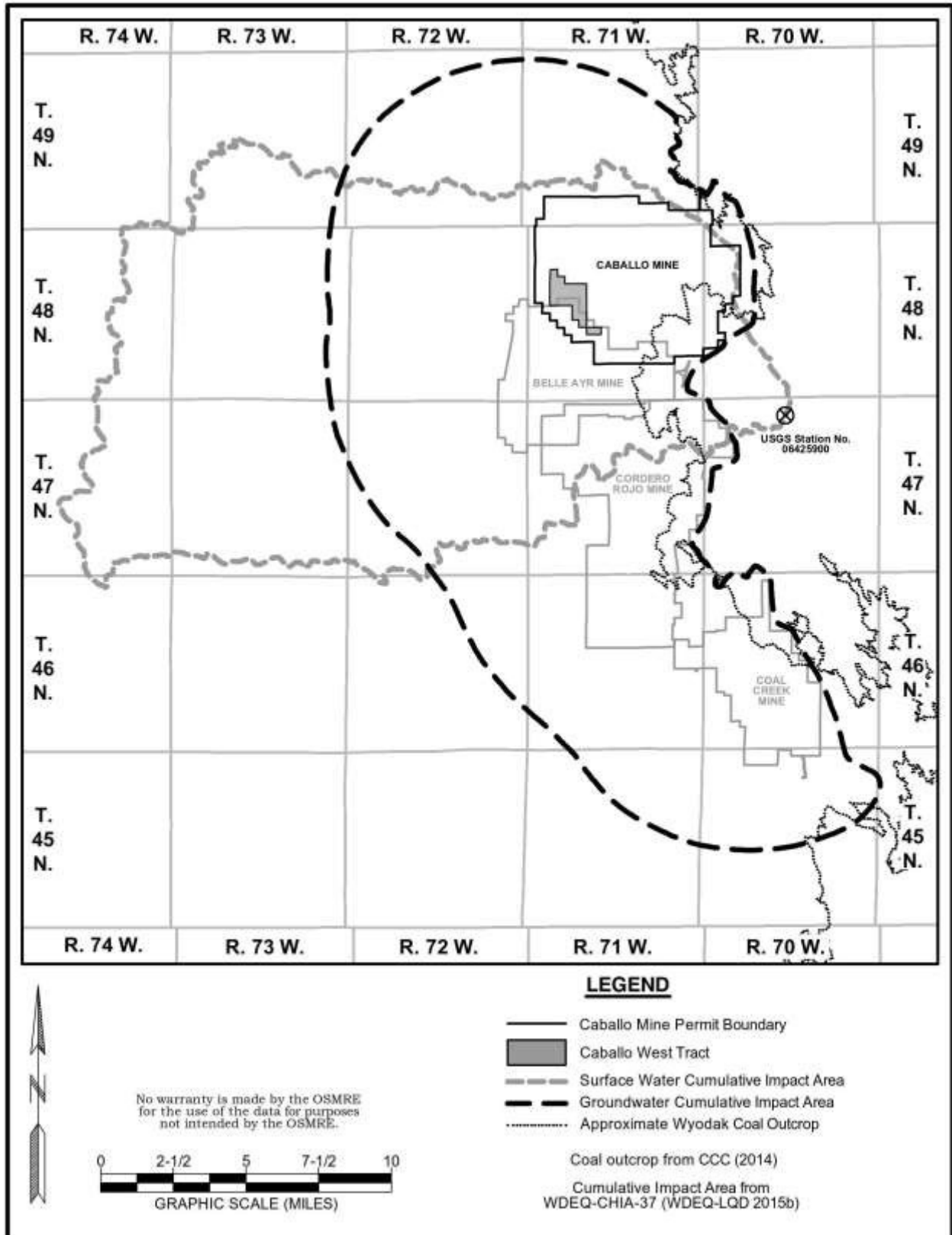
Impacts to groundwater under the No Action Alternative would be similar to those under the Proposed Action, but the aerial extent of groundwater aquifer removal would be reduced by approximately 866.7 acres. Impacts to overburden and coal aquifers have already occurred within the Caballo West tract related to coal recovery on adjacent federal coal leases, ongoing mining activities at nearby mines, and CBNG recovery. Under the No Action Alternative, the duration of impacts to groundwater would not be extended. Therefore, implementation of the No Action Alternative would have negligible effect on reducing the magnitude of these impacts, but would reduce the extent and duration.

4.5.1.2 Cumulative Effects

The 5-foot drawdown area was selected as the cumulative impact area (CIA) for groundwater because this limit would detect the extent of minor groundwater impacts. This area corresponds to the CIA used in the 2015 CHIA. The area delineated by the maximum cumulative 5-foot drawdown contour in the Wyodak coal aquifer for the central group of mines is included on **map 4-2**. The effects of removal of the coal and overburden aquifers and replacing them with backfilled overburden are the foremost groundwater concern regarding cumulative effects. Mining the tract would increase the cumulative size of the backfill area in the central group of mines. 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 mining the Caballo West tract and from dewatering the active mine pits. Where the effects of pumping from central group of mines overlap, additional water level declines would result from concurrent operations.

The 2015 CHIA indicates that few to none of the impacts to the alluvial aquifer are cumulative in nature as the individual mines tend to impact different sections of discrete alluvial sediments. In addition, the 2015 CHIA states that cumulative impacts caused by mining of the overburden aquifer would be minimal. Outside the mined areas, the native overburden aquifer would remain structurally undisturbed and would be in hydraulic connection with the backfill aquifer. Based on the current available data, the model predictions by the mines, and the area geology, it is expected that the cumulative impacts caused by mining on the native undisturbed overburden aquifer to the west of the mine permit boundaries would be negligible.

Mining impacts to groundwater levels in the Wyodak coal aquifer are more extensive than the overburden since the coal seams are mined out and the hydraulic conductivity of the coal aquifer is higher than the overburden and underburden aquifers. As described in the 2015 CHIA for the central group of mines, CBNG dewatering in the central PRB has been decreasing since 2001. If the present trend of CBNG dewatering continues, it is conceivable that the CBNG effects on groundwater in the Wyodak coal aquifer would decline over the next several years and the coal mining impacts would be more distinguishable. The 2015 CHIA concluded that the impacts on groundwater levels and groundwater quality in the Wyodak coal aquifer are expected to be minimal and the coal aquifer would be able to support livestock use.



Map 4-2. Cumulative Impact Area for Potential Surface Water and Groundwater Impacts

The 2015 CHIA included groundwater quality data for 2011 to 2013 from 29 backfill aquifer wells from the central group of mines and indicated that from the available data, it is difficult to assess, interpret, and predict the groundwater quality of the backfill with a single hypothesis. It is generally expected that over time the backfill would be flushed by groundwater flowing through the reclaimed material and down gradient to the northwest to the native undisturbed aquifers. Thus, the water quality in the backfill is expected to improve over time.

The time to flush backfill and improve the water quality varies considerably based on the permeability of the backfill and groundwater flow rates in the aquifers. Based on the predictions from the mines and the observed data, it is expected that the backfill aquifer would be a viable supply source to support the WDEQ-LQD approved postmining land use of livestock and wildlife. This is consistent with **section 3.5.1**, which indicated that the groundwater quality within the backfill wells at the Caballo Mine have water quality that meet Class III standards for livestock use, with the exception of one well that is completed in the reclaimed North Tisdale Creek alluvium. Outside the central group of mine permit boundaries the backfill aquifer is not present and the native existing aquifers would remain structurally undisturbed. The 2015 CHIA indicates that it is reasonable to expect that the recovery of the native aquifers outside the permit boundaries would be relatively faster than the backfill aquifer, and the existing wells in these native aquifers would remain viable to support the existing use.

The 2015 CHIA states that during mining, the underburden aquifer that is in close proximity to the mine pits would be impacted in various ways, including some fragmentation, drawdown due to the influences of the pit dewatering, and exposure of the aquifer materials for a limited time to the atmosphere and direct precipitation events. During the initial stages of backfill aquifer resaturation, there is expected to be some upward groundwater flow from the underburden to the backfill aquifer. Therefore, in areas where the backfill aquifer would be recharged by the underburden aquifer, it is expected to have minimal effects on the underburden aquifer groundwater quality. Outside of the mined areas, the aquifers overlying the underburden aquifer would remain structurally undisturbed. In addition, the relatively lower hydraulic conductivity of the underburden aquifer supports that coal mining would have limited cumulative effects on the underburden groundwater system and these effects would be declining with increasing distance from the coal mine permit boundaries to the west.

As discussed in **section 4.5.1.1.1**, while the physical characteristics of the backfill is different from premining conditions, backfill recharge has been documented at the Caballo Mine. In addition, backfill water quality is generally suitable for livestock use and wildlife habitat, which are the planned postmining land uses. Therefore, cumulative effects to groundwater resources resulting from the Proposed Action are expected to be moderate and long-term.

4.5.1.3 Mitigation Measures

W.S. 35-11-415(b)(xii) requires surface coal mines 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 WDEQ-LQD requires 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 would be restored to a condition which minimizes disturbance to prevailing hydrologic balance in the permit area and in adjacent areas (WDEQ-LQD 2012).

Under provisions of Permit No. 433, Caballo Mine is required to monitor water levels and water quality in the alluvium, overburden, coal, underburden, and backfill (PCM 2014). 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, postmining groundwater conditions. Many groundwater monitoring wells installed by Caballo Mine within and around its current permit area have been used to evaluate groundwater conditions associated with the mine and continue to be monitored to reveal a long-term record of groundwater conditions. After the completion of reclamation, a large groundwater monitoring network would remain. This would include not only backfill wells, but also a number of coal, overburden, and alluvial wells in undisturbed areas.

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 impacts can be found in section 3.5.2.2 of the 2009 SGAC EIS. Additional discussions can also be found in the Surface Water portion of the 2015 CHIA. As discussed in **section 3.5.2**, there are currently no surface water monitoring stations on Tisdale Creek and baseline water quality indicated few exceedances of WDEQ-WQD Class 3B water quality standards.

Under the Proposed Action changes in surface runoff characteristics and sediment discharges would occur because of the mining and reconstruction of drainage channels as mining progresses and because of the use of sediment control structures used to manage discharges of surface water from the mine permit areas. Since the tract would be mined as an extension of the existing Caballo Mine 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. Stream channels would be restored after surface mining operations are completed on the tract. Under the Proposed Action, the postmining drainage area of Tisdale Creek would increase by 2.4 square miles (12 percent) due to the opening of the closed basins within the watershed and a slight encroachment into the premining North Tisdale watershed. The North Tisdale postmining drainage area would decrease by about 1.4 square miles (20 percent). The impacts associated with the changes in postmining drainage areas would be small because watershed modeling indicates that postmining runoff would be similar to premining conditions. In Coal Rules and Regulations, Chapter 1, Section 2(cd), WDEQ-LQD defines material damage to the hydrologic balance as a significant long-term or permanent adverse change to the hydrologic regime (WDEQ-LQD 2014b). WDEQ-LQD Coal 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). Because the results of modeling indicate that postmining flood estimates would be similar to premining, the direct and indirect effects to surface water are expected to be moderate until final bond release has been obtained.

4.5.2.1.2 No Action Alternative

The impacts to surface water under the No Action Alternative would be similar to those under the Proposed Action since impacts to surface water features have already occurred within the tract related to coal recovery on adjacent federal coal leases, as approved by Permit No. 433.

Therefore, implementation of the No Action Alternative would have negligible effect on reducing the magnitude of surface water impacts.

4.5.2.2 Cumulative Effects

The surface water CIA includes the entire Caballo Creek drainage area upstream from USGS Station No. 06425900 (**map 4-2**). 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 2015 CHIA analyzed the cumulative mining related impacts to surface water resources associated within the Caballo Creek and concluded that considering the size of CIA, the chances of measuring water quantity changes that would be persistent and detectable at USGS Station No. 06425900 are small. The 2015 CHIA also acknowledges CBM surface water discharge into Caballo Creek; however, because CBM production in the Caballo Creek drainage has been declining since 2001, cumulative effects to surface water from CBM would be negligible. Therefore, the cumulative effects to surface water are expected to be minor.

4.5.2.3 Mitigation Measures

Permit No. 433 requires PCM to restore stream channels after surface mining operations are completed. The major drainages of the Caballo Mine would be reclaimed using a channel-valley floor system consisting of an inner pilot channel designed to accommodate a 2-year recurrence interval flood and an outer flood channel designed to serve as a guide for major floods and prevent floodwaters from spreading outside the floodplain area (PCM 2014). An additional aspect of reclamation would involve the establishment of a pool and riffle system within the channel bottom. The restored guide channel within a floodplain channel with the incorporation of the pool and riffle system would be functionally and morphologically analogous to the existing channel and floodplain systems. Minor tributaries to the major drainages would be constructed by contouring the reclaimed topography into swales rather than constructed channels. These minor tributaries would aid in controlling potential erosion by channelizing overland flow.

Surface runoff would be controlled by a series of detention berms, diversion ditches, and sedimentation ponds. All necessary hydrologic control facilities would be constructed according to applicable state and federal requirements. All mining related surface water discharges are permitted under a Wyoming Pollutant Discharge Elimination System (WYPDES) program under Permit No. WY0025755, which requires treatment, monitoring, and reporting of all surface discharges. A number of postmining impoundments would be constructed to replace premining features and to provide opportunities for stock and wildlife watering.

4.5.3 Water Rights

4.5.3.1 Direct and Indirect Effects

4.5.3.1.1 Proposed Action

Impacts to water rights would be the same as those described in section 3.5.3.2.1.3 of the 2009 SGAC EIS. Prior to energy development in the area, water appropriations (both groundwater and surface water) were typically for livestock use. However, mining companies currently hold the majority of the water rights.

As stated in section 3.5.2.1.3 of the 2009 SGAC EIS, some privately permitted water wells in the vicinity of the Caballo West tract have been or would likely be impacted (either by removing the well or by water level drawdown) by mining and CBNG development. Future drawdowns to the

Wyodak coal aquifer are expected to be negligible because the coal seam has essentially been dewatered. 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 under the Proposed Action although the duration of impacts would be extended.

Only attenuation of normal peak flows downstream of the Caballo Mine is expected under the Proposed Action, since runoff is currently being controlled as a result of mining unrelated to the tract. Therefore, it is unlikely that any of the privately permitted surface water rights would be impacted by removal of surface water features within the tract.

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 Caballo Mine permit area. Impacts to groundwater and surface water rights have already occurred from mining within the Caballo Mine 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 for livestock use and wildlife habitat. Under the Proposed Action impacts to groundwater and surface water rights would be minor and long-term.

4.5.3.1.2 No Action Alternative

The impacts to surface and groundwater rights under the No Action Alternative would be similar to those under the Proposed Action because impacts to groundwater and surface water have already occurred within the tract related to coal recovery on adjacent federal coal leases. Therefore, implementation of the No Action Alternative would have a minor effect on water rights.

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 2 miles of the tract are discussed in **section 3.5.3**. While the approval of the federal mining plan modification would contribute to additional, more extensive mining disturbance in the central group of mines, there would be minor additional cumulative water rights impacts because groundwater systems have already been affected by CBNG removal and ongoing mining and because runoff is currently being controlled by the mines.

The 2015 CHIA concluded that the limited amount of disturbance relative to the size of the Caballo Creek CIA makes it unlikely that water quality changes would be detectable at the point of accumulation at USGS Station No. 06425900. Because dilution from water outside the permit areas helps negate impacts to water quality, the potential for the mines to cumulatively impact surface water quality in the Caballo Creek CIA is likely low and no material damage to surface water quality is expected. Any impacts to downstream water rights would fall under the jurisdiction of the SEO.

The 2015 CHIA concluded that although coal mining will have impacts, the impacts would not cause irretrievable loss of the groundwater resource to support existing or reasonably foreseeable uses outside of the coal mine permit boundaries. In addition, as discussed in **section 4.5.1.3**, W.S. 35-11-415(b)(xii) requires that mines 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.

4.5.3.3 Mitigation Measures

Permit No. 433 requires PCM to cooperate with water right holders on site specific mitigation plans for all existing water rights affected by mining (PCM 2014). A typical mitigation plan would include documenting that drawdown has occurred, lowering the pump so that more water is available, and if necessary, installing a pump with a larger lift capacity. If further mitigation is needed or if the wells are disturbed by mining, Caballo would drill a new well into the Fort Union Formation below the coal seam, and a solar pump or windmill would be installed. The replacement plan would be finalized in consultation with the water right owner prior to drilling the replacement wells.

4.6 Alluvial Valley Floors

4.6.1 Direct and Indirect Effects

4.6.1.1 Proposed Action

The direct and indirect effects to AVFs would not be different from those described in section 3.6.2.1 of the 2009 SGAC EIS. Because the only AVFs on Tisdale Creek are located approximately 4 miles downstream of the Caballo West tract, there would be no direct and indirect effects to AVFs.

4.6.1.2 No Action Alternative

Impacts to the AVFs have resulted from current mining activity; therefore, implementation of the No Action Alternative would have a minor effect on AVFs.

4.6.2 Cumulative Effects

The cumulative effects to AVFs would not be significantly different than those described in section 4.2.6 of the 2009 SGAC EIS. Areas outside of the permitted mines have generally not been surveyed for the presence of AVFs; therefore, the locations and extent of the AVFs outside of the mine permit areas have not been determined. The cumulative effects on AVFs are expected to be negligible.

4.6.3 Mitigation Measures

No mitigation measures would be necessary for AVFs.

4.7 Wetlands/Aquatic Features

4.7.1 Direct and Indirect Effects

4.7.1.1 Proposed Action

The direct and indirect effects to wetlands would not be different from those described in section 3.7.2.1 of the 2009 SGAC EIS. Follow-up wetlands delineations and USACE determinations have shown that there are no jurisdictional wetlands and only 1.79 acres of aquatic features within and adjacent to the Caballo West tract. The Proposed Action would result in the loss of approximately 1.19 acres of aquatic features since approximately 0.60 acre have already been disturbed related to disturbance resulting from approved coal recovery from adjacent lands. Disturbed non-jurisdictional aquatic features would be replaced during the reclamation phase of

mining. The direct and indirect effects to aquatic features are expected to be minor and short-term.

4.7.1.2 No Action Alternative

Under the No Action Alternative impacts to non-jurisdictional aquatic features would be the same as the Proposed Action, but reduced by 1.19 acres.

4.7.2 Cumulative Effects:

Disturbed jurisdictional and non-jurisdictional features would be restored as required by the authorized federal, state, or private surface landowner, as specified in the mining permits, which are approved by WDEQ-LQD before mining operations would be conducted. Therefore, there would be no net loss of jurisdictional and non-jurisdictional features and cumulative impacts would be negligible.

4.7.3 Mitigation Measures

Disturbed non-jurisdictional aquatic features 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 commence.

4.8 Soil

4.8.1 Direct and Indirect Effects

4.8.1.1 Proposed Action

The direct and indirect effects to soils would not be different from those described in section 3.8.2.1 of the 2009 SGAC EIS. Soils within the Caballo West tract would be altered under the Proposed Action. Following reclamation, the replaced topsoil should support a stable and productive native vegetation community adequate in quantity and quality to support planned postmining land uses (i.e., rangeland and wildlife habitat). The direct and indirect effects related to the Proposed Action to soils would be moderate (866.7 acres of disturbance) and short-term.

4.8.1.2 No Action Alternative

The impacts to soils under the No Action Alternative would be similar to those under the Proposed Action although the impacts to approximately 866.7 acres would not occur.

4.8.2 Cumulative Effects

The cumulative impacts to soils would not be significantly different than those described in section 4.2.7 of the 2009 SGAC EIS. According to the 2015 CHIA, over the mid 2012 to early 2014 period, the life-of-mine disturbed acreage at the central group of mines totaled approximately 32,294 acres. Of this total, approximately 28 percent was actively mined, 28 percent was in long-term mining or reclamation facilities, and 44 percent had been backfilled and graded. Areas within active mines are progressively disturbed and would progressively be reclaimed by planting appropriate vegetation species to restore soil productivity and prevent soil erosion. The cumulative effects related to soils would be moderate and short-term.

4.8.3 Mitigation Measures

Suitable soil would be salvaged and stockpiled to support plant growth for use in reclamation. Sediment control structures would be built to trap eroded soil and revegetation would reduce wind erosion. PCM would replace all salvaged topsoil in a manner which ensures successful

revegetation and supports the postmining land uses. Regraded overburden would be sampled to verify suitability as subsoil for compliance with root zone criteria as specified by WDEQ-LQD Guideline No. 1A (Topsoil and Subsoil) (WDEQ LQD 2015c). Unsuitable materials would be removed and either treated, reblended or replaced with the required depth of suitable overburden material or the affected area would be capped such that a minimum of the required depth of suitable material exists.

4.9 Vegetation

4.9.1 Direct and Indirect Effects

4.9.1.1 Proposed Action

The direct and indirect effects to vegetation would not be different from those described in section 3.9.2.1 of the 2009 SGAC EIS. Direct effects associated with the removal of vegetation from the Caballo West tract would include increased soil erosion and habitat loss for wildlife and livestock over what is currently being experienced. Indirect effects on reclaimed lands would 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. As discussed in section 3.9.1, the Ute ladies'-tresses, which is listed as threatened, is the only plant T&E wildlife species with the potential of occurring in the area. This species was not located within the tract during surveys conducted in 2007, 2009, and 2010 and there are no critical habitats for this T&E species within the Caballo West tract.

Reclamation, including revegetation, would occur contemporaneously with mining on adjacent lands (i.e., reclamation would begin after an area is mined). In an effort to approximate premining conditions, PCM would plan to reestablish vegetation types during the reclamation operation that are similar to the premining types. Reestablished vegetation would be dominated by species mandated in the reclamation seed mixtures (to be approved by WDEQ-LQD). The reclamation plan for PCM includes steps to control invasion by weedy (invasive, nonnative) plant species. The direct and indirect effects related to the Proposed Action on vegetation would be moderate and short-term.

4.9.1.2 No Action Alternative

The impacts to vegetation under the No Action Alternative would be similar to those under the Proposed Action although the impacts to approximately 866.7 acres to recover federal coal would not occur.

4.9.2 Cumulative Effects

Cumulative effects would be similar to those described in **section 4.8.3**. The overall contribution to cumulative effects to vegetation would be minor due to the localized effects and the improved productivity on mined lands that have been reclaimed.

4.9.3 Mitigation Measures

Revegetation success would be evaluated until the final reclamation bond is released.

4.10 Wildlife

The direct and indirect effects to wildlife would not be different from those described in section 3.10.1.2 of the 2009 SGAC EIS. Impacts to wildlife that would result from mining the

Caballo West tract have been addressed by the WGFD and WDEQ-LQD when Permit No. 433 was amended to include the tract.

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

4.10.1 Raptors

4.10.1.1 Direct and Indirect Effects

4.10.1.1.1 Proposed Action

Intact raptor nests are located within the tract. However, based on the low number of nesting raptors within the tract and the PCM'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.

4.10.1.1.2 No Action Alternative

Under this alternative, disturbance related impacts to raptors in the area would continue, but the duration of impacts would be reduced by approximately 8.9 years.

4.10.1.2 Cumulative Impacts

The cumulative effects related to the Proposed Action on regional raptor populations would be moderate and short-term.

4.10.1.3 Mitigation Measures

No mitigation measures specific to raptors are necessary. PCM's general reclamation practices for establishing or enhancing post-mine wildlife habitat are described in the Reclamation Plan of Permit No. 433. PCM also has developed plans and procedures to minimize impacts to nesting raptors and ensure proper reclamation techniques are implemented to enhance habitat in the postmining landscape for raptors and their primary prey species.

4.10.2 Greater Sage-grouse (GRSG)

4.10.2.1 Direct and Indirect Effects

4.10.2.1.1 Proposed Action

As discussed in **section 3.10.2**, long-term results from annual lek monitoring suggest that the Caballo Mine permit area only supports GRSG when regional populations are especially high. Only one of the six historical leks with within the Caballo West tract 4-mile radius of concern has an occupied WGFD management status and this lek has not been active since 2009. The closest GRSG core area to the tract is the Thunder Basin core area, which is approximately 8.8 miles distant, and there are no winter concentration or connectivity areas near the tract. Ongoing 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. 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. 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 minor and short-term.

4.10.2.1.2 No Action Alternative

Under this alternative, disturbance related impacts to GRSG in the area would continue, but the duration of impacts would be reduced by approximately 8.9 years.

4.10.2.2 Cumulative Impacts

WGFD information for the central group of mines indicate that the average number of male grouse per lek (3.7) was down 45 percent in 2018 compared to 2017 (WGFD 2018). However, the average number of males per lek observed in 2018 was equal to the 10-year annual average (3.7) and the 3-year running average rate of change (linear trendline), based on 2009 through 2018 CIA lek average annual counts, increased over the time period. The cumulative effects on regional GRSG populations related to disturbance at the central group of mines would be moderate and short-term.

4.10.2.3 Mitigation Measures

No mitigation measures specific to GRSG are necessary. PCM's general reclamation practices for establishing or enhancing post-mine wildlife habitat are described in the Reclamation Plan of Permit No. 433. Shrub seedlings would be planted in shrub pockets to improve the beneficial effects of the shrubs for wildlife.

4.10.3 Threatened, Endangered, and Candidate Species and Species of Special Interest

4.10.3.1 Direct and Indirect Effects

4.10.3.1.1 Proposed Action

As discussed in **section 3.10.3.1**, the northern long-eared bat, which is listed as threatened, is the only vertebrate T&E wildlife species with the potential of occurring in the area. There are no critical habitats for this T&E species within the Caballo West tract or within Campbell County. According to the USFWS, the primary threat to the northern long-eared bat is WNS. The northern long-eared bat is also threatened by the loss and degradation of summer habitat, by collision with or barotrauma (injury to the lungs due to a change in air pressure) caused by wind turbines, and mine closures and vandalism of winter roosts and hibernacula. No wind turbines are within the general area and, as described in **section 3.10.3.1**, preferred roosting and reproductive habitats are limited in the Caballo Mine permit area and surrounding 1.0-mile monitoring area. However, potential foraging areas are present throughout the Caballo Mine permit area and surrounding monitoring area. No northern long-eared bat populations have been documented within the Caballo Mine survey area (permit area and 1.0-mile perimeter) (PCM 2018b).

Because the Caballo West tract lies within the AOI for the northern long-eared bat and the WNS zone, OSMRE has an obligation to consult with USFWS. OSMRE has complied with the programmatic biological opinion (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. On March 29, 2019 OSMRE received a memorandum from USFWS indicating that although the Proposed Action may affect the northern long-eared bat, there are no effects beyond those previously

disclosed in the USFWS’s programmatic biological opinion for the final 4(d) rule (USFWS 2019b). Therefore, the programmatic biological opinion satisfies OSRMRE’s responsibilities under section 7 of the ESA relative to the northern long-eared bat.

A discussion of SOSI that could potentially occur in the area is included in **section 3.10.3.2** and a list of these species is included in **appendix E**. This impacts assessment related to the Proposed Action focus on WGFD SGCN and the WGFD tier ranking. Of the 50 SOSI that could occur in the tract, 46 are SGCN, of which 24 have been observed in the area. Two of the WGFD SGCN (burrowing owl and mountain plover) are classified as Tier I species and both of these species have been observed in the area. The burrowing owl has been documented as nesting in the area, while the mountain plover has been recorded only rarely.

If present, these T&E species and SOSI would be temporarily displaced but current mining and reclamation practices in place at the Caballo Mine would protect species and promote the return of these species once reclamation has been completed. In an effort to approximate premining conditions, PCM would reestablish vegetation types during the reclamation operation that are similar to the premining types. The direct and indirect effects related to the Proposed Action on T&E species and SOSI would be moderate and short-term.

4.10.3.1.2 No Action Alternative

Under this alternative, disturbance related impacts to T&E species and SOSI would continue, but the duration of impacts would be reduced by approximately 8.9 years.

4.10.3.2 **Cumulative Impacts**

The cumulative effects on regional T&E species and other species of special interest populations would be related to disturbance at the central group of mines and would be moderate and short-term.

4.10.3.3 **Mitigation Measures**

No mitigation measures specific to T&E species and SOSI are necessary. The general reclamation practices for establishing or enhancing postmining wildlife habitat at the Caballo Mine described in the Reclamation Plan of Permit No. 433 are in place. Shrub seedlings would be planted in shrub pockets to improve the beneficial effects of the shrubs for SOSI.

4.11 Land Use and Recreation

4.11.1 Direct and Indirect Effects

4.11.1.1 **Proposed Action**

The direct and indirect effects to land use and recreation would not be different from those described in Section 3.11.2.1 of the 2009 SGAC EIS. Surface ownership within the Caballo West tract is private (PCM) and proposed coal removal is managed by the BLM. The primary land use impacts of the Proposed Action would be reduction of livestock grazing, loss of wildlife habitat, and curtailment of other mineral development. Livestock grazing has already been prohibited due to the tract being inside the permit boundary and adjacent to active mine areas. Hunting on the tract is currently not allowed because it is within the mine permit boundary and would continue to be disallowed during mining and reclamation. While non-coal mineral development would be curtailed on the tract, much of the CBNG has been depleted in the shallower production areas. Following reclamation, the land would be suitable for grazing and wildlife uses, which are the

historic land uses. Therefore, the direct and indirect effects related to land use would be negligible and short-term.

4.11.1.2 No Action Alternative

Under the No Action Alternative, disturbance related impacts would be the same as the Proposed Action, but disturbance would be reduced by approximately 866.7 acres.

4.11.2 Cumulative Impacts

Cumulative effects would be similar to those described in **section 4.8.3**. The overall contribution to cumulative effects to vegetation would be minor due to the localized effects and the improved productivity on mined lands that have been reclaimed.

Cumulative effects would be related to land use at the central group of mines. As described in **section 4.8.3**, disturbed acreage at the central group of mines totaled approximately 32,294 acres. Because 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 has been depleted. Therefore, cumulative impacts from the Proposed Action on land use would be negligible.

4.11.3 Mitigation Measures

No mitigation measures specific to land use and recreation are necessary.

4.12 Cultural Resources

4.12.1 Direct and Indirect Effects

4.12.1.1 Proposed Action

The direct and indirect effects to cultural resources would not be different from those described in section 3.12.2.1 of the 2009 SGAC EIS. The Caballo West tract has been subjected to Class III cultural resource inventories and none of the sites identified have been classified as NRHP eligible sites that would require mitigation prior to disturbance. The direct and indirect effects on cultural resource from the Proposed Action would be negligible but long-term.

Letters of consultation were sent out to 24 Native American tribes/tribal representatives during the scoping process. OSMRE received a response from the Comanche Nation indicating that the location of the Caballo West tract has been cross referenced with Comanche Nation site files and no properties were identified. OSMRE also received a response from the Cheyenne and Arapaho tribes indicating that Caballo West tract area has been categorized as No Adverse Effect.

4.12.1.2 No Action Alternative

Under the No Action Alternative, disturbance related impacts would be the same as the Proposed Action, but disturbance would be reduced by approximately 866.7 acres.

4.12.2 Cumulative Impacts

The individual evaluation of cultural resource sites in the central group of mines 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 minimal. 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

The direct and indirect effects to land use and recreation would not be different from those described in section 3.13.2.1 of the 2009 SGAC EIS. Potential direct effects would arise from disturbance associated with the Proposed Action and would cease upon reclamation. Potential indirect effects consist of permanent changes to existing topography and the vegetative component of the area, irrespective of reclamation success. 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 3,200 feet from the tract boundary. The direct and indirect effects related to visual resources could affect local residences and are therefore listed as moderate and long-term.

4.13.1.2 No Action Alternative

Under the No Action Alternative, visual resource related impacts would be the same as the Proposed Action, but disturbance would be reduced by approximately 866.7 acres.

4.13.2 Cumulative Impacts

Cumulative visual resources effects would be related to disturbance at central group of 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. 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 and long-term.

4.13.3 Mitigation Measures

Current BACT measures would continue to be employed at the Caballo Mine to control visibility impacts from particulates, which could affect visibility.

4.14 Noise

4.14.1 Direct and Indirect Effects

4.14.1.1 Proposed Action

The direct and indirect effects to noise would be the same as those described in section 3.14.2.1 of the 2009 SGAC EIS. Under the Proposed Action, noise levels would not increase but would be extended by 8.9 years. Potential blasting related noise impacts would be 53 dBA at the closest residence (approximately 3,200 feet to the west). Because of the remoteness of the Caballo West tract and because mining is already on going in the area, noise would have few off-site impacts. Wildlife in the immediate vicinity of the tract may be adversely affected by the noise during mining operations; however, anecdotal observations at surface coal mines in the area suggest that some wildlife may adapt to increased noise associated with coal mining activity. 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 and long-term.

4.14.1.2 No Action Alternative

Under the No Action Alternative, noise impacts would be the same as the Proposed Action, but the extent of the impacts would be reduced by approximately 8.9 years.

4.14.2 Cumulative Effects

Cumulative effects would be related to disturbance at central group of mines. Potential sources of noise disturbances include, but are not limited to, agriculture, mining, roads, urban areas, and oil and gas development. 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. The cumulative impacts related to noise as discerned by the public would be moderate but short-term.

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

The direct and indirect effects to transportation facilities would be the same as those described in section 3.15.2.1 of the 2009 SGAC EIS. Under the Proposed Action Bishop Road would be relocated, but other existing transportation facilities, including roads, railroads, coal conveyors, and overhead electrical transmission lines associated with the Caballo Mine would continue to be used. Relocation of Bishop Road would only result in minor impacts to existing traffic patterns, which has a low utilization and impacts would be short-term. The Proposed Action would not result in increased mine related traffic but would extend impacts by 8.9 years.

All of the coal mined at the Caballo Mine would continue to be transported by rail. Based on an estimated annual production rate of 13.5 Mt of coal shipped by rail and an estimated 15,470 tons of coal per train, the Proposed Action would result in approximately 873 train trips per year (one way). The variation in coal destinations and multiple rail transportation routes make it speculative to analyze the potential impacts to the entire rail corridor in detail. Under the Proposed Action, the number of trains shipping coal from Caballo Mine would not change, but the duration would be extended by 8.9 years.

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. 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 demonstrated 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).

Overall, the added direct and indirect effects of the Proposed Action on transportation would be minor and short-term.

4.15.1.2 No Action Alternative

Under the No Action Alternative, transportation impacts in the area would be the same as the Proposed Action, but the duration of the impacts would be reduced by approximately 8.9 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 central group of mines are already in place, and coal production and employment levels would not change.

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 Caballo Mine, 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 8.9 years at the Caballo Mine, and thus the duration of utilization of BNSF and UP rail lines would be extended by that amount.

The cumulative impacts related to transportation would be minor and short-term.

4.15.3 Mitigation Measures

No mitigation measures specific to transportation facilities are necessary.

4.16 Hazardous and Solid Waste

4.16.1 Direct and Indirect Effects

4.16.1.1 Proposed Action

The direct and indirect effects to hazardous and solid waste would not be different from those described in section 3.16.2.1 of the 2009 SGAC EIS. Under the Proposed Action hazardous and solid waste would not increase but generation would be extended by 8.9 years. Direct and indirect effects on hazardous and solid wastes would be minor and short-term.

4.16.1.2 No Action Alternative

Under the No Action Alternative, hazardous and solid wastes would continue to be generated at the Caballo Mine, but the duration of the impacts would be reduced by approximately 8.9 years.

4.16.2 Cumulative Impacts

Cumulative hazardous and solid wastes effects would be related to mining operations at the central group of mines. Potential impacts would cease upon project completion and successful reclamation in a given area. The cumulative impacts related to hazardous and solid waste as would be minor and short-term.

4.16.3 Mitigation Measures

No mitigation measures specific to hazardous and solid wastes are necessary.

4.17 Socioeconomics

4.17.1 Direct and Indirect Effects

4.17.1.1 Proposed Action

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 Caballo Mine. 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 from the Caballo Mine and Caballo West tract are provided in **table 4-9** and **table 4-10**, respectively.

Table 4-9. LOM Federal and State Revenues from Federal Coal Recovery within the Caballo Mine (millions of dollars)

Revenue Source	Total \$ Collected	Federal Revenue	State Revenue
Federal Mineral Royalties	693.6	346.8	346.8
Abandoned Mine Lands Fund	124.3	62.1	62.1
Severance Tax	286.0	-- ¹	286.0
Bonus Bid Annual Revenues ²	0.0	0.0	0.0
Ad Valorem Tax	234.1	-- ¹	234.1
Black Lung	18.7	18.7	-- ¹
Sales and Use Tax	35.6	-- ¹	35.6
Totals	1,392.3	427.6	964.7

¹ No revenues disbursed.

² No bonus bid revenues collected after 2016.

³ Total does not equal subtotals due to rounding.

Source: WWC calculation – provided in **appendix D**

Table 4-10. LOM Federal and State Revenues from Federal Coal Recovery within the Caballo West Tract (millions of dollars)

Revenue Source	Total \$ Collected	Fed Revenue	State Revenue
Federal Mineral Royalties	187.2	93.6	93.6
Abandoned Mine Lands Fund	33.5	16.8	16.8
Severance Tax	74.2	-- ¹	74.2
Bonus Bid Annual Revenues ²	0.0	0.0	0.0
Ad Valorem Tax	63.2	-- ¹	63.2
Black Lung	5.0	5.0	-- ¹
Sales and Use Tax	9.6	-- ¹	9.6
Totals	372.7	115.4	257.4

¹ No revenues disbursed.

² No bonus bid revenues collected after 2016.

Source: WWC calculation – provided in **appendix D**

Under the Proposed Action, Wyoming revenues generated from LOM Caballo Mine production could be increased by approximately \$257.4 million and federal revenues could be increased by \$115.4 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 economic impacts related to mining the federal coal.

Mining in the 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 Proposed Action, although the duration of employment for current employees would be extended.

No additional changes in the current socioeconomic situation are anticipated. Direct and indirect effects on socioeconomics under the Proposed Action would be moderate and short-term.

4.17.1.2 No Action Alternative

Under the No Action Alternative, approximately \$257.4 million of Wyoming revenues and approximately \$115.4 million of federal revenues would not be realized. The selection of the No Action Alternative would likely not result in direct job losses, but any revenue, state program funding, abandoned mine land fees, and black lung fees that might otherwise be generated by extending the LOM by 8.9 years would not be collected. In addition, the duration of employment for current employees would be reduced by 8.9 years. The No Action Alternative would result in moderate direct and indirect socioeconomic effects.

4.17.2 Cumulative Impacts

Cumulative effects would be related to socioeconomic conditions in Campbell County. Cumulative effects are not substantially 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. The cumulative effects on socioeconomics are expected to be moderate and short-term.

4.17.3 Mitigation Measures

No mitigation measures specific to reducing socioeconomic impacts are necessary.

4.18 Short-Term Uses and Long-Term Productivity

This section relates to the balance or trade-off between short-term uses and long-term productivity for each resource in relation to the Proposed Action. The discussions contained throughout this environmental consequences chapter, in the existing Caballo Mine federal mining plan, and in the 2009 SGAC EIS provide adequate analyses and relationships of short-term 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. These impacts range from negligible to moderate and short to long-term. For the Proposed Action, details regarding these impacts are presented in the preceding resource sections and the 2009 SGAC EIS. Unavoidable adverse effects are summarized in **table 4-11**.

Table 4-11. Unavoidable Adverse Effects of the Proposed Action

Resource	Unavoidable Adverse Effect
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 cannot be avoided during mining.
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.
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. Microbial and chemical impacts due to accelerated erosion and mixing of soil zones may occur as a result of disturbance.
Vegetation	Vegetation would be eliminated beginning with the initial disturbance and continuing until reclamation is complete. 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 Caballo West tract have been designated as eligible for listing on the NRHP. Undiscovered cultural resources could be impacted by surface disturbing activities. Any newly-discovered NRHP-eligible 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.
Noise	Noise would result from mining activities similar to the existing condition.
Transportation Facilities	State Highway 59 would continue to experience mine related traffic. Bishop Road may be relocated.
Hazardous and Solid Waste	Coal mining and associated coal processing would yield coal waste.

5.0 Consultation and Coordination

5.1 Public Comment Process

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 is available at: <https://www.wrcc.osmre.gov/initiatives/caballoMine.shtm>.

OSMRE released a public NOI to prepare the Caballo Mine Caballo West tract EA in the Gillette News Record on December 19, 2018 and again on February 8, 2019. Public outreach letters describing the EA and soliciting comments were mailed on December 19, 2018 and again on February 5, 2019 to a total of 172 recipients, including city governments, adjacent landowners, and other interested parties and 26 tribes/tribal representatives (see **Appendix A**). The legal notices and letters invited the public to comment on issues of concern related to the EA. Written comments were solicited until February 22, 2019. **Appendix B** presents a summary of the scoping comments received by the public. Seven comment letters were received during the public scoping period. Comment letters received during the public review period for this EA would be considered during the ASLM approval process.

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

Name	Organization	Project Responsibility
Elizabeth Shaeffer	OSMRE	Project Lead
Logan Sholar	OSMRE	Project Coordination
Gretchen Pinkham	OSMRE	Air Quality/Transportation
Roberta Martínez-Hernández	OSMRE	Hydrology
Jeremy Iliff	OSMRE	Cultural/Historical/Paleontological

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

Table 5-2. Third Party Contractor Personnel

Name	Organization	Project Responsibility	Education
Beth Kelly	WWC Engineering	Primary Author	B.S. Chemical Engineering
John Berry	WWC Engineering	Author, QAQC	B.S. Wildlife Management
Jack Fritz	WWC Engineering	QAQC	B.S. Chemical Engineering
Mal McGill	WWC Engineering	AutoCAD	A.S. Engineering

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/caballoMine.shtm>.

6.0 References

AirNow, 2019, Air Quality Index (AQI) Basics. Available on the internet as of January 2019:
<https://airnow.gov/>.

Barney, R., 2019, Personal communication between Reo Barney, WDEQ-AQD, and Beth Kelly, WWC Engineering, February 15, 2019.

Bureau of Land Management (BLM), 2008, BLM Manual 6840 – Special Status Species Management. Available on the internet as of December 2018:
https://www.blm.gov/sites/blm.gov/files/uploads/mediacenter_blmpolicymanual6840.pdf.

Bureau of Land Management (BLM), 2009, Environmental Impact Statement for the South Gillette Area Coal Lease Applications WYWI72585, WYWI73360, WYWI72657, WYWI61248. Available on the internet as of December 2018:
<https://eplanning.blm.gov/epl-front-office/eplanning/legacyProjectSite.do?methodName=renderLegacyProjectSite&projectId=67025>.

Bureau of Land Management (BLM), 2010, Record of Decision for the Caballo West Lease by Application, Campbell County, Wyoming WYWI72657. Available on the internet as of December 2018:
<https://eplanning.blm.gov/epl-front-office/eplanning/legacyProjectSite.do?methodName=renderLegacyProjectSite&projectId=67025>.

Bureau of Land Management (BLM), 2011, Caballo West LBA Coal Data Sheet. Available on the internet as of December 2018: https://eplanning.blm.gov/epl-front-office/projects/nepa/67025/101140/123162/Caballo_West_LBA.pdf.

Bureau of Land Management (BLM), 2015, Buffalo Field Office Approved Resource Management Plan, September 2015. Available on the internet as of December 2018:
<https://eplanning.blm.gov/epl-front-office/eplanning/planAndProjectSite.do?methodName=dispatchToPatternPage¤tPageId=48300>.

BNSF Railway (BNSF), 2016, BNSF Railway Statement on STB Coal Dust Decision, Coal Dust Frequently Asked Questions. Available on the internet as of April 2019:
<http://www.bnsf.com/ship-with-bnsf/energy/coal/coal-dust.html>.

Commission for Environmental Cooperation (CEC), 2011, North American Power Plant Air Emissions. Available on the internet as of December 2018:
<http://www3.cec.org/islandora/en/item/10236-north-american-power-plant-air-emissions-en.pdf>.

Department of Interior (DOI), 2004, Department of the Interior Departmental Manual Part 516. Available on the internet as of December 2018:

http://www.blm.gov/wo/st/en/prog/planning/nepa/webguide/departmental_manual.html.

Hydro-Engineering, LLC. (Hydro-Engineering), 2016, Gillette Area Groundwater Monitoring Organization (GAGMO) 35-year Report. Electronic copy only, available on request from OSMRE.

IML Air Science, 2013, Caballo Mine Ambient Air Monitoring Network, 4th Quarter & Annual Report 2013. Electronic copy only, available on request from OSMRE.

IML Air Science, 2014, Caballo Mine Ambient Air Monitoring Network, 4th Quarter & Annual Report 2014. Electronic copy only, available on request from OSMRE.

IML Air Science, 2015, Caballo Mine Ambient Air Monitoring Network, 4th Quarter & Annual Report 2015. Electronic copy only, available on request from OSMRE.

IML Air Science, 2016, Caballo Mine Ambient Air Monitoring Network, 4th Quarter & Annual Report 2016. Electronic copy only, available on request from OSMRE.

IML Air Science, 2017, Caballo Mine Ambient Air Monitoring Network, 4th Quarter & Annual Report 2017. Electronic copy only, available on request from OSMRE.

Interagency Monitoring of Protected Environments (IMPROVE), 2019, Data Acquired from Interagency Monitoring of Protected Visual Environments. Available on the internet as of January 2019: <http://vista.cira.colostate.edu/improve/>.

McVehil-Monnett Associates, Inc. (McVehil-Monnett), 2014, Air Quality Permit Application to Modify the Belle Ayr Mine. MMA Project Number 2578-13. Prepared for Alpha Coal West. Electronic copy only, available on request from OSMRE.

National Atmospheric Deposition Program (NADP), 2014, National Atmospheric Deposition Program 2013 Annual Summary. NADP Data Report 2014-01. Illinois State Water Survey, University of Illinois at Urbana-Champaign, IL. Available on the internet as of January 2019: <http://nadp.slh.wisc.edu/lib/dataReports.aspx>.

National Atmospheric Deposition Program (NADP), 2015, National Atmospheric Deposition Program 2014 Annual Summary. NADP Data Report 2015-01. Illinois State Water Survey, University of Illinois at Urbana-Champaign, IL. Available on the internet as of January 2019: <http://nadp.slh.wisc.edu/lib/dataReports.aspx>.

National Atmospheric Deposition Program (NADP), 2016, National Atmospheric Deposition Program 2015 Annual Summary. NADP Data Report 2016-02. Illinois State Water Survey, University of Illinois at Urbana-Champaign, IL. Available on the internet as of January 2019: <http://nadp.slh.wisc.edu/lib/dataReports.aspx>.

- National Atmospheric Deposition Program (NADP), 2017, National Atmospheric Deposition Program 2016 Annual Summary. NADP Data Report 2017-01. Illinois State Water Survey, University of Illinois at Urbana-Champaign, IL. Available on the internet as of January 2019: <http://nadp.slh.wisc.edu/lib/dataReports.aspx>.
- National Atmospheric Deposition Program (NADP), 2018, National Atmospheric Deposition Program 2017 Annual Summary. Wisconsin State Laboratory of Hygiene, University of Wisconsin-Madison, WI. Available on the internet as of January 2019: <http://nadp.slh.wisc.edu/lib/dataReports.aspx>.
- Natural Resource Conservation Service (NRCS), 2008, Letter to Jamie Eberly Regarding Prime Farmland within the Caballo West Tract. Electronic copy only, available on request from OSMRE.
- Natural Resource and Energy Explorer (NREX), 2018, Mapping Tool for Wyoming. Available on the internet as of December 2018: <https://nrex.wyo.gov/>.
- Natural Resources Revenue Data, 2019, Federal Production by Location. Available on the internet as of January 2019: <https://revenuedata.doi.gov/downloads/federal-production/>.
- Office of Management and Budget, 2003, Circular A-4, September 17, 2003. Available on the internet as of January 2019: <https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/circulars/A4/a-4.pdf>.
- Office of the Governor, 2015, State of Wyoming Executive Department Executive Order 2015-4 Greater Sage-Grouse Core Area Protection. Available on the internet as of December 2018: <http://psc.state.wy.us/pscdocs/download/SageGrouseExecOrder2015-7.pdf>.
- Office of Surface Mining Reclamation and Enforcement (OSMRE), 1989, REG-I 490-Handbook on Procedures for Implementing the NEPA; National Environmental Policy Act (NEPA) Handbook. Available on the internet as of December 2018: <http://www.osmre.gov/lrg/directives.shtm>.
- Office of Surface Mining Reclamation and Enforcement (OSMRE), 1999, REG-31 881-Preparation of Mining Plan Decision Documents. Available on the internet as of December 2018: <https://www.osmre.gov/lrg/directives.shtm>.
- Office of Surface Mining Reclamation and Enforcement (OSMRE), 2003, Letter from Guy Padgett (OSMRE) to Mark Rogaczewski (WDEQ-LQD). Electronic copy only, available on request from OSMRE.
- Office of Surface Mining Reclamation and Enforcement (OSMRE), 2012, Letter from Dale Herbert (OSMRE) to Mary Hopkins (Wyoming SHPO) RE: Cultural Resource Review of Caballo Mine's Southwest Amendment Area Peabody Powder River Operations, LLC. Electronic copy only, available on request from OSMRE.

- Office of Surface Mining Reclamation and Enforcement (OSMRE), 2017, Annual Evaluation Report for the Regulatory Program Administered by the Department of Environmental Quality – Land Quality Division of Wyoming, for Evaluation Year 2017. Available on the internet as of January 2019: <https://www.odocs.osmre.gov/>.
- Office of Surface Mining Reclamation and Enforcement (OSMRE), 2019a, Initiatives – Caballo Mine. Available on the internet as of January 2019: <https://www.wrcc.osmre.gov/initiatives.shtm>.
- Office of Surface Mining Reclamation and Enforcement (OSMRE), 2019b, Reclamation Performance Bonds - Bonding Overview. Available on the internet as of January 2019: <http://www.osmre.gov/resources/bonds/BondsOverview.shtm>.
- Pace, Thomas G., 2005, Examination of the Multiplier Used to Estimate PM_{2.5} Fugitive Dust Emissions from PM₁₀. Available on the internet as of January 2019: http://www3.epa.gov/ttnchie1/conference/ei14/session5/pace_pres.pdf.
- Peabody Caballo Mining, LLC (PCM), 2014, Caballo Mine Permit No. 433-T7, Southwest Amendment Submittal. Electronic copy only, available on request from OSMRE.
- Peabody Caballo Mining, LLC (PCM), 2017, 2017 Caballo Mine Emission Inventory. Electronic copy only, available on request from OSMRE.
- Peabody Caballo Mining, LLC (PCM), 2018a, Personal communication between Kim Cox, Caballo Mine, and Beth Kelly, WWC Engineering, November 30, 2018. Electronic copy only, available on request from OSMRE.
- Peabody Caballo Mining, LLC (PCM), 2018b, Caballo Mine Permit No. 433-T7, 2018 Annual Report, June 21, 2018. Electronic copy only, available on request from OSMRE.
- Peabody Caballo Mining, LLC (PCM), 2019, 2013-2018 Destination of Coal Report. Electronic copy only, available on request from OSMRE.
- Pitchford, M.L., and W.C. Malm, 1994, Development and Applications of a Standard Visual Index. *Atmospheric Environment* 28(5): 1,049-1,054. Electronic copy only, available on request from OSMRE.
- Ramboll Environ, 2016, Coal Dust from Rail Transport. Electronic copy only, available on request from OSMRE.
- Redhorse Corporation (Redhorse), 2016, Air Quality Permit Application to Modify the Cordero Rojo Mine Wyoming Air Quality Permit #MD-9943 Technical Support Document. Electronic copy only, available on request from OSMRE.

- Seattle Times, 2016, BNSF to study coal covers under tentative lawsuit agreement. Available on the internet as of April 2019: <https://www.seattletimes.com/seattle-news/environment/enviros-bnsf-railway-reach-agreement-in-coal-dust-lawsuit/>.
- Shelanski, H. and M. Obstfeld, 2015, Estimating the benefits from carbon dioxide emissions reductions. Office of Management and Budget. Available on the Internet as of January 2019: <https://www.whitehouse.gov/blog/2015/07/02/estimating-benefits-carbon-dioxide-emissions-reductions>.
- U.S. Army Corps of Engineers (USACE), 2010, Letter to Philip Murphree Regarding the Jurisdictional Determination Concerning Aquatic Sites within the Caballo Mine. Electronic copy only, available on request from OSMRE.
- U.S. Army Corps of Engineers (USACE), 2017, Letter to Philip Murphree Regarding the Authorization to Continue Operations within the Caballo Mine Permit Boundary. Electronic copy only, available on request from OSMRE.
- U.S. Bureau of Labor Statistics, 2018, Employment Status of the Civilian Non-Institutional Population 1976 to 2017 Averages. Available on the internet as of December 2018: <https://www.bls.gov/lau/home.htm>.
- U.S. Census Bureau (USCB), 2018, Community Facts-Find Popular Facts and Frequently Requested Data About your Community. Available from website as of December 2018: <https://factfinder.census.gov>.
- U.S. Energy Information Administration (EIA), 2017, Annual Coal Distribution Report 2017. Available on the internet as of January 2019: <https://www.eia.gov/coal/distribution/annual/>.
- U.S. Environmental Protection Agency (EPA), 2008, Direct Emissions from Stationary Combustion Sources. Available on the internet as of December 2018: <https://www.epa.gov/climateleadership>.
- U.S. Environmental Protection Agency (EPA), 2016, Report on the Environment, Acid Rain. Available on the internet as of December 2018: <https://cfpub.epa.gov/roe/indicator.cfm?i=1>.
- U.S. Environmental Protection Agency (EPA), 2018, Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2016. Available on the internet as of January 2019: <https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2016>.
- U.S. Environmental Protection Agency (EPA), 2019a, Outdoor Air Quality Data Monitor Values Report. Available on the internet as of January 2019: <https://www.epa.gov/outdoor-air-quality-data/monitor-values-report>.

- U.S. Environmental Protection Agency (EPA), 2019b, Toxics Release Inventory (TRI) Program. Available on the internet as of January 2019: <https://www.epa.gov/toxics-release-inventory-tri-program/tri-basic-data-files-calendar-years-1987-2017>.
- U.S. Environmental Protection Agency (EPA), 2019c, What is Acid Rain? Available on the internet as of January 2019: <https://www.epa.gov/acidrain/what-acid-rain>.
- U.S. Environmental Protection Agency (EPA), 2019d, Overview of Greenhouse Gases. Available on the internet as of January 2019: <https://www.epa.gov/ghgemissions/overview-greenhouse-gases>.
- U.S. Environmental Protection Agency (EPA), 2019e, Overview of Greenhouse Gases. Available on the internet as of January 2019: <https://www.epa.gov/energy/greenhouse-gases-equivalencies-calculator-calculations-and-references>.
- U.S. Environmental Protection Agency (EPA), 2019f, Air Quality Index Report. Available on the internet as of January 2019: <https://www.epa.gov/outdoor-air-quality-data/air-quality-index-report>.
- U.S. Environmental Protection Agency (EPA), 2019g, State Average Annual Emissions Trends. Available on the internet as of May 2019: <https://www.epa.gov/air-emissions-inventories/air-pollutant-emissions-trends-data>.
- U.S. Fish and Wildlife Service (USFWS), 2016, Endangered Species Midwest Region Fact Sheet: Northern Long-Eared Bat *Myotis septentrionalis*. Available on the internet as of January 2019: <https://www.fws.gov/midwest/endangered/mammals/nleb/nlebFactSheet.html>.
- U.S. Fish and Wildlife Service (USFWS), 2018a, Federally Listed, Proposed and Candidate Species, Northern Long-eared Bat. Available on the internet as of February 2018: <https://www.fws.gov/wyominges/Species/NLEBat.php>.
- U.S. Fish and Wildlife Service (USFWS), 2018b, List of Threatened and Endangered Species that may occur in your Proposed Project Location, and/or may be Affected by your Proposed Project. Electronic copy only, available on request from OSMRE.
- U.S. Fish and Wildlife Service (USFWS), 2019a, Northern Long-eared Bat Final 4(d) Rule. Available on the internet as of January 2019: <https://www.fws.gov/midwest/endangered/mammals/nleb/4drule.html>.
- U.S. Fish and Wildlife Service (USFWS), 2019b, Memorandum RE: Northern long-eared bat consultation for Caballo Mine West Tract Environmental Assessment. Electronic copy only, available on request from OSMRE.
- U.S. Geological Survey (USGS), 2016, National Climate Change Viewer. Available on the internet as of January 2019: https://www2.usgs.gov/climate_landuse/clu_rd/nccv.asp.

- Wyoming Department of Environmental Quality - Air Quality Division (WDEQ-AQD), 2006, Air Quality Permit MD-1477. Electronic copy only, available on request from OSMRE.
- Wyoming Department of Environmental Quality - Air Quality Division (WDEQ-AQD), 2014, Permit Waiver for Air Quality Permit MD-1477. Electronic copy only, available on request from OSMRE.
- Wyoming Department of Environmental Quality - Land Quality Division (WDEQ-LQD), 2012, Chapter 4 Environmental Protection Performance Standards for Surface Coal Mining Operations. Available on the internet as of January 2019:
<https://rules.wyo.gov/Search.aspx?mode=1>.
- Wyoming Department of Environmental Quality - Land Quality Division (WDEQ-LQD), 2013, Email from Craig Hults, WDEQ-LQD to Marilee O'Rourke (OSMRE) RE: Caballo Mine Southwest Amendment Cultural Inventory. Electronic copy only, available on request from OSMRE.
- Wyoming Department of Environmental Quality - Land Quality Division (WDEQ-LQD), 2014a, Guideline No. 20 Bond Release Categories and Submittal Procedures for Coal Mines. Available on the internet as of January 2019:
<http://deq.wyoming.gov/lqd/resources/guidelines/>.
- Wyoming Department of Environmental Quality - Land Quality Division (WDEQ-LQD), 2014b, Chapter 1 Authorities and Definitions for Surface Coal Mining Operations. Available on the internet as of January 2019: <https://rules.wyo.gov/Search.aspx?mode=1>.
- Wyoming Department of Environmental Quality - Land Quality Division (WDEQ-LQD), 2015a, Approval of Peabody Caballo Mining, LLC, Caballo Coal Mine Southwest Amendment (Permit No. 433-T7; TFN 5 2/363) Change No. 6 Amendment No. 1. Electronic copy only, available on request from OSMRE.
- Wyoming Department of Environmental Quality - Land Quality Division (WDEQ-LQD), 2015b, Cumulative Hydrologic Impact Assessment of Coal Mining in the Central Powder River Basin, November 2015, WDEQ-CHIA-37. Electronic copy only, available on request from OSMRE.
- Wyoming Department of Environmental Quality - Land Quality Division (WDEQ-LQD), 2015c, Guideline No. 1A Topsoil and Subsoil. Available on the internet as of January 2019:
<http://deq.wyoming.gov/lqd/resources/guidelines/>.
- Wyoming Department of Workforce Services (WDWS), 2008, Annual Report of the State Inspector of Mines of Wyoming. Available on the internet as of January 2019:
<http://www.wyomingworkforce.org/businesses/mines/info/>.

- Wyoming Department of Workforce Services (WDWS), 2011, Annual Report of the State Inspector of Mines of Wyoming. Available on the internet as of January 2019: <http://www.wyomingworkforce.org/businesses/mines/info/>.
- Wyoming Department of Workforce Services (WDWS), 2012, Annual Report of the State Inspector of Mines of Wyoming. Available on the internet as of January 2019: <http://www.wyomingworkforce.org/businesses/mines/info/>.
- Wyoming Department of Workforce Services (WDWS), 2013, Annual Report of the State Inspector of Mines of Wyoming. Available on the internet as of January 2019: <http://www.wyomingworkforce.org/businesses/mines/info/>.
- Wyoming Department of Workforce Services (WDWS), 2014, Annual Report of the State Inspector of Mines of Wyoming. Available on the internet as of January 2019: <http://www.wyomingworkforce.org/businesses/mines/info/>.
- Wyoming Department of Workforce Services (WDWS), 2015, Annual Report of the State Inspector of Mines of Wyoming. Available on the internet as of January 2019: <http://www.wyomingworkforce.org/businesses/mines/info/>.
- Wyoming Department of Workforce Services (WDWS), 2016, Annual Report of the State Inspector of Mines of Wyoming. Available on the internet as of January 2019: <http://www.wyomingworkforce.org/businesses/mines/info/>.
- Wyoming Department of Workforce Services (WDWS), 2017, Annual Report of the State Inspector of Mines of Wyoming. Available on the internet as of January 2019: <http://www.wyomingworkforce.org/businesses/mines/info/>.
- Wyoming Department of Workforce Services (WDWS), 2018, Wyoming Labor Force Trends May 2018, Vol. 55 No. 5. Available on the internet as of December 2018: <http://doe.state.wy.us/lmi/backiss.htm>.
- Wyoming Game and Fish Department (WGFD), 2018, Wyoming Game and Fish Department Unpublished Data – 2009-2017 Annual Lek Monitoring. Electronic copy only, available on request from OSMRE.
- Wyoming Game and Fish Department (WGFD), 2019, Wyoming Species of Greatest Conservation Need. Available on the internet as of January 2019: <https://wgfd.wyo.gov/WGFD/media/content/PDF/Habitat/SWAP/SGCN-Introduction.pdf>.
- Wyoming Oil and Gas Conservation Commission (WOGCC), 2018, Download. Available on the internet as of July 2018: <http://pipeline.wyo.gov/legacywogcce.cfm>.
- Wyoming Oil and Gas Conservation Commission (WOGCC), 2019, Well Search. Available on the internet as of January 2019: <http://pipeline.wyo.gov/legacywogcce.cfm>.

Wyoming State Engineer's Office (SEO), 2019, e-Permit Application and Water Rights Database. Available on the internet as of January 2019:
<https://sites.google.com/a/wyo.gov/seol/>.

Wyoming State Historic Preservation Office (SHPO), 2012, Letter from Joseph Daniel (SHPO) to Dale Herbort (OSMRE) RE: Cultural Resource Review of 16 sites on Caballo Mine, PT433 Peabody Powder Operations, LLC. Electronic copy only, available on request from OSMRE.

Wyoming State Historic Preservation Office (SHPO), 2019, Resource Definitions and Recording Guidelines. Available on the internet as of January 2019:
<http://wyoshpo.state.wy.us/index.php/programs/review-and-consultation-s106/guidelines-standards-and-legislation>.

WWC Engineering (WWC), 2019, GHG, Air Quality, and Socioeconomic Calculations located in Appendices C and D, respectively.

APPENDIX A

LEGAL NOTICES
FOR FEDERAL LEASE MODIFICATION APPROVAL
WYW172657

Public Notice
Caballo 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 implementation of a federal mining plan for the Caballo Mine West Tract for federal coal lease WYW172657 (the Project). 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 lease and sale of the federal coal included in the Caballo West LBA (WYW172657) was originally evaluated in the 2009 South Gillette Area Coal Lease Applications Environmental Impact Statement (2009 SGAC EIS). The coal was offered for sale in a sealed-bid, competitive lease process on August 17, 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 Alpha Wyoming Land Company was accepted. The lease was subsequently transferred from Alpha Wyoming Land Company to BTU Western Resources on July 24, 2012. BTU Western Resources owns and operates the Caballo Mine. 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 November 30, 2015, the Wyoming Department of Environmental Quality (WDEQ)/Land Quality Division (LQD) approved Caballo Coal Company's (CCC) application to amend the Mine Permit No. 433 to include 1,294 acres, which included the Caballo West 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). The Caballo 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 the Caballo Mine's permit area, approved in accordance with the Surface Mining Control and Reclamation Act. The amount of remaining recoverable federal coal authorized for recovery within currently approved federal mining plans is approximately 363.9 million tons (Mt). The Project proposes to add approximately 119.8 Mt of recoverable federal coal. The annual production rate used to calculate the environmental impacts resulting from the Proposed Action will be 13.5 million tons per year (Mtpy), which is the estimated future annual production rate suggested by CCC and is below the maximum permitted production rate of 35 Mtpy set by WDEQ/AQD air quality permit MD-1477. CCC started operation in 1979 and the mine will continue to operate until 2042 under the current, approved mining plan. Using the estimated 13.5 Mtpy production rate, the Project would extend the life of the mine by approximately 8.9 years, to 2051.

The EA will update, clarify, and provide new and additional environmental information for the Project that has become available since the 2009 SGAC EIS was approved and the lease was issued. As a result of the EA process, OSMRE will determine whether or not there are significant environmental impacts. An environmental impact statement will be prepared if the EA identifies significant impacts. If a finding of no significant impact is reached, and pursuant to 30 CFR 746.13, OSMRE will prepare and submit to the ASLM a mining plan decision document recommending approval, disapproval, or conditional approval of the mining plan. As required under the Mineral Leasing Act of 1920, the ASLM will approve, disapprove, or conditionally approve the mining plan approval document within the mining plan decision document.

Appendix A

ATTN: Caballo West Tract EA
C/O: Logan Sholar,
OSMRE Western Region
1999 Broadway, Suite 3320
Denver, CO 80202-3050

Comments may also be emailed to: osm-nepa-wy@osmre.gov, ensure the subject line reads: ATTN: OSMRE, Caballo West Tract EA. Comments should be received or postmarked no later than January 19, 2019 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 the Project may be obtained from Logan Sholar, telephone number (303) 293-5036 and the Project website provided below. When available, the EA and other supporting documentation will be posted at:
<http://www.wrcc.osmre.gov/initiatives/caballoMine.shtm>.

The OSMRE Western Region website was inaccessible from late December, 2018 through January, 2019 due to the government shutdown. Therefore, OSMRE is extending the scoping period for the preparation of an Environmental Assessment (EA) for the Caballo Mine West Tract new Federal mining plan for an additional 15 days. Scoping comments will be accepted from February 7, 2019 to February 22, 2019.

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 implementation of a federal mining plan for the Caballo Mine West Tract for federal coal lease WYW172657 (the Project). 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 lease and sale of the federal coal included in the Caballo West LBA (WYW172657) was originally evaluated in the 2009 South Gillette Area Coal Lease Applications Environmental Impact Statement (2009 SGAC EIS). The coal was offered for sale in a sealed-bid, competitive lease process on August 17, 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 Alpha Wyoming Land Company was accepted. The lease was subsequently transferred from Alpha Wyoming Land Company to BTU Western Resources on July 24, 2012. BTU Western Resources owns and operates the Caballo Mine. 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 November 30, 2015, the Wyoming Department of Environmental Quality (WDEQ)/Land Quality Division (LQD) approved Caballo Coal Company's (CCC) application to amend the Mine Permit No. 433 to include 1,294 acres, which included the Caballo West 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). The Caballo 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 the Caballo Mine's permit area, approved in accordance with the Surface Mining Control and Reclamation Act. The amount of remaining recoverable federal coal authorized for recovery within currently approved federal mining plans is approximately 363.9 million tons (Mt). The Project proposes to add approximately 119.8 Mt of recoverable federal coal. The annual production rate used to calculate the environmental impacts resulting from the Proposed Action will be 13.5 million tons per year (Mtpy), which is the estimated future annual production rate suggested by CCC and is below the maximum permitted production rate of 35 Mtpy set by WDEQ/AQD air quality permit MD-1477. CCC started operation in 1979 and the mine will continue to operate until 2042 under the current, approved mining plan. Using the estimated 13.5 Mtpy production rate, the Project would extend the life of the mine by approximately 8.9 years, to 2051.

The EA will update, clarify, and provide new and additional environmental information for the Project that has become available since the 2009 SGAC EIS was approved and the lease was issued. As a result of the EA process, OSMRE will determine whether or not there are significant environmental impacts. An environmental impact statement will be prepared if the EA identifies significant impacts. If a finding of no significant impact is reached, and pursuant to 30 CFR 746.13, OSMRE will prepare and submit to the ASLM a mining plan decision document recommending approval, disapproval, or conditional approval of the mining plan. As required under the Mineral Leasing Act of 1920, the ASLM will approve, disapprove, or conditionally approve the mining plan approval document within the mining plan decision document.

Appendix A

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: Caballo West Tract EA
C/O: Logan Sholar
OSMRE Western Region
1999 Broadway, Suite 3320,
Denver, CO 80202-3050

Comments may also be emailed to: osm-nepa-wy@osmre.gov, ensure the subject line reads: ATTN: OSMRE, Caballo West Tract EA. Comments should be received or postmarked no later than February 22, 2019 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 the Project may be obtained from Logan Sholar, telephone number (303) 293-5036 and the Project website provided below. When available, the EA and other supporting documentation will be posted at:

<http://www.wrcc.osmre.gov/initiatives/caballoMine.shtm>.



United States Department of the Interior

OFFICE OF SURFACE MINING
RECLAMATION AND ENFORCEMENT

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



December 19, 2018

Dear Stakeholders and Interested Parties,

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 implementation of a federal mining plan for the Caballo West Tract for federal coal lease WYW172657 (the Project). 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 lease and sale of the federal coal included in the Caballo West LBA (WYW172657) was originally evaluated in the 2009 South Gillette Area Coal Lease Applications Environmental Impact Statement (2009 SGAC EIS). The coal was offered for sale in a sealed-bid, competitive lease process on August 17, 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 Alpha Wyoming Land Company was accepted. The lease was subsequently transferred from Alpha Wyoming Land Company to BTU Western Resources on July 24, 2012. BTU Western Resources owns and operates the Caballo Mine. 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 November 30, 2015, the Wyoming Department of Environmental Quality (WDEQ)/Land Quality Division (LQD) approved Caballo Coal Company's (CCC) application to amend the Mine Permit No. 433 to include 1,294 acres, which included the Caballo West 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). The Caballo 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 the Caballo Mine's permit area, approved in accordance with the Surface Mining Control and Reclamation Act. The amount of remaining recoverable federal coal authorized for recovery within currently approved federal mining plans is approximately 363.9 million tons (Mt). The Project proposes to add approximately 119.8 Mt of recoverable federal coal. The annual production rate used to calculate the environmental impacts resulting from the Proposed Action will be 13.5 million tons per year (Mtpy), which is the estimated future annual production rate suggested by CCC and is below the maximum permitted production rate of 35 Mtpy set by WDEQ/AQD air quality permit MD-1477. CCC started operation in 1976 and the mine will continue to operate until 2042 under the current, approved mining plan. Using the estimated 13.5 Mtpy production rate, the Project would extend the life of the mine by approximately 8.9 years, to 2051.

Appendix A

The EA will update, clarify, and provide new and additional environmental information for the Project that has become available since the 2009 SGAC EIS was approved and the lease was issued. As a result of the EA process, OSMRE will determine whether or not there are significant environmental impacts related to the Project. An environmental impact statement will be prepared if the EA identifies significant impacts. If a finding of no significant impact (FONSI) is reached, and pursuant to 30 CFR § 746.13, OSMRE will prepare and submit to the ASLM a mining plan decision document recommending approval, disapproval, or conditional approval of the mining plan. As required under the Mineral Leasing Act of 1920, the ASLM will approve, disapprove, or conditionally approve the federal mining plan document within the mining plan decision document.

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: Caballo West Tract EA
C/O: Logan Sholar
OSMRE Western Region
1999 Broadway, Suite 3320,
Denver, CO 80202-3050

Comments may also be emailed to: osm-nepa-wy@osmre.gov, ensure the subject line reads: ATTN: OSMRE, Caballo West Tract EA. Comments should be received or postmarked no later than January 19, 2019 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 the Project may be obtained from Logan Sholar, telephone number (303) 293-5036 and the Project website provided below. When available, the EA and other supporting documentation will be posted at:
<http://www.wrcc.osmre.gov/initiatives/caballoMine.shtm>

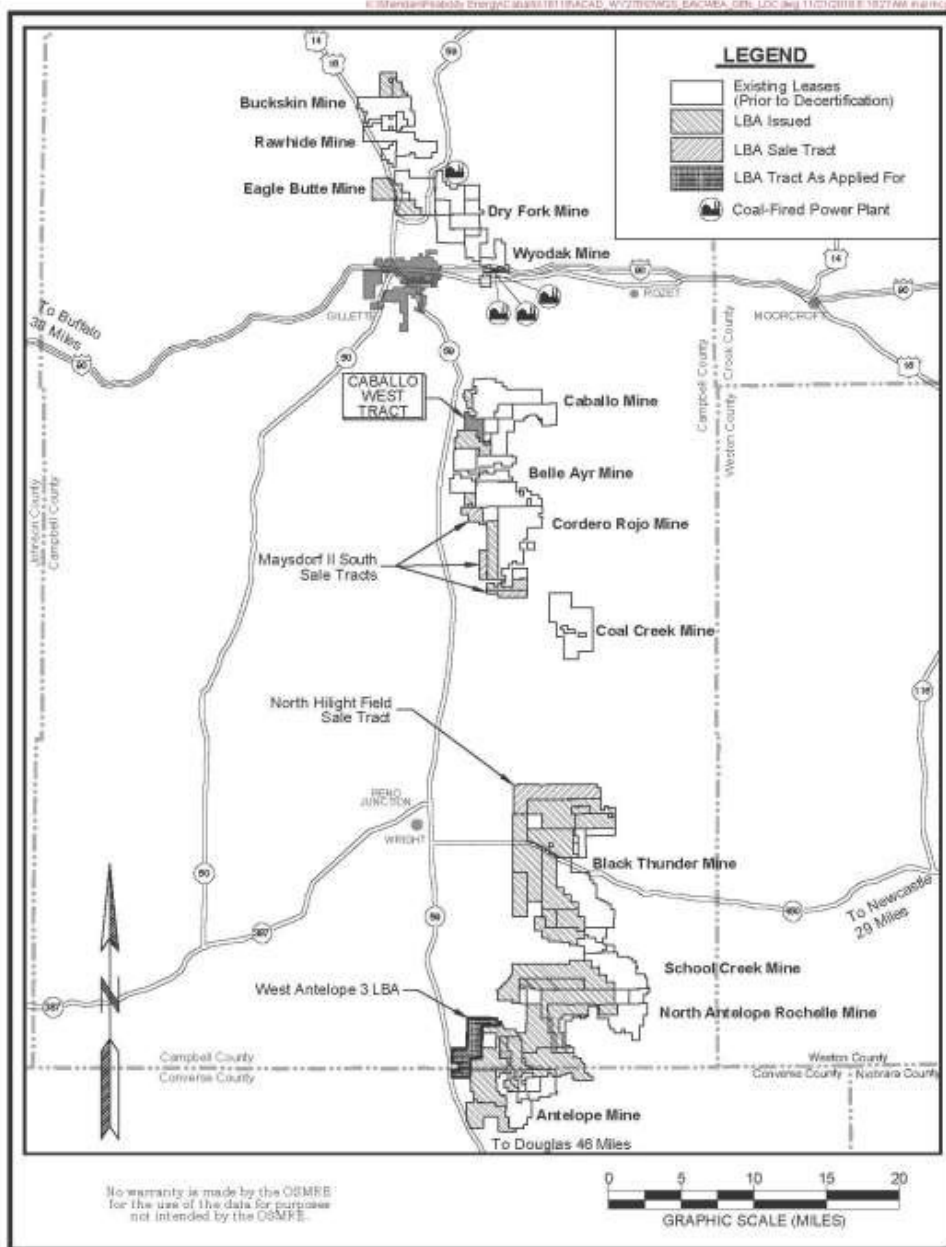
Sincerely,



Elizabeth Shaeffer, Manager
Field Operations Branch

Attachment – Location Map

Appendix A



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

February 5, 2019

Dear Stakeholders and Interested Parties,

The OSMRE Western Region website was inaccessible from late December, 2018 through January, 2019 due to the government shutdown. Therefore, OSMRE is extending the scoping period for the preparation of an Environmental Assessment (EA) for the Caballo Mine West Tract new Federal mining plan for an additional 15 days. Scoping comments will be accepted from February 7, 2019 to February 22, 2019.

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 implementation of a federal mining plan for the Caballo West Tract for federal coal lease WYW172657 (the Project). 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 lease and sale of the federal coal included in the Caballo West LBA (WYW172657) was originally evaluated in the 2009 South Gillette Area Coal Lease Applications Environmental Impact Statement (2009 SGAC EIS). The coal was offered for sale in a sealed-bid, competitive lease process on August 17, 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 Alpha Wyoming Land Company was accepted. The lease was subsequently transferred from Alpha Wyoming Land Company to BTU Western Resources on July 24, 2012. BTU Western Resources owns and operates the Caballo Mine. 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 November 30, 2015, the Wyoming Department of Environmental Quality (WDEQ)/Land Quality Division (LQD) approved Caballo Coal Company's (CCC) application to amend the Mine Permit No. 433 to include 1,294 acres, which included the Caballo West 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). The Caballo 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 the Caballo Mine's permit area, approved in accordance with the Surface Mining Control and Reclamation Act. The amount of remaining recoverable federal coal authorized for recovery within currently approved federal mining plans is approximately 363.9 million tons (Mt). The Project proposes to add approximately 119.8 Mt of recoverable federal coal. The annual production rate used to calculate the environmental impacts resulting from the Proposed Action will be 13.5 million tons per year (Mtpy), which is the estimated future annual production rate suggested by CCC and is below the maximum permitted production rate of 35 Mtpy set by WDEQ/AQD air quality permit MD-1477.

Appendix A

CCC started operation in 1976 and the mine will continue to operate until 2042 under the current, approved mining plan. Using the estimated 13.5 Mtpy production rate, the Project would extend the life of the mine by approximately 8.9 years, to 2051.

The EA will update, clarify, and provide new and additional environmental information for the Project that has become available since the 2009 SGAC EIS was approved and the lease was issued. As a result of the EA process, OSMRE will determine whether or not there are significant environmental impacts related to the Project. An environmental impact statement will be prepared if the EA identifies significant impacts. If a finding of no significant impact (FONSI) is reached, and pursuant to 30 CFR § 746.13, OSMRE will prepare and submit to the ASLM a mining plan decision document recommending approval, disapproval, or conditional approval of the mining plan. As required under the Mineral Leasing Act of 1920, the ASLM will approve, disapprove, or conditionally approve the federal mining plan document within the mining plan decision document.

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: Caballo West Tract EA
C/O: Logan Sholar
OSMRE Western Region
1999 Broadway, Suite 3320,
Denver, CO 80202-3050

Comments may also be emailed to: osm-nepa-wy@osmre.gov, ensure the subject line reads: ATTN: OSMRE, Caballo West Tract EA. Comments should be received or postmarked no later than February 22, 2019 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 the Project may be obtained from Logan Sholar, telephone number (303) 293-5036 and the Project website provided below. When available, the EA and other supporting documentation will be posted at: <http://www.wrcc.osmre.gov/initiatives/caballoMine.shtm>.

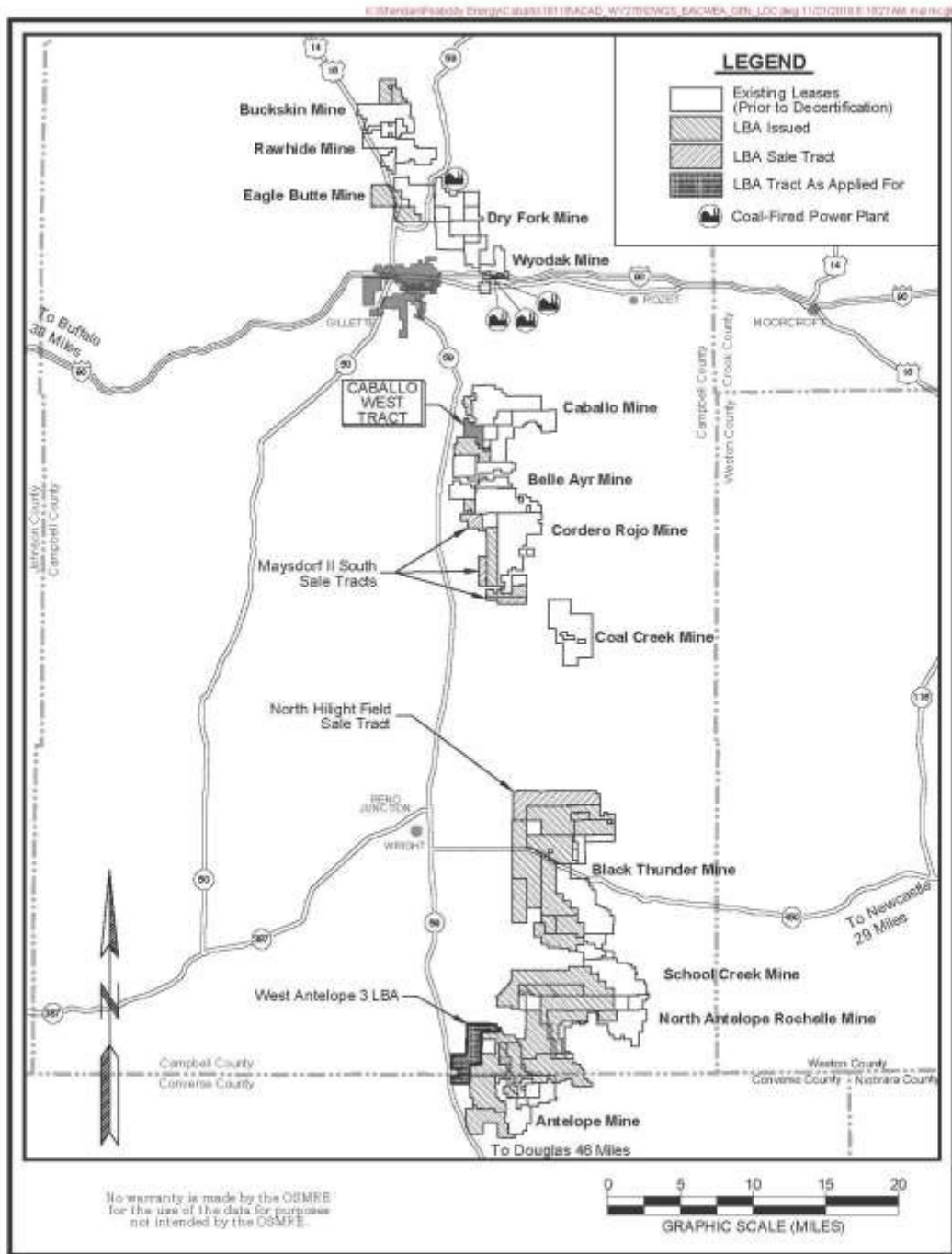
Sincerely,



Elizabeth Shaeffer, Manager
Field Operations Branch

Attachment – Location Map

Appendix A



APPENDIX B

PUBLIC SCOPING AND NOTICE OF AVAILABILITY MAILING LISTS
and
PUBLIC SCOPING COMMENT SUMMARIES
and
EA REVIEW COMMENT SUMMARIES and RESPONSES
(INDIVIDUAL LETTERS RECEIVED HAVE NOT BEEN INCLUDED)

Appendix B

Mailing List

Name	Title	
Tribes		
Vernon Hill	Chairman	Eastern Shoshone Business Council
Dean Goggles	Chairman	Northern Arapaho Business Council
Shaun Chapoose	Chairperson	The Ute Tribe of the Uintah and Ouray Reservation
Harold C. Frazier	Chairman	Cheyenne River Sioux Tribal Government
Roxanne Sazue	Chairwoman	Crow Creek Sioux Tribe
Wanda Wells	Cultural Affairs	Crow Creek Sioux Tribe
Anthony Reider	President	Flandreau Santee Sioux Tribe
Michael Jandreau	Chairman	Lower Brule Sioux Tribe
Clair Green	Cultural Resources/Public Affairs	Lower Brule Sioux Tribe
John Yellow Bird Steele	President	Oglala Sioux Tribal Council
William Kindle	President	Rosebud Sioux Tribe
Garryl Rousseau Sr.	Vice-Chairman or Acting Chairman	Sisseton-Wahpeton Oyate Tribes
Robert Flying Hawk	Chairman	Yankton Sioux Tribe
Lyman Guy	Tribal Chairman	Apache Tribe of Oklahoma
Lisa Martin	Tribal Council Coordinator	Cheyenne-Arapaho Tribes of Oklahoma
Wallace Coffey	Chairman	Comanche Nation Tribe
Amber Toppah	Lady Chairman	Kiowa Business Committee
Roger Trudell	Chairman	Santee Sioux Tribe of Nebraska
Mark Fox	Chairman	MHA Nation Tribal Council, Three Affiliated Tribes
Dave Archambault II	Chairman	Standing Rock Sioux Tribe
Vernon Finley	Chairman	Confederated Salish and Kootenai Tribes of the Flathead
Floyd Azure	Chairman	Ft. Peck Assiniboine and Sioux Tribes
Harry Barnes	Chairman	Blackfeet Tribal Business Council
Darrin Old Coyote	Chairman	Crow Tribal Council
Llevando "Cowboy" Fisher Sr.	President	Northern Cheyenne Tribal Council
Blaine Edmo	Chairman	Shoshone-Bannock Tribes of the Fort Hall Reservation
Federal, State, and Local Agencies		
Doug Miyamoto	Director	Wyoming Department of Agriculture
Todd Parfitt	Director	Wyoming Department of Environmental Quality
Mark Rogaczewski	District 3 Supervisor	WDEQ Land Quality Division
David Waterstreet	MANAGER	WDEQ WATERSHED PROTECTION SECTION
Scott Talbott	Director	Wyoming Department of Game and Fish
Mary Hopkins	SHPO	Wyoming Historic Preservation Office, SHPO
Milward Simpson	Director	Wyoming Department of Parks and Cultural Resources
Stephanie Pyle	Senior Administrator	Wyoming Department of Public Health
Bridget Hill	Director	Office of State Lands and Investment
Josh Van Vlack	State Forester	Wyoming Forestry Division
Bill Panos	Director	Wyoming Department of Transportation
Brian Lovett	Executive Director	Wyoming Industrial Siting Agency
Erin Campbell	Director/State Geologist	Wyoming Geological Survey
Dan Noble	Director	Wyoming Department of Revenue

Appendix B

Name	Title	
Mark W. Watson	Director	Wyoming Oil and Gas Conservation Commission
Patrick T. Tyrrell	State Engineer	Wyoming State Engineer's Office
Domenic Bravo	Division Administrator	Wyoming State Parks, Historic Sites & Trails Division
Harry C. LaBonde	Director	Wyoming Water Development Commission
		Wyoming Office of the Governor
John Cox	Director	Wyoming Department of Workforce Services
Diane Shober	Executive Director	Wyoming Office of Tourism Board
Alan B. Minier	Chairman	Wyoming Public Service Commission
	Economic Analysis Division	Wyoming Department of Administration and Information
Mark Gordon	Wyoming State Treasurer	Office of the State Treasurer
Nancy Vehr	Air Quality Administrator	WY DEQ Air Quality Division
Sarah Needles	Cultural Resources Division Administrator	WY State Historic Pres Office
Kyle Wendtland	LQD Administrator	Wyoming LQD - DEQ
		Wyoming State Board of Land Commissioners
Tony Glover	Manager	WY Dept of Workforce & Planning, Research & Planning
Chris Wichmann	Manager	Wyoming Dept of Agriculture - Natural Resources &
Mark Christensen		Campbell County Commissioners
Dr. Garry Becker		Campbell County Commissioners
Matt Avery		Campbell County Commissioners
Rusty Bell		Campbell County Commissioners
Micky Shober		Campbell County Commissioners
		Campbell County Airport
Keith Bowar	Chief Building Official	Campbell County Building Division
Megan Nelms	AICP, County Planner & Zoning	Campbell County Planning & Zoning Division
David King	CCEMA Coordinator	Campbell County Emergency Management
Bill Shank	Fire Chief	Campbell County Fire Department
Dave McCormick	Executive Director	Campbell County Parks and Recreation
Kevin King, P.E.	Director	Campbell County Department of Public Works
Kevin F. Geis, P.E.	Executive Director	Campbell County Road & Bridge
Quade Schmelzle	Director	Campbell County Weed & Pest
		Campbell County Conservation District
		Campbell County School District I
	Executive Director	Campbell County Economic Development Corporation
		Campbell County Public Land Board
Tom Langston		Gillette Department of Commercial Development
Louise Carter-King	Mayor	City of Gillette
Kevin McGrath	City Council	City of Gillette
Tim Carsrud	City Council	City of Gillette
Robin Kuntz	City Council	City of Gillette
Dan Barks	City Council	City of Gillette
Billy Montgomery	City Council	City of Gillette
Ted Jerred	City Council	City of Gillette
Dustin Hamilton	Development Services Director	City of Gillette

Appendix B

Name	Title	
Sawley Wilde	Public Works Director	City of Gillette
Kendall Glover	Director of Utilities	City of Gillette
Jim Hloucal	Chief of Police	City of Gillette
Pam Boger	Administrative Services Director	City of Gillette
Cartier Napier	City Administrator	City of Gillette
Hon. Matthew H. Mead	Governor	Wyoming Governor
Representative Scott Clem	District HD31	Wyoming Legislature
Representative Roy Edwards	District HD53	Wyoming Legislature
Representative Bill Pownall	District HD52	Wyoming Legislature
Senator Ogden Driskill	District SD01	Wyoming Legislature
Senator Michael Von Flatern	District SD24	Wyoming Legislature
Darryl LaCounte	Regional Director	Rocky Mountain Regional Office, Bureau of Indian Affairs
Carlie Ronca	Area Manager	Wyoming Area Office, Bureau of Reclamation
		Wyoming Regulatory Office, US Army Corps of
Mary Jo Rugwell	State Director	Wyoming State Office, Bureau of Land Management
Stephanie Connolly	High Plains District Manager	High Plains District Office, Bureau of Land Management
Mitchell Leverette	Division Chief	Bureau of Land Management
Jamie Connell	State Director	Montana State Office, Bureau of Land Management
Todd Yeager		Miles City Office, Bureau of Land Management
Duane Spencer		Buffalo Field Office, Bureau of Land Management
Rhen Etzelmiller		Casper Field Office, Bureau of Land Management
		Library, Bureau of Land Management
	Coal Coordinator	Montana State Office, Bureau of Land Management
	Coal Coordinator	Wyoming State Office, Bureau of Land Management
Lawrence S. Roberts	Acting Assistant Secretary	Bureau of Indian Affairs
	Environmental Division	US Air Force Headquarters/CEVP
		NPS
		NPS - Air Quality
		NPS Air Resources Division
		NPS 2310
		U.S. Department of Energy
Shaun McGrath	Administrator	US EPA, Region 8
Mark Sattelberg	Field Supervisor	Wyoming Ecological Services Field Office, US Fish and
Dennis Jaeger	Forest Supervisor's Office	Thunder Basin National Grassland, USDA Forest Service
		Devils Tower National Monument, National Park Service
Astrid Martinez	State Conservationist	Wyoming State Office, Natural Resources Conservation
Marcello Calle		Office of Surface Mining Reclamation and Enforcement
		Advisory Council on Historic Preservation
		US Army Corps of Engineers
		US EPA
	Ecological Services	US Fish and Wildlife Service
		US Geological Survey
	BLM Cooperator Lead	USDA-FS Douglas Ranger District

Appendix B

Name	Title	
		USGS Water Resources Division
		US Fish and Wildlife Service, Ecological Services
		US Army Corps of Engineers
		US EPA
		US Geological Survey
Michael Enzi	US Senate	Gillette Office
John Barrasso	US Senate	Casper Office
Liz Cheney	US House of Representatives	Casper Office
Businesses and Individuals		
Contura Wyoming Land, LLC		
Peabody Caballo Mining, LLC		
Rourke, Linda K., Trustee % First Interstate		
Rourke, Paul Donald, et al		
State of Wyoming Commissioner of Public		
Bertalot, Dusty		
Bertalot, Kenneth K. and Angela M.		
BTU Western Resources, Inc.		
Conkey, Bonnie A.		
Edwards, Joseph Leon		
Johnson, Steven E. and Debora		
Love, Harry E., Jr.		
Miller, Gary D. and Patty		
Miller, Glenn E. and Susan C. Mirich-Miller		
Mark Thrall		Belle Ayr Mine
H.A. True		President, Belle Fourche Pipeline Company
Mitchell J. Reneau		VP Land, Bill Barrett Corporation
		Biodiversity Conservation Alliance
		BNSF Railway Company
		Buckskin Mine-Kiewit Mining Group
		Casper Star Tribune
Amy M. Atwood		Center for Biological Diversity
John Trummel		Cloud Peak Energy
		Converse County Commission
Dr. Dan Espelan		Converse County School District #1
Kirk M. Hughes		Converse County School District #2
Paul W. Musselman		Converse Cty, Special Projects
		Cordero Rojo Mine
		Defenders of Wildlife
		Devils Tower National Monument
Matt Adelman		Publisher, Douglas Budget
		Environmental Policy and Culture Program
		Federation for North American Wild Sheep
Energy Reporter		Gillette News-Record

Appendix B

Name	Title	
Steve Bullock		Governor of Montana
Scott Child		Interwest Mining Company
Joe Mehl		Kiewit Mining Group Inc
Jim McLeland		M&K Oil Company Inc
Greg Julian		Mineral Management Service
Hal Quinn		National Mining Association
		National Wildlife Federation
		Natural Resources Defense Council
Shannon Anderson		Powder River Basin Resource Council
Phil Dinsmoor		Powder River Coal Company
Bob Comer		Rocky Mtn Region Solicitor
Peter Morgan		Sierra Club
Lecia Craft		Thunder Basin Coal Company
Ralph Kingan		Mayor, Town of Wright
Roger Miller		President, Trout Unlimited
Lance Fritz		President, Chief Executive Officer, Union Pacific Railroad
		US West Communications (Qwest Corp.)
Jason M. Ryan		Business Analytics Director, US Western Surface
Wendi Chatman		UW Libraries
Taylor Jones		WildEarth Guardians
Mike Evers		WWC Engineering
		WY Business Council
Bill Schilling		Wyoming Business Alliance
Matt Grant		Wyoming Mining Association
Gary Wilmont		Wyoming Outdoor Council
Niels Hansen		Wyoming Stock Growers Assoc
Steve Kilpatrick		Wyoming Wildlife Federation
Amy Wallop-Hendrickson		Wyoming Wool Growers Association, Executive
Mike McCracken	Publisher	Wyoming-Tribune Eagle
Katie Parker		Yates Petroleum Corp et al

Appendix B

Caballo West Tract EA Public Outreach (Scoping) Comments Summary

Comment Date	Water Quality	Air Quality	Wildlife	Level of NEPA/ NEPA Process	Reclamation/ Self Bonding	Climate Change/ Global Warming	Transportation	Pro Mining	# of Comments
1/10/19	1								1
1/11/19	1	1							2
1/18/19									0
1/18/19	1	1		1	1	1			5
1/18/19									0
1/18/19							1		1
1/22/19	1	1	1	1		1			6
2/21/19								1	1
	4	3	1	2	1	2	1	1	13

Commenter: Wyoming Game and Fish Department

Comment: The staff of the Wyoming Game and Fish Department (Department) has reviewed the proposed Environmental Assessment and Finding of no Significant Impact for the Caballo Mine West Tract Federal Mining Plan Modification (WYW172657) located in Campbell County. We have no terrestrial or aquatic concerns pertaining to this mining plan modification.

Response: Noted

Commenter: Wyoming Department of Transportation

Comment: Thank you for the opportunity to comment but we have no concerns at this time.

Response: Noted

Commenter: Environmental Defense Fund, Institute for Policy Integrity at New York University School of Law, Montana Environmental Information Center, WildEarth Guardians

Comment: The Caballo Mine is located in the Powder River Basin. The Caballo Mine West Tract extension would extend the life of the mine by approximately nine years, from 2042-2051, and increase the amount of coal mined from an average of 10.1 million tons per year to approximately 13.5 tons per year. OSM estimates and quantifies direct upstream, indirect, and downstream greenhouse gas emissions from the additional coal mining, with downstream emissions amounting to over 23 million tons of carbon dioxide equivalent each year, extending decades into the future.³ Yet the EA does not include a monetized estimate of any of the actual, real-world climate damages those emissions will produce. When compared to the no action alternative, the scenario that OSM proposes would result in billions of dollars in additional climate impacts.

OSM uses faulty reasoning to defend why it has chosen not to use the social cost of greenhouse gases metric to monetize the plan's emissions. OSM's arguments are wrong, and these comments explain why OSM reasoning is flawed and how OSM has violated its obligations under the National Environmental Policy Act (NEPA). Specifically, we make the following points:

1. Application of the social cost of greenhouse gases is not limited to rulemakings; NEPA requires agencies to fully and accurately estimate environmental, public health, and social welfare differences between alternatives, and the social cost of greenhouse gases is the best available tool to compare the climate impacts of alternatives;
2. Executive Order 13,783 does not bar agencies from using the same methodology and inputs applied by the Interagency Working Group (IWG) to develop its best estimates of social cost of greenhouse gases and, in fact, by requiring agencies to use best practices, the Executive Order would point agencies toward the same or higher values of global climate damages as calculated by the IWG;
3. Although NEPA does not require a formal cost-benefit analysis, the statute does require a "reasonably thorough discussion" and "necessary contextual information" on real-world climate impacts and their significance. The social cost of greenhouse gases provides such information;

4. OSM monetized a number of other effects of the program, including employment and labor income, and must give climate effects the same consideration. When an agency monetizes a proposed action's potential benefits—as OSM does here—the potential climate costs must be treated with proportional rigor. Additionally, simply because not every effect can be monetized does not mean that monetization is not a useful analytical tool.
5. OSM inaccurately claims that the SCC is not applicable to a project of this duration; the SCC should be applied to annual emissions for every year that emissions from the project occur in order to assess the magnitude of the project's climate impacts.

Response:

1. The “social cost of carbon” protocol (SCC) was developed by a Federal Interagency Working Group (IWG), to assist agencies in addressing EO12866, which requires Federal agencies to assess the cost and the benefits, associated with GHG emissions, of proposed regulations as part of their regulatory impact analyses. This action is not a rulemaking for which the SCC protocol was originally developed.
2. On March 28, 2017, the President issued EO 13783 which, among other actions, withdrew the Technical Support Documents upon which the protocol was based and disbanded the earlier Interagency Working Group on Social Cost of Greenhouse Gases. The EO further directed agencies to ensure that estimates of the social cost of GHGs used in regulatory analyses “are based on the best available science and economics” and are consistent with the guidance contained in OMB Circular A-4, “including with respect to the consideration of domestic versus international impacts and the consideration of appropriate discount rates” (E.O. 13783, Section 5(c)). In compliance with OMB Circular A-4, interim protocols have been developed for use in the rulemaking context. However, the Circular does not apply to project-level decisions, so there is no EO requirement to apply the SCC protocol to project-level decisions.
3. NEPA does not require a cost-benefit analysis (40 C.F.R. § 1502.23), although NEPA does require consideration of “effects” that include “economic” and “social” effects. 40 C.F.R. 1508.8(b). The SCC protocol estimates economic costs associated with an increase in CO₂ emissions – typically expressed as a one metric ton increase in a single year – and includes, but is not limited to, potential changes in net agricultural productivity, human health, and property damages from increased flood risk over hundreds of years. The estimate is developed by aggregating results “across models, over time, across regions and impact categories, and across 150,000 scenarios” (Rose et al. 2014). The dollar cost figure arrived at based on the SCC calculation represents the value of damages avoided if, ultimately, there is no increase in carbon emissions. But the dollar cost figure is expressed in a broad range, reflecting a degree of uncertainty that greatly diminishes the SCC's utility as an input to the Secretary's decision making. For example, in a previous environmental impact statement, OSMRE estimated that the selected alternative had a cumulative SCC ranging from approximately \$4.2 billion to \$22.1 billion depending on dollar value and the discount rate used. The cumulative SCC for the no action alternative ranged from \$2.0 billion to \$10.7 billion. Given the uncertainties associated with assigning a specific and accurate SCC resulting from 8.9 additional years of operation under the mining plan modification, and that the SCC protocol and similar models were developed to estimate impacts of regulations over long time frames, OSMRE's ability to evaluate

Appendix B

these impacts on a project-level would be doubtful¹ (Pindyck 2013, Hope 2013, Anthoff and Tol 2013, Nordhaus 2014, and Waldhoff et al. 2011, 2014). Without a complete monetary cost-benefit analysis, which would include the social benefits of the proposed action to society as a whole and other potential positive benefits, inclusion solely of an SCC cost analysis would be unbalanced, potentially inaccurate, and not useful in facilitating an authorized officer's decision.

4. Any increased economic activity, in terms of revenue, employment, labor income, total value added, and output, that is expected to occur with the proposed action is simply an economic impact, rather than an economic benefit, inasmuch as such impacts might be viewed by another person as negative or undesirable impacts due to potential increase in local population, competition for jobs, and concerns that changes in population would change the quality of the local community. Economic impact is distinct from "economic benefit" as defined in economic theory and methodology (Watson, Wilson, Thilmany, and Winter 2007), and the socioeconomic impact analysis required under NEPA is distinct from an economic cost-benefit analysis, which is not required.
5. The SCC protocol does not measure the actual incremental impacts of a project on the biophysical environment at a specific geographical location and does not include all damages or benefits from carbon emissions.

Given the uncertainties associated with assigning a specific and accurate social cost of carbon estimate resulting from 8.9 additional years of operation under the mining plan modification, and that the SCC protocol and similar models were developed to estimate impacts of regulations over long time frames, this EA quantifies direct and indirect GHG emissions and evaluates these emissions in the context of state and U.S. GHG emission inventories, as discussed in **section 4.4.5**.

Section 4.4.5 and 4.4.6. specifically evaluate the direct and indirect effects of the Proposed Action and clearly includes the estimated direct and indirect impacts from GHG emissions related to the Proposed Action. Without having a specific tool to identify project-level impacts on global climate, OSMRE chose to disclose the Proposed Action-related GHG emissions in the context of state and national GHG emissions to provide the public and decision maker with relevant information for potential impacts to climate. OSMRE has determined that the existing analysis is adequate to inform the decisionmaker of potential impacts of the Proposed Action.

Commenter: Sierra Club, WildEarth Guardians, Center for Biological Diversity

¹ This conclusion is supported in the February 2018 BLM *Regulatory Impact Analysis for the Proposed Rule to Rescind or Revise Certain Requirements of the 2016 Waste Prevention Rule* (BLM 2018), noting that "[t]he scientific and economics literature has further explored known sources of uncertainty related to estimates of the social cost of carbon and other greenhouse gases noting further that researchers have examined the sensitivity of Integrated Assessment Models (IAMs) and the resulting estimates to different assumptions embedded in the models (see, e.g., Pindyck 2013, Hope 2013, Anthoff and Tol 2013, Nordhaus 2014, and Waldhoff et al. 2011, 2014). BLM further spoke to the "additional sources of uncertainty that have not been fully characterized and explored due to remaining data limitations, concluding that" [a]dditional research is needed to expand the quantification of various sources of uncertainty in estimates of the social cost of carbon and other greenhouse gases (e.g., developing explicit probability distributions for more inputs pertaining to climate impacts and their valuation). On damage functions, other experts have found that those used in most IAMs have no theoretical or empirical foundation, claiming that the overall model is able to "obtain almost any result one desires" (Pindyck 2013). Naturally, the indeterminate amount of uncertainty surrounding the IAMs used to approximate social costs for specific greenhouse gas emissions merits additional research and analysis and further peer-review in order to better ascertain the best available science and economics in accordance with E.O. 13783." BLM's discussion is in the context of a rulemaking for which the SCC was developed. The uncertainties regarding the applicability of social cost of carbon by OSMRE in the context of a specific project is even greater.

Comment #1: Under both long-standing NEPA regulations and OSMRE's own internal NEPA guidance, OSMRE must prepare an Environmental Impact Statement ("EIS") to analyze the environmental impacts of the Caballo West proposal.

Response #1: OSMRE reviewed Peabody Caballo Mining, LLC's proposed action against the DOI Departmental Manual, Series 31, Part 516, Chapter 13, Section 13.4 titled Major Actions Normally Requiring an EIS (516 DM 13). The BLM released a final environmental impact statement for the South Gillette Area Coal Lease Applications (SGAC EIS) in August of 2009 which included an analysis of impacts resulting from leasing and mining of the Caballo West tract at the Caballo Mine. The analysis of potential impacts in the SGAC EIS did not identify significant impacts to any resources within the established analysis areas. OSMRE recognizes that the area proposed to be mined in the Caballo West Tract includes 866.7 acres of disturbance and the annual full production for the entire mine is expected to remain at 13.5Mt during the mining of Federal coal in the Caballo West Tract. OSMRE also understands that the proposed project would extend the life of the mine by 8.9 years with reclamation likely continuing beyond 15 years. OSMRE has recently completed EAs for other Federal coal mining projects in this region of Wyoming wherein the amount of coal removal and surface acreage disturbance were greater than what would occur under the proposed mining of Federal coal in the Caballo West Tract at the Caballo Mine. These recently completed OSMRE EAs also reflect mining and reclamation operations that will occur for 15 years or more. Significant impacts were not identified during the analysis for these other OSMRE EAs. Due to the lack of significant impacts identified in the recent Cordero Rojo Duvall Amendment EA and the Belle Ayr North EA, OSMRE determined that an EIS was not initially required. 516 DM 13 explicitly recognizes that OSMRE may choose not to prepare an EIS for any of the listed actions, and "If for any of these actions it is proposed not to prepare an EIS, an EA will be prepared and handled in accordance with Section 1501.4(e)(2)." OSMRE has completed the EA process and has not identified significant negative impacts.

Comment #2: NEPA requires OSMRE to analyze and disclose the cumulative climate impact of mining at Caballo West when added to similar past, present, and reasonably foreseeable future mining proposals. Here, OSMRE attempts to dodge any meaningful cumulative climate analysis. Instead, it simply lists generally expected regional climate impacts, completely divorced from any contribution from Department of Interior ("DOI") actions, and asserts that it is impossible to prepare a cumulative climate analysis for any project anywhere.

Despite the global nature of climate change, OSMRE could nonetheless consider the cumulative climate impact of its decisions by calculating the total direct and indirect emissions associated with similar OSMRE decisions in the same area. OSMRE has made no attempt to quantify GHG emissions associated with Caballo West mining when combined with other similar mining proposals in the Powder River Basin or other OSMRE approved mine plans. In contrast to its approach to cumulative climate impacts, the Draft EA provides a cumulative air quality assessment of air emissions at the Caballo Mine, combined with PM10 and PM2.5 emissions from the nearby Belle Ayr, Coal Creek, and Cordero Rojo mines from 2010-2017, as well as for the 2016-2035 time period.

It is important that OSMRE analyze the impacts of mining at Caballo West consistent with the "hard look" NEPA requires, in order to ensure DOI can make an objective, informed decision on the proposed coal lease expansion in Wyoming.

Response #2: Section 4.4.6.2 of the EA states that "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." Section 4.4.5 presents emissions related to the Proposed Action in the context of total U.S. emissions. OSMRE, where appropriate and not overly speculative,

included data from the most current future climate modeling (Section 4.4.6.2 of the EA) as in the case with the Air Quality and Climate Change discussion in Chapter 4 allowing the decision maker to evaluate potential impacts, such as increased maximum temperatures and decreased maximum precipitation, associated with the Proposed Action using representative or predicted emissions.

Comment #3: OSMRE must acknowledge the scientific consensus on the urgent need to cut U.S. greenhouse gas emissions.

Since the 2009 SGAC EIS, two National Climate Assessments have been released by the U.S. Global Change Research Program (“USGCRP”), in 2014 and 2018, respectively. With an overwhelming amount of climate evidence published within the past 10 years, OSMRE must acknowledge the findings of recent climate reports, including the Fourth National Climate Assessment of 2018, as well as two other studies published last year by the Intergovernmental Panel on Climate Change (“IPCC”) and the U.S. Geological Survey. Additionally, information published in January of this year specifically points out the urgent need for land management agencies to say “no” to the fossil fuel industry and for elected officials at all levels to steer the industry towards equitable and orderly phase-out.

OSMRE must both acknowledge that a new, far more robust set of scientific documents exists now compared to BLM’s 2009 EIS that the Draft EA tiers to, and must disclose that these scientific documents conclude that we need to dramatically reduce greenhouse gas emissions within a dangerously small window of time in order to avoid the worst effects of climate disruption.

Response #3: While this EA does incorporate by reference descriptions of the affected environment and certain analyses from the 2009 SGAC EIS, analyses of impacts to certain resources like air quality and climate have been updated to reflect new information since completion of the 2009 SGAC EIS. OSMRE has determined that this EA adequately discloses the intensity of potential impacts to the environment, and climate specifically, based on the analyses in Ch. 4 and Section 4.4.5, respectively. Section 4.4.5 of the EA evaluates the reasonably foreseeable direct and indirect effects of the Proposed Action and clearly includes the estimated direct and indirect impacts from GHG emissions related to the Proposed Action. The EA’s analysis is sufficiently thorough to inform the decisionmaker and the public of potential impacts of the Proposed Action.

Comment #4: OSMRE must discard the perfect substitution theory in order to properly analyze the market and climate impacts of the proposed project. In the 2009 South Gillette Area Coal Leasing EIS, BLM denied that the Caballo coal lease would have any contribution to climate change. BLM claimed, incorrectly, that expanding federal coal leases would have no impact on the amount of coal mined in the U.S. or on the amount of carbon dioxide emitted from burning coal to generate electricity. OSMRE’s Draft EA is silent on substitution, leaving the impression that OSMRE endorses the climate analysis in the 2009 EIS, because OSMRE has “incorporated by reference analyses included in the 2009 South Gillette [EIS].”

Under this perfect substitution theory, which has been squarely rejected by every federal court to consider the issue, even if federal agencies were to deny a particular coal lease, the same amount of coal would ultimately be mined elsewhere, and thus the greenhouse gas emissions from our electricity sector would remain the same regardless of agency decisions. The perfect substitution

theory defies economics and ignores the fundamental economic principles of supply and demand, denying the public and decisionmakers the opportunity to review and consider a project's climate impacts, as required by NEPA. Yet OSMRE fails to even address substitution in the Draft EA, thus leaving in place the unsupported and incorrect perfect substitution theory espoused in the 2009 South Gillette Coal Leasing EIS, which OSMRE tiers to here.

OSMRE's failure to study these market and climate effects of its decision is even more glaring because there are readily-available models that would allow the agency and the public to understand the substitution effects and GHG emissions differences between the Action and No Action alternatives.

Under NEPA, agencies must provide a clear basis for choice among considered alternatives, and in particular here OSMRE must distinguish between the climate impacts of Action and No Action alternatives. 42 U.S.C. §§ 4332(2)(C), 4332(2)(E), and 40 C.F.R. §§ 1502.14(f), 1508.9(b). NEPA requires agencies to use the tools available to them in order to ascertain essential information or explain why they cannot do so. 40 C.F.R. § 1502.22. Under the applicable NEPA regulations, if an agency intends not to include essential information in its NEPA review, it "shall" explain (1) why such essential information is incomplete or unavailable; (2) its relevance to reasonably foreseeable impacts; (3) a summary of existing science on the topic; and (4) the agency's evaluation based on any generally accepted theoretical approaches. *Id.* § 1502.22(b). Given that other agencies have long used energy models to analyze market and climate impacts of their proposals, that information is plainly "available" within the meaning of the regulation, and OSMRE must utilize these available tools to understand the impacts of various alternatives here.

OSMRE must address the key climate question: whether there is a measurable difference in greenhouse gas emissions between approving and rejecting this approximately 120 million ton coal mine expansion. Without such an answer, neither OSMRE nor the public can adequately distinguish between the climate impacts of the Action and No Action alternatives. In the context of climate change, OSMRE must, at the bare minimum, analyze and disclose the difference in greenhouse gas emission levels between considered alternatives, including the No Action alternative. Here, by adhering to an outdated EIS that recites an inaccurate and judicially-rejected economic assumption, OSMRE improperly downplays the climate impacts of its decision and violates NEPA.

Response #4: OSMRE is not relying on the "perfect substitution theory" in the Caballo West Tract EA based on the fact that all potential direct, indirect and cumulative impacts to climate resulting from mining, transporting and burning coal as would be approved under the Proposed Action have been disclosed. A full-scale supply and demand market analysis is not required and is outside the scope of this EA. Section 4.4.5 of the EA discloses and quantifies the difference in greenhouse gas emissions impacts between the Proposed Action Alternative and the No Action Alternative. The Proposed Action would result in impacts that are moderate and would extend those impacts approximately 8.9 years beyond the current life of the mine. 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 8.9 years. While annual CO₂e emissions would remain the same as the Proposed Action for approximately 24 years, the life of mine CO₂e emissions would decrease by approximately 37 percent as a result of the No Action Alternative, based on 8.9-fewer years of combustion of Caballo Mine coal. Using the 2016 U.S. estimate for comparison purposes, the estimated annual CO₂e contribution from the Caballo Mine coal

was approximately 0.27 percent. Under the Proposed Action, the estimated CO₂e contribution would be approximately 0.36 percent of the U.S. total CO₂e emissions. The direct and indirect effects of the Proposed Action on annual CO₂e emissions would be moderate and short-term.

Regarding the potential cumulative impacts on climate, the current tools for simulating climate change generally focus on global and regional-scale modeling. The IPCC Fifth Assessment Report (AR5), issued in 2013, makes certain conclusions about the future impacts of GHG emissions on climate change based largely on several modeling analyses that evaluate the natural systems and feedback mechanisms contributing to climate variability over the entirety of the Earth. The modeling analyses consider a range of global GHG emissions scenarios known as Representative Concentration Pathways (RCPs). The RCPs evaluate different pathways of GHG emissions and atmospheric concentrations, air pollutant emissions, and land use patterns.

The anthropogenic GHG emissions represented in each scenario are influenced by assumptions of population size, economic activity, lifestyle, energy use, land use patterns, technology, and climate policy. The RCPs include a stringent mitigation scenario (RCP2.6), two intermediate scenarios (RCP4.5 and RCP6.0) and one scenario with very high GHG emissions (RCP8.5) (IPCC, 2014 pg. 8). A “lower scenario” (RCP4.5), which assumes lower emissions and concentrations of GHGs and aerosols and projects a lower change in radiative forcing by 2100; and (2) a “higher scenario” (RCP8.5), which assumes a continued dependence on fossil fuels, higher GHG emissions and concentrations, and projects a larger change in radiative forcing by 2100. These scenarios correspond to atmospheric concentrations of CO₂ by the year 2100 of 538 ppm for RCP4.5 and 936 ppm for RCP8.5. Each RCP scenario has been used in multiple global integrated assessment models to make predictions about future warming associated with those GHG emissions. For example, by 2050, global surface temperature change is projected to likely range from 0.5 to 2.0 degrees Celsius (°C) for the high emissions scenario (RCP8.5), but likely to range from 0.3 to 1.0°C for the low emissions scenario (RCP2.6) (IPCC, 2014 pg. 59-60).

According to the EPA (2018) in 2016 (the most recent year of available CO₂ data at this time), CO₂e emissions in the U.S. totaled 6,511.3 million metric tons. The estimated CO₂e contribution of the U.S. emissions would be approximately 13% of the total global CO₂e emissions. In 2018, the United States Geological Survey (USGS) published a report titled “*Federal Lands Greenhouse Gas Emissions and Sequestration in the United States: Estimates for 2005–14*” (USGS 2018) on GHG emissions from extraction and use of fossil fuels produced on Federal lands and GHG sinks (carbon storage by terrestrial ecosystems) on Federal lands in the US. In 2014, nationwide emissions from fossil fuels (oil, gas, and coal) extracted from Federal lands were 1,279.0 MMmt carbon dioxide equivalents (CO₂e) of carbon dioxide, 47.6 MMmt CO₂e of methane, and 5.5 MMT CO₂e of nitrous oxide based on 100-year GWPs (USGS, 2018 pg. 6). In 2014, carbon storage by terrestrial ecosystems on Federal lands in the conterminous United States (not including Alaska and Hawaii) was 83,600 MMmt CO₂e. Soils stored 63 percent of carbon, with vegetation and dead organic matter storing 26 percent and 11 percent, respectively (USGS, 2018 pg. 12). Between 2005 and 2014, the annual rate of net carbon uptake by terrestrial ecosystems in the conterminous US ranged from a sink (sequestration) of 475 MMmt tons of CO₂e per year to a source (emission) of 51 MMmt CO₂e per year due to changes in climate/weather, land use, land cover change, wild fire frequency, and other factors. Terrestrial ecosystems on Federal lands sequestered an average of 195 MMmt CO₂e per year nationally between 2005 and 2014 (USGS, 2018 pg. 13-17).

According to the IPCC's *Fourth National Climate Assessment*, changes in average global temperature are predicted to be in the range of 0.3 to 2.0°C by 2050, warming rates can vary across the globe and are greater at higher latitudes due in part to reduced snow cover and reduced albedo. For example, in the Northern Great Plains, Montana, Wyoming, North Dakota, South Dakota, and Nebraska climate model predictions show a warmer future, with conditions becoming consistently warmer in two to three decades and temperatures rising steadily towards the middle of the century, irrespective of the climate scenario modeled, with predicted temperature increases of between 2 to 4°F (approx. 1-2°C) projected by 2050 under the lower emissions scenario.

To discuss the cumulative impacts of GHG emissions for the project area, regional-scale projected impacts are discussed for Campbell County, WY in Section 4.4.6.2. The USGS National Climate Change Viewer (USGS 2016) was used to evaluate potential climate change at the county level. The viewer provides data showing projections of future climate trends under RCP emission scenarios.

The low emissions scenario (RCP4.5) and the higher emissions scenario (RCP8.5) are based on projections from 30 different global climate models. Projected changes to the maximum and minimum temperature and precipitation for Campbell County are presented to assess cumulative impacts from GHG emissions. Generally, the RCP4.5 and RCP8.5 scenarios forecast similar levels of climate impacts in the region over the next few decades; however, impacts over the next century diverge significantly. Because of uncertainties in the climate models, especially toward the end of the century, the impacts projected represent a forecast but are not certain to occur at the magnitudes projected.

Overall, the RCP8.5 scenario representing the higher emission scenario results in higher seasonal average maximum and minimum temperature projections over the century, in comparison to the RCP4.5 scenario. However, both scenarios project an increase over the historical average over the next century. Assuming the Proposed Action extends the life of the project by 8.9 years, the associated emissions related to the project would occur from 2042-2051. The temperature projections for both scenarios around the mid-century are fairly consistent with most of the divergence in the scenarios being realized in the latter half of the century. By the time the project emissions occur, the seasonal maximum and minimum temperatures in Campbell County are projected to increase by roughly 6.5 and 6.3°F based on the most aggressive global climate change model.

Because the EA quantifies total GHG emissions from the Proposed Action, it is possible to compare those emissions to the global GHG emissions estimate for 2010 in the AR5. Under the Proposed Action, the estimated CO₂e contribution would be approximately 0.05% of the total global CO₂e emissions. GHG emissions resulting from the Proposed Action would contribute to global atmospheric concentrations of GHG emissions; however, the degree to which the emissions from 8.9 additional years of mining, transporting and burning this Federal coal would contribute to cumulative climate change impacts would not be significant.

Further, the human and natural causes of climate change, and the impacts of climate change, are global. GHG emissions do not remain localized but become mixed with the general composition of the Earth's atmosphere. On a global scale, the GHG emission contribution of any single geographic subunit (such as a SMCRA-delegated State Regulatory Authority or OSMRE regional office) or source (such as federal minerals) on a subnational scale is dwarfed by the large number of comparable national and subnational contributors. The relative contribution of GHG emissions from production and consumption of Federal minerals will vary depending on contemporaneous changes in other sources of GHG emissions. A single subnational contributor is very unlikely to influence

global cumulative emissions. Therefore, the analysis in this EA does not separate the contribution of the Proposed Action's GHG emissions to global climate change impacts from the multitude of other past, present, and RFFAs that have produced or would produce or mitigate GHG emissions. At present, the climate change research community has not yet developed tools for evaluating or quantifying endpoint impacts attributable to the emissions of GHGs from a single source. Nevertheless, each source contributes, on a relative basis, to global emissions and long-term climate impacts. OSMRE has determined that the analysis presented in this EA uses the best available data and tools and is adequate to inform the decisionmaker and the public of the potential cumulative impacts of the Proposed Action.

Comment #5: OSMRE must evaluate the significance of greenhouse gas emissions by using available methodologies. Once OSMRE accurately discloses the *amount* of the greenhouse gas emissions associated with this mine expansion, it must also assess the *impact* that those emissions have on the environment. The social cost of carbon protocol (often abbreviated as "SCC" in agency documents) is an appropriate tool for OSMRE to use for this assessment. The social cost of carbon provides an estimate of the economic damage, in dollars, caused by each incremental ton of carbon dioxide emitted into the atmosphere, including impacts such as increased drought, wildfires, decreased agricultural productivity, and sea level rise, among others. By translating climate impacts, and tons of greenhouse gasses in particular, into dollars, the social cost of carbon offers OSMRE an easy to use and understandable tool that would allow the public and decisionmakers to better understand the climate impacts of OSMRE's decision here.

One of the measuring standards available to the agency for analyzing the magnitude and severity of OSMRE-related fossil fuel emissions is by applying those emissions to the remaining global carbon budget. A "carbon budget" offers a cap on the remaining stock of greenhouse gasses that can be emitted while still keeping global average temperature rise below scientifically-backed warming thresholds – beyond which climate change impacts may result in severe and irreparable harm to the biosphere and humanity. Utilizing carbon budgets would offer OSMRE a methodology for analyzing how the proposed mine expansion and the continued coal combustion from the Caballo West tract may affect the country's ability to meet recognized greenhouse gas emission reduction targets.

Response #5: Section 4.4.5 specifically evaluates the direct and indirect effects of the Proposed Action and clearly includes the estimated direct and indirect impacts from GHG emissions related to the Proposed Action. The Proposed Action would result in impacts that are moderate and would extend those impacts approximately 8.9 years beyond the current life of the mine. 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 8.9 years. While annual CO₂e emissions would remain the same as the Proposed Action for approximately 24 years, the LOM CO₂e emissions would decrease by approximately 37 percent as a result of the No Action Alternative, based on 8.9-fewer years of combustion of Caballo Mine coal. Using the 2016 U.S. estimate for comparison purposes, the estimated CO₂e contribution from the Caballo Mine coal was approximately 0.27 percent. Under the Proposed Action, the estimated CO₂e contribution would be approximately 0.36 percent of the U.S. total CO₂e emissions. The direct and indirect effects of the Proposed Action on annual CO₂e emissions would be moderate and short-term.

A carbon budgeting analysis is not required to determine if significant impacts related to GHG emissions are occurring and is outside the scope of this EA. OSMRE, where appropriate and not overly speculative, included data from the most current future climate modeling (Section 4.4.6.2 of the EA) as in the case with the Climate discussion in Chapter 4, allowing the decision maker to evaluate potential impacts such as increased maximum temperatures and decreased maximum precipitation associated with the Proposed Action using representative and predicted emissions.

Further, this EA does not undertake an analysis of SCC because 1) it is not engaged in a rulemaking for which the protocol was originally developed; 2) the IWG, technical supporting documents, and associated guidance have been withdrawn; 3) NEPA does not require cost-benefit analysis and the agency did not undertake one here; and 4) because the full social benefits of coal-fired energy production have not been monetized, quantifying only the costs of GHG emissions will provide information that is both potentially inaccurate and not useful. The EA's analysis is sufficiently thorough to inform the decisionmaker and the public of potential impacts of the Proposed Action.

Comment #6: OSMRE fails to take a hard look at impacts to Greater sage-grouse. In addition to global impacts to carbon emissions, the Caballo West expansion would negatively impact the local sage grouse population in Wyoming. The proposed expansion of the Caballo West mine is within General Habitat Management Area ("GHMA") for sage grouse and within four miles of at least six "historical" sage-grouse leks, including one (the Lynde lek) confirmed active as recently as 2009.

The proposed mine plan includes no specific mitigation measures for greater sage-grouse other than the provisions applicable to General Habitat Management Areas (GHMA) under the Wyoming ARMPA. Draft EA at 4-28. The 2019 Wyoming Sage-Grouse Plan amendments eliminate previously applicable noise standards for activities in GHMA. Wyoming 2019 Sage-Grouse Plan Amendments A-8 (Management Decision SSS 12). Therefore, implementation of the 2019 plan amendments will result in increased noise impacts to the Lynde lek and other potentially suitable sage-grouse habitat in the immediate vicinity of the mine expansion not previously analyzed in BLM's EIS for its 2015 amendments to the Buffalo RMP and other Wyoming RMPs. OSMRE must assess the effects of mine-related noise on lek use on the Lynde and other adjacent leks, and resulting effects on the viability, connectivity, and prospects for recovery of the Thunder Basin core population.

OSMRE must further incorporate into the mine plan all applicable provisions of the Wyoming Sage-Grouse Resource Management Plan Amendments. These include, but are not limited to:

- Management Direction SSS 4 (work with Wyoming Game and Fish to incorporate additional mitigation under State regulations, policies, and programs);
- Management Direction SSS 9 (seasonal 2-mile buffer on sage-grouse leks outside of Priority Habitat Management Areas ("PHMA"))
- Management Direction SSS 10 (seasonal limitations on operations within winter concentration areas; Draft EA does not identify whether winter concentration areas are present); and
- Management Direction SSS 13 (develop adaptive management strategies).

OSMRE should also consult with Wyoming Game and Fish to determine whether, in light of recent lek attendance declines, Draft EA at 4-28, soft or hard triggers for the affected grouse population require additional management measures. If, based on this review, the area should be reclassified as a Priority Habitat Management Area, OSMRE must apply all applicable management measures for PHMA, including determination whether surface mining is or is not suitable.

Response #6: The specific noise protocols for measurement and implementation noise are specific to PHMAs (Table A-1, MD SSS 12 of Appendix A). The Wyoming ARMPA classified the Caballo West tract as a GHMA regarding Greater sage-grouse, which eliminates the need for noise evaluation for the Proposed Action. While the Lynde lek has a Wyoming Game and Fish management status of occupied, it has not been active (annual status) since 2009. Based on the lack of use of the area by Greater sage-grouse that was discussed in the EA and the statement regarding a lack of concern included in the Wyoming Game and Fish comment letter dated January

18, 2019 for review of the Proposed Action, there is little likelihood of reclassification of the area to a PHMA. The EA adequately evaluates the Proposed Action for suitability for mining as related to Greater sage- grouse. No changes made related to noise or habitat reclassification.

MD SSS 4: The Wyoming Game and Fish reviewed the proposed action and responded in a comment letter dated January 18, 2019 that they had no terrestrial wildlife concerns pertaining to the project. The comment letter did not include any recommendations for additional mitigation. No changes made.

MD SSS9: As indicated in Appendix A (Table A-1) of the 2019 Wyoming Sage-Grouse Plan amendments, the management goals, objectives, decisions related to MD SSS 9 are specific to the protection of Greater Sage-Grouse breeding, nesting, and early brood rearing habitat within 2 miles of the perimeter of an occupied lek (or lek center if no perimeter is yet mapped) located outside PHMA. There are no leks within 2 miles of the proposed disturbance. No changes made.

MD SSS 10: The EA provides on page 4-17 that no winter concentration or connectivity areas are near the tract so there would be no seasonal limitations on operations. No changes made.

MD SSS 13: As stated in Appendix A (MD SSS 13 in Table A-1) and Appendix C (COT Objective 6) of the 2019 Wyoming Sage-Grouse Plan amendments, the requirement for development for adaptive management strategies are specific to an EIS so the requirement is not applicable to this EA. Based on thorough analysis described in Section 4.10.2 of the EA and coordination with the WY Game and Fish, OSMRE determined that impacts to greater sage grouse resulting from the proposed project would be minor to moderate and short-term, and adaptive management practices would not be necessary. No changes made.

Commenter: Peabody Energy

Comment #1: The Introduction to the FONSI appears to contain some information from previous documents published by the Office of Surface Mining Reclamation and Enforcement (OSMRE) that does not pertain to the Caballo Mine or the Caballo West lease tract. Reference to "surface mining permit No. PT0214", for example, is specific to a neighboring mine operated by a different company. OSMRE may wish to check other references throughout the FONSI for accuracy.

Response #1: The text in Section A of the FONSI has been revised to correct the permit number.

Comment #2 In Section C of the FONSI, the first sentence refers to a " ... currently approved federal mining plan modification related to WYWI72657 ... ". This implies that a federal mining plan has been previously approved for the subject lease. OSMRE may wish to consider rewording this sentence for clarification.

Response #2: The text in Section C of the FONSI has been revised for clarification.

Comment #3 Table 2-2 located on page 2-6 shows outdated information concerning backfilling acreage and total disturbed acreage. Current information shows that 60% of the total disturbed acreage at the Caballo Mine is in some stage of reclamation. Of the remaining acreage, 17% is long- term disturbance and 23% is active mining.

Response #3: Table 2-2 was based on information included in PCM's 2018 Annual Report, which was the most current report available at the time of publication.

Comment #4: It should be noted for the readers that PM10 sampler BA-1, included on Table 3-1, is a Belle Ayr Mine sampler. This sampler happens to lie within the lease tract area and therefore captures air quality data relative to the area of interest.

Response #4: The text in Section 3.4.1.1 of the EA has been revised for clarification.

References

Anthoff, D. and Tol, R.S.J. 2013. "The uncertainty about the social cost of carbon: a decomposition analysis using FUND." *Climatic Change*, 117: 515-530.

Hope, Chris. 2013. "Critical issues for the calculation of the social cost of CO2: why the estimates from PAGE09 are higher than those from PAGE2002." *Climatic Change*, 117: 531-543.

Nordhaus, William D. 2017. "Revisiting the social cost of carbon." *Proceedings of the National Academy of Sciences of the United States*, 114 (7): 1518-1523.

Pindyck, Robert. 2013. "Climate change policy: What do the models tell us?" *Journal of Economic Literature*, 51(3), 860-872.

Waldhoff, S., Anthoff, D., Rose, S., & Tol, R. S. J. (2011). The marginal damage costs of different greenhouse gases: An application of FUND (Economics Discussion Paper No. 2011-43). Kiel: Kiel Institute for the World Economy.

Waldhoff, S., D. Anthoff, S. Rose, and R.S.J. Tol. 2014. The Marginal Damage Costs of Different Greenhouse Gases: An Application of FUND. *The Open-Access, Open Assessment E-Journal* 8(31): 1-33. <http://dx.doi.org/10.5018/economics-ejournal.ja.2014-31>.

APPENDIX C

GREENHOUSE GAS EMISSIONS CALCULATIONS

**PM₁₀, PM_{2.5}, SO₂, NO_x, Hg, CO, and CO₂ CONTRIBUTIONS FROM COAL COMBUSTION
CALCULATIONS**
(Completed by WWC Engineering)

Appendix C

GHG Calculations Assumptions

Direct Emissions Variables

Source	CO ₂ 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
 23 Tons/car empty - 1/2 are 21 tons and 1/2 are 25 tons (BNSF 2017)
 119 Tons of Coal/Car (BNSF 2017)
 15,470 Tons of Coal/Train (calculated)
 200 Tons/locomotive – four per train (4Rail 2017)
 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 ₂ e Conversion Rate	Kg CO ₂ e/Gal Diesel	Kg CO ₂ e/Mile/Ton
CO ₂	10.21	1	10.21	0.023417431
CH ₄	0.0000112	25	0.00028	0.000001
N ₂ O	0.0000224	298	0.0066752	0.000015
Total			10.2169552	0.0234

Source: Conversion Rate – EPA 2017a
 Emission Rate – EPA 2014

Transportation Variables

	Miles/gal/l Ton ¹	Miles	Kg CO ₂ e/Mile/Ton ²	Tons	Kg CO ₂ e/Mile	Kg CO ₂ e/Trip	Metric Tons CO ₂ e/Trip
Loaded	436	1,131	0.0234	19,260.0	451.3 (Calculated)	510,631.3 (Calculated)	510.6 (Calculated)
Empty	436	1,131	0.0234	3,790.0	88.8 (Calculated)	100,482.5 (Calculated)	100.5 (Calculated)

¹ FactCheck 2008

² EPA 2014

Caballo Mine Production, 2013-2017

	2013	2014	2015	2016	2017	Average
Production (Tons)	8,979,111	7,990,986	11,402,155	11,221,557	11,125,949	10,143,952

Source: WDWS (2013-2017)

Appendix C

Estimated 2013 Caballo Mine Equivalent CO₂e (in metric tons)

Source	Coal (Mt)	Ave. Known Ratio (tons CO ₂ e/Mt coal)	Tons CO ₂ e
Direct			
Fuel	8.98	3266.9	29,334
Electricity		2670.1	23,975
Mining Process		1147.7	10,305
Total Direct			63,614
Indirect			
Rail Transport			
2013 Coal Production	8,979,111		
2013 Coal Shipped by Rail	8,979,111		
Tons Coal/Train	15,470		
Empty Train Tons	3,790		
Loaded Train Tons	19,260		
# Loaded Trains/year	580		
# Empty Trains/year	580		
Average Rail Miles to Power Plant	1,052		
Kg CO ₂ e/Mi/Loaded Train	451.33		
Kg CO ₂ e/Mi/Empty Train	88.81		
Kg CO ₂ e/year Empty	54,229,172.3		
Kg CO ₂ e/year Loaded	275,581,493.3		
Kg CO ₂ e/year Total	329,810,665.6		
Rail Transport (Metric Tons CO ₂ e/year)	329,811		
Power Plant Combustion (Metric Tons CO ₂ e/year)	15,040,011		
Total Indirect CO₂e	15,369,822		
Total Direct + Indirect CO₂e	15,433,436		

100% Coal shipped to U.S. power plants

Appendix C

Estimated 2014 Caballo Mine Equivalent CO₂e (in metric tons)

Source	Coal (Mt)	Ave. Known Ratio (tons CO ₂ e/Mt coal)	Tons CO ₂ e
Direct			
Fuel	7.99	3266.9	26,106
Electricity		2670.1	21,337
Mining Process		1147.7	9,171
Total Direct			56,614
Indirect			
Rail Transport			
2014 Coal Production	7,990,986		
2014 Coal Shipped by Rail	7,990,986		
Tons Coal/Train	15,470		
Empty Train Tons	3,790		
Loaded Train Tons	19,260		
# Loaded Trains/year	517		
# Empty Trains/year	517		
Average Rail Miles to Power Plant	1,098		
Kg CO ₂ e/Mi/Loaded Train	451.33		
Kg CO ₂ e/Mi/Empty Train	88.81		
Kg CO ₂ e/year Empty	50,371,699.7		
Kg CO ₂ e/year Loaded	255,978,611.4		
Kg CO ₂ e/year Total	306,350,311.1		
Rail Transport (Metric Tons CO ₂ e/year)	306,350		
Power Plant Combustion (Metric Tons CO ₂ e/year)	13,384,902		
Total Indirect CO₂e	13,691,252		
Total Direct + Indirect CO₂e	13,747,866		

100% Coal shipped to U.S. power plants

Appendix C

Estimated 2015 Caballo Mine Equivalent CO₂e (in metric tons)

Source	Coal (Mt)	Ave. Known Ratio (tons CO ₂ e/Mt coal)	Tons CO ₂ e
Direct			
Fuel	11.40	3266.9	37,250
Electricity		2670.1	30,445
Mining Process		1147.7	13,086
Total Direct			80,781
Indirect			
Rail Transport			
2015 Coal Production	11,402,155		
2015 Coal Shipped by Rail	11,402,155		
Tons Coal/Train	15,470		
Empty Train Tons	3,790		
Loaded Train Tons	19,260		
# Loaded Trains/year	737		
# Empty Trains/year	737		
Average Rail Miles to Power Plant	1,009		
Kg CO ₂ e/Mi/Loaded Train	451.33		
Kg CO ₂ e/Mi/Empty Train	88.81		
Kg CO ₂ e/year Empty	66,048,354.6		
Kg CO ₂ e/year Loaded	335,644,144.9		
Kg CO ₂ e/year Total	401,692,499.5		
Rail Transport (Metric Tons CO ₂ e/year)	401,692.5		
Power Plant Combustion (Metric Tons CO ₂ e/year)	19,098,610		
Total Indirect CO₂e	19,500,302		
Total Direct + Indirect CO₂e	19,581,083		

100% Coal shipped to U.S. power plants

Appendix C

Estimated 2016 Caballo Mine Equivalent CO₂e (in metric tons)

Source	Coal (Mt)	Ave. Known Ratio (tons CO ₂ e/Mt coal)	Tons CO ₂ e
Direct			
Fuel	11.22	3266.9	36,660
Electricity		2670.1	29,963
Mining Process		1147.7	12,879
Total Direct			79,501
Indirect			
Rail Transport			
2016 Coal Production	11,221,557		
2016 Coal Shipped by Rail	11,221,557		
Tons Coal/Train	15,470		
Empty Train Tons	3,790		
Loaded Train Tons	19,260		
# Loaded Trains/year	725		
# Empty Trains/year	725		
Average Rail Miles to Power Plant	1,238		
Kg CO ₂ e/Mi/Loaded Train	451.33		
Kg CO ₂ e/Mi/Empty Train	88.81		
Kg CO ₂ e/year Empty	79,754,952.5		
Kg CO ₂ e/year Loaded	405,298,254.5		
Kg CO ₂ e/year Total	485,053,207.0		
Rail Transport (Metric Tons CO ₂ e/year)	485,053		
Power Plant Combustion (Metric Tons CO ₂ e/year)	18,796,108		
Total Indirect CO₂e	19,281,161		
Total Direct + Indirect CO₂e	19,360,663		

100% Coal shipped to U.S. power plants

Appendix C

Estimated 2017 Caballo Mine Equivalent CO₂e (in metric tons)

Source	Coal (Mt)	Ave. Known Ratio (tons CO ₂ e/Mt coal)	Tons CO ₂ e
Direct			
Fuel	11.13	3266.9	36,347
Electricity		2670.1	29,707
Mining Process		1147.7	12,769
Total Direct			78,824
Indirect			
Rail Transport			
2017 Coal Production	11,125,949		
2017 Coal Shipped by Rail	11,125,949		
Tons Coal/Train	15,470		
Empty Train Tons	3,790		
Loaded Train Tons	19,260		
# Loaded Trains/year	719		
# Empty Trains/year	719		
Average Rail Miles to Power Plant	1,260		
Kg CO ₂ e/Mi/Loaded Train	451.33		
Kg CO ₂ e/Mi/Empty Train	88.81		
Kg CO ₂ e/year Empty	80,480,655.7		
Kg CO ₂ e/year Loaded	408,986,128.9		
Kg CO ₂ e/year Total	489,466,784.6		
Rail Transport (Metric Tons CO ₂ e/year)	489,467		
Power Plant Combustion (Metric Tons CO ₂ e/year)	18,635,965		
Total Indirect CO₂e	19,125,431		
Total Direct + Indirect CO₂e	19,204,255		

100% Coal shipped to U.S. power plants

Appendix C

Summary of Estimated Caballo Mine 2013-17 CO₂e Emissions

CO ₂ e Source	2013	2014	2015	2016	2017	Avg.	% Of Total Emissions
Direct Emissions							
Fuel	29,334	26,106	37,250	36,660	36,347	33,139	
Electricity	23,975	21,337	30,445	29,963	29,707	27,085	
Mining Process	10,305	9,171	13,086	12,879	12,769	11,642	
Total Direct Emissions	63,614	56,614	80,781	79,501	78,824	71,867	0.4%
Indirect Emissions							
Rail Transport	329,811	306,350	401,692	485,053	489,467	402,475	2.3%
Power Plant Combustion (CO ₂ e)	15,040,011	13,384,902	19,098,610	18,796,108	18,635,965	16,991,119	97.3%
Total Indirect Emissions	15,369,822	13,691,252	19,500,302	19,281,161	19,125,431	17,393,594	99.6%
Total Emissions	15,433,436	13,747,866	19,581,083	19,360,663	19,204,255	17,465,460	100%

Appendix C

Estimated 2018-2051 Caballo Mine Equivalent CO₂e (in metric tons)

Source	Coal (Mt)	Ave. Known Ratio (tons/Mt coal)	Tons
Direct			
Fuel	13.5	3266.9	44,103
Electricity		2670.1	36,046
Mining Process		1147.7	15,494
Total Direct			95,643
Indirect			
Rail Transport			
2017 Coal Production	13,500,000		
2017 Coal Shipped by Rail	13,500,000		
Tons Coal/Train	15,470		
Empty Train Tons	3,790		
Loaded Train Tons	19,260		
# Loaded Trains/year	873		
# Empty Trains/year	873		
Average Rail Miles to Power Plant	1,031		
Kg CO ₂ e/Mi/Loaded Train	451.33		
Kg CO ₂ e/Mi/Empty Train	88.81		
Kg CO ₂ e/year Empty	87,655,722		
Kg CO ₂ e/year Loaded	445,448,337		
Kg CO ₂ e/year Total	533,104,059		
Rail Transport (Metric Tons CO ₂ e/year)	533,104		
Power Plant Combustion (Metric Tons CO ₂ e/year)	22,615,500		
Total Indirect	23,145,604		
Total Direct + Indirect CO₂e	23,241,248		

100% Coal shipped to U.S. power plants

Summary of Estimated Caballo Mine 2018-2051 CO₂e Emissions

CO₂e Source	2018-2051	% Of Total Emissions
Direct Emissions		
Fuel	44,103	
Electricity	36,046	
Mining Process	15,494	
Total Direct Emissions	95,643	0.4%
Indirect Emissions		
Rail Transport	533,104	2.3%
Power Plant Combustion (CO ₂ e)	22,612,500	97.3%
Total Indirect Emissions	23,145,604	99.6%
Total Emissions	23,241,248	100%

Appendix C

Parameters Used to Calculate Combustion Emissions

Btu per short ton	16,890,000	https://pubs.usgs.gov/pp/p1625a/Chapters/Pg.pdf
tons per kg	0.00110231	Conversion
tons to generate 1KW-h	0.000618709	https://www.eia.gov/tools/faqs/faq.cfm?id=667&t=2
tons to generate 1 MW-h	0.618709295	Calculated
PM10 Emissions per Btu (kg/MW-h)	0.39	http://www3.cec.org/islandora/en/item/10236-north-american-power-plant-air-emissions
PM10 Emissions per Btu (ton/MW-h)	0.000429901	Calculated
PM2.5 Emissions per Btu (kg/MW-h)	0.305	http://www3.cec.org/islandora/en/item/10236-north-american-power-plant-air-emissions
PM2.5 Emissions per Btu (ton/MW-h)	0.00013112	Calculated
SO2 Emissions (kg/MW-h)	17.5	AP-42 Table 1.1-3, with S (sulfur content %) = 0.5 from USGS 1625-A cited above
NOx Emissions (kg/MW-h)	7.2	AP-42 Table 1.1-3, pulverized coal, dry bottom, tangentially fired, sub-bituminous, NSPS
Hg Emissions per Btu (kg/MW-h)	0.000083	AP-42 Table 1.1-18
CO Emissions (lb) per ton	0.50000000	AP-42 Table 1.1-3

Combustion Emissions Values

Years	2013	2014	2015	2016	2017	Avg	2018-2051
Tons of Coal Mined (From CCC)	8,979,111	7,990,986	11,402,155	11,221,557	11,125,949	10,143,952	13,500,000
mw-h from coal mined	14,512,649	12,915,575	18,428,938	18,137,043	17,982,515	16,395,344	21,819,617
PM10 Emissions (Tons)	6,239.0	5,552.4	7,922.6	7,797.1	7,730.7	7,048	9,380
PM 2.5 Emissions (Tons)	1,902.9	1,693.5	2,416.4	2,378.1	2,357.9	2,150	2,861
SO2 Emissions (Tons)	78,567.2	69,921.1	99,768.9	98,188.6	97,352.1	88,760	118,125
NOx Emissions (Tons)	32,324.8	28,767.5	41,047.8	40,397.6	40,053.4	36,518	48,600
Hg Emissions (Tons)	0.4	0.3	0.5	0.5	0.5	0.4	0.6
CO Emissions (Tons)	2,244.8	1,997.7	2,850.5	2,805.4	2,781.5	2,536	3,375

APPENDIX D

REVENUE CALCULATIONS
(Completed by WWC Engineering)

Estimated 2018 Fiscal Revenue from 2017 Coal Production in Campbell Co. (Million U.S. Dollars)

Revenue Source	Total Collected	Federal Revenue	State Revenue
Federal Mineral Royalties	477.5	238.9	238.9
Abandoned Mine Lands Fund	85.6	57.6	28.0
Severance Tax	196.1		196.1
Bonus Bid Annual Revenues	0.0	0.0	0.0
Ad Valorem Tax	161.2		161.2
Black Lung	161.3	161.3	
Sales and Use Tax	25.3		25.3
Totals	1,106.9	457.6	649.3
\$/Ton			\$2.05

Total Future Revenues from Caballo Mine (No Action Alternative) (Million U.S. Dollars)

Revenue Source	Total Collected	Federal Revenue	State Revenue
Federal Mineral Royalties	506.4	253.2	253.2
Abandoned Mine Lands Fund	90.7	45.4	45.4
Severance Tax	211.8		211.8
Bonus Bid Annual Revenues	0.0	0.0	0.0
Ad Valorem Tax	170.9		170.9
Black Lung	13.7	13.7	
Sales and Use Tax	25.9		25.9
Totals	1,019.4	312.2	707.2
\$/Ton			\$2.18

Future Revenues added by the Caballo West Tract only (Million U.S. Dollars)

Revenue Source	Total Collected	Federal Revenue	State Revenue
Federal Mineral Royalties	187.2	93.6	93.6
Abandoned Mine Lands Fund	33.5	16.8	16.8
Severance Tax	74.2		74.2
Bonus Bid Annual Revenues	0.0	0.0	0.0
Ad Valorem Tax	63.2		63.2
Black Lung	5.0	5.0	
Sales and Use Tax	9.6		9.6
Totals	372.7	115.4	257.3
\$/Ton			\$2.15

Total Future Revenues from Caballo Mine (existing mine plus Caballo West tract) (Million U.S. Dollars)

Revenue Source	Total Collected	Federal Revenue	State Revenue
Federal Mineral Royalties	693.6	346.8	346.8
Abandoned Mine Lands Fund	124.3	62.1	62.1
Severance Tax	286.0		286.0
Bonus Bid Annual Revenues	0.0	0.0	0.0
Ad Valorem Tax	234.1		234.1
Black Lung	18.7	18.7	
Sales and Use Tax	35.4		35.4
Totals	1,392.1	427.7	964.5
\$/Ton			\$2.17

Difference Between the Caballo Mine No Action Alternative and the Proposed Action
(Million U.S. Dollars)

Revenue Source	Total Collected	Federal Revenue	State Revenue
Federal Mineral Royalties	187.2	93.6	93.6
Abandoned Mine Lands Fund	33.5	16.8	16.8
Severance Tax	74.2		74.2
Bonus Bid Annual Revenues	0.0	0.0	0.0
Ad Valorem Tax	63.2		63.2
Black Lung	5.0	5.0	
Sales and Use Tax	9.6		9.6
Totals	372.7	115.4	257.3

Estimated 2022 Campbell Co. Fiscal Revenue (Million U.S. Dollars)

Revenue Source	Total Collected	Federal Revenue	State Revenue
Federal Mineral Royalties	438.172	219.1	219.1
Abandoned Mine Lands Fund	78.520	39.3	39.3
Severance Tax	173.670		173.7
Bonus Bid Annual Revenues	0.000	0.0	0.0
Ad Valorem Tax	147.892		147.9
Black Lung	11.819	11.8	
Sales and Use Tax	22.376		22.4
Totals	872.4	270.2	602.3
\$/Ton			\$2.15

All revenues were calculated using variables presented below

Bonus Bid Payments, 2008-2017

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	\$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	\$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	\$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

Source: BLM 2017. Bids are paid off in four equal 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
2017 Wyoming	314,755,317	\$2,995,345,054	9.52	62.462	\$187,095,243	0.5944	0.07	209,674,154	\$0.6661
2017 Campbell Co.	292,994,954	\$2,592,159,599	8.85	59.610	\$154,518,634	0.5274	0.07	181,451,172	\$0.6193

Source: WDOR 2015 and 2016a

Revenue Calculations Variables

Coal Production (tons)¹		Campbell	Wyoming
	2017 Tons Produced	305,612,350	316,603,867
	2022 Tons Produced (Estimated)	280,430,000	290,000,000
		From Campbell Co.	96.53%
	Caballo West Tract²	(tons mineable)	(tons recoverable)
	No Action Alternative	363,900,000	324,100,000
	Added by Proposed Action	130,200,000	119,800,000
	Average 2017 Sales Price (\$/ton)		
	2017 PRB Subbituminous Coal	\$12.52 ²	\$12.50 ³
	2017 Price without BLT ⁴	\$12.48	\$12.46
Federal Royalties			
	WY share of FR = 0.5 x FR		
	Federal Royalties ³	\$477,519,296.88	
	Wyoming Share	\$238,759,648.44	
Abandoned Mine Lands Funds⁵			
	Campbell AML Total	\$85,571,458.00	
	WY Share ⁶	\$28,000,000.00	
Severance Taxes⁷			
	Campbell ST Rate/Ton	\$0.6193	
	2017 Severance Taxes ⁸	\$196,072,123.16	
Lease Bonus Bids (2017 Payments)			
	2017+	\$0.00	
	Total 2017+ Bonus Bid Payments	\$0.00	
	WY share	\$0.00	
Campbell Ad Valorem Taxes⁷			
	AVT Rate/ton	\$0.53	
	AVT (Total)	\$161,172,750.99	
Black Lung			
	2017 BLT Rate/Ton ⁸	\$0.528	
	2017 BLT Collected ⁹	\$161,260,279.09	
	Future BLT Rate/Ton ¹⁰	\$0.527	
	Future BLT Collected	\$147,736,111.11	
2017 Campbell Co. Employment (mining)¹¹			
	Buckskin	202	
	Belle Ayr	244	
	Eagle Butte	271	
	Cordero Rojo	366	
	Antelope	526	
	Caballo	160	
	NARM	1,364	
	Rawhide	113	
	Black Thunder	1,220	
	Coal Creek	155	
	Dry Fork	79	
	Wyodak	63	
	Total	4,763	
Federal Income Tax¹²			
	Head of Household income info:		
	10% on first \$12,750		
Caballo West Tract Federal Mining Plan Modification EA for Permit No. 433			
	Rate ¹⁰	13.6%	
	Tax/employee	\$6,197.23	
	Fed Tax	\$29,517,409.88	
Fiscal Year 2017 Sales and Use Tax¹³			
	Coal Mining	\$25,262,023.00	
	\$/ton	\$0.08	

¹ WDOR 2017

² CCC 2018a

³ Calculated - Tons produced x 2017 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 CREG 2018

⁶ Calculated - Wyoming's portion of 2017 + AML Funds (Max out at \$75,000,000)

⁷ WDOR 2017, recalculated using Campbell Co. numbers only

⁸ Calculated - Maximum per ton rate is \$0.55

⁹ IRS 2018

Appendix D

¹⁰ Calculated - Rate x 2022 Estimated Production

¹¹ WDWS 2017

¹² WDOE 2015 (This is the most current doc as of December 2018)

¹³ WDOR 2018

REFERENCES

Caballo Coal Company (CCC), 2018a, Personal communication between Kim Cox, Caballo Mine, and Beth Kelly, WWC Engineering, November 30, 2018. Electronic copy only, available on request from OSMRE.

Internal Revenue Service (IRS), 2018, Coal Excise Tax Audit Technique Guide (ATG). Available on the internet as of December 2018: <https://www.irs.gov/pub/irs-mssp/coal.pdf>

Wyoming Department of Administration & Information, Consensus Revenue Estimating Group (CREG), 2018, Wyoming State Government Revenue Forecast Fiscal Year 2019 – Fiscal Year 2024. Available on the internet as of January 2019: http://eadiv.state.wy.us/creg/GreenCREG_Oct18.pdf

Wyoming Department of Employment (WDOE), 2015, Wage Records in Wyoming: Employment and Earnings by Age and Gender with Place of Work in Campbell County, 2000-2015. Available on the internet as of December 2018: https://doe.state.wy.us/LMI/earnings_tables/2016/County/Campbell_2000-2015.pdf

Wyoming Department of Revenue (WDOR), 2017, 2017 Annual Report. Available on the internet as of January 2019: <https://sites.google.com/a/wyo.gov/wy-dor/2017AnnualReport.pdf?attredirects=0>

Wyoming Department of Revenue (WDOR), 2018, Total Distribution by Major Class and By County Reporting Date Range: 07/2017 – 06/2018. Available on the internet as of December 2018: https://0ebaeb71-a-84cef9ff-s-sites.googlegroups.com/a/wyo.gov/wy-dor/FY2018MajorBusinessClassbyCountySUMMARY.pdf?attachauth=ANoY7cqdFsqwnvEjv3RL7kqs5qISUoga7iqY504ph-cTolpogIXFt0me3ZDnvDxsjBUU7YPlEBupV7Ay2WVWGxOr9ffj3DHmncGk9-WzSdrIUncPWkpfIH0Q3JjhLVTkN5pkO5-sr7N74YF8vQCFKGTThRh7hKSij7GeNIDwRKi_mTF_ygixmhLZTUx_183XbS97YWv_ZjFvelZsBsHVRqnpUZUzPwzwyLlgDjor98Qc6jHI

APPENDIX E

CABALLO MINE SPECIAL STATUS SPECIES SUMMARY TABLES
FOR FEDERAL LEASE MODIFICATION APPROVAL - WYW172657

Vertebrate Species of Special Interest Associated with the Caballo Mine Project Area

	Common Name	Scientific Name	Status Under the ESA	Protected Under the MBTA	Listed as a BLM Sensitive Species	Listed as a WYNDD SOC	WGFD SGCN			Observed in the Area
							SGCN	NNS	Tier	
Amphibian	Great plains toad	<i>Anaxyrus cognatus</i>					Yes	NSSU(U)	II	
Amphibian	Northern leopard frog	<i>Lithobates pipiens</i>	NW		Yes	Yes	Yes	NSS4(Bc)	II	
Amphibian	Plains spadefoot	<i>Spea bombifrons</i>				Yes	Yes	NSS4(Bc)	II	
Bird	Western grebe	<i>Aechmophorus occidentalis</i>		Yes			Yes	NSSU(U)	II	Yes
Bird	Western tiger salamander	<i>Ambystoma mavortium</i>					Yes	NSS4(Bc)	III	
Bird	Baird's sparrow	<i>Ammodramus bairdii</i>	NW	Yes	Yes	Yes	Yes	NSS4(Bc)	II	Yes
Bird	Grasshopper sparrow	<i>Ammodramus savannarum</i>		Yes			Yes	NSS4(Bc)	II	Yes
Bird	Golden eagle	<i>Aquila chrysaetos</i>		Yes			Yes	NSS4(Bc)	II	Yes
Bird	Great blue heron	<i>Ardea herodias</i>		Yes			Yes	NSS4(Bc)	II	Yes
Bird	Short-eared owl	<i>Asio flammeus</i>		Yes		Yes	Yes	NSS4(Bc)	II	Yes
Bird	Burrowing owl	<i>Athene cunicularia</i>		Yes	Yes	Yes	Yes	NSSU(U)	I	Yes
Bird	Lesser scaup	<i>Aythya affinis</i>		Yes						
Bird	Redhead	<i>Aythya americana</i>		Yes						Yes
Bird	Canvasback	<i>Aythya valisineria</i>		Yes						Yes
Bird	Upland sandpiper	<i>Bartramia longicauda</i>		Yes			Yes	NSSU(U)	II	Yes
Bird	Ferruginous hawk	<i>Buteo regalis</i>	NW	Yes	Yes	Yes	Yes	NSS4(Cb)	II	Yes
Bird	Swainson's hawk	<i>Buteo swainsoni</i>		Yes			Yes	NSSU(U)	II	Yes
Bird	Lark bunting	<i>Calamospiza melanocorys</i>		Yes						Yes
Bird	Chestnut-collared longspur	<i>Calcarius ornatus</i>		Yes		Yes	Yes	NSS4(Bc)	II	Yes
Bird	Greater sage-grouse	<i>Centrocercus urophasianus</i>	NW		Yes	Yes	Yes	NSS4(Bc)	II	Yes
Bird	Mountain plover	<i>Charadrius montanus</i>	NW	Yes	Yes	Yes	Yes	NSSU(U)	I	Yes
Bird	Yellow-billed cuckoo	<i>Coccyzus americanus</i>		Yes	Yes	Yes	Yes	NSSU(U)	II	
Bird	Bobolink	<i>Dolichonyx oryzivorus</i>		Yes		Yes	Yes	NSS4(Bc)	II	
Bird	Willow flycatcher	<i>Empidonax traillii</i>		Yes			Yes	NSS3(Bb)	III	
Bird	Merlin	<i>Falco columbarius</i>		Yes			Yes	NSSU(U)	III	
Bird	American kestrel	<i>Falco sparverius</i>		Yes			Yes	NSS4(Bc)	III	Yes
Bird	MacGillivray's warbler	<i>Geothlypis tolmiei</i>		Yes			Yes	NSS4(Bc)	II	
Bird	Common yellowthroat	<i>Geothlypis trichas</i>		Yes			Yes	NSS4(Bc)	III	

Appendix E

	Common Name	Scientific Name	Status Under the ESA	Protected Under the MBTA	Listed as a BLM Sensitive Species	Listed as a WYNDD SOC	WGFD SGCN			Observed in the Area
							SGCN	NNS	Tier	
Bird	Bald eagle	<i>Haliaeetus leucocephalus</i>	DM	Yes	Yes	Yes	Yes	NSS3(Bb)	II	Yes
Bird	Loggerhead shrike	<i>Lanius ludovicianus</i>		Yes	Yes	Yes	Yes	NSS4(Bc)	II	Yes
Bird	Red-headed woodpecker	<i>Melanerpes erythrocephalus</i>		Yes			Yes	NSS4(Bc)	II	Yes
Bird	Long-billed curlew	<i>Numenius americanus</i>		Yes	Yes	Yes	Yes	NSS3(Bb)	II	Yes
Bird	Sage thrasher	<i>Oreoscoptes montanus</i>		Yes	Yes		Yes	NSS4(Bc)	II	Yes
Bird	White-faced ibis	<i>Plegadis chihi</i>		Yes	Yes	Yes	Yes	NSS3(Bb)	II	Yes
Bird	Virginia rail	<i>Rallus limicola</i>		Yes			Yes	NSSU(U)	III	
Bird	Mccown's longspur	<i>Rhynchophanes mccownii</i>		Yes		Yes	Yes	NSS4(Bc)	II	Yes
Bird	Dickcissel	<i>Spiza americana</i>		Yes			Yes	NSSU(U)	II	
Bird	Brewer's sparrow	<i>Spizella breweri</i>		Yes	Yes		Yes	NSS4(Bc)	II	Yes
Mammal	Black-tailed prairie dog	<i>Cynomys ludovicianus</i>	NW		Yes	Yes	Yes	NSS4(Cb)	II	Yes
Mammal	Sagebrush vole	<i>Lemmyscus curtatus</i>					Yes	NSS4(Cb)	II	
Mammal	Western small-footed myotis	<i>Myotis ciliolabrum</i>					Yes	NSS4(Cb)	II	
Mammal	Little brown myotis	<i>Myotis lucifugus</i>	UR				Yes	NSS3(Bb)	II	
Mammal	Olive-backed Pocket Mouse	<i>Perognathus fasciatus</i>					Yes	NSS4(Cb)	III	
Mammal	Plains harvest mouse	<i>Reithrodontomys montanus</i>					Yes	NSS3(Bb)	II	
Reptile	Eastern spiny softshell	<i>Apalone spinifera spinifera</i>					Yes	NSS2(Ba)	II	
Reptile	Western painted turtle	<i>Chrysemys picta bellii</i>					Yes	NSS4(Bc)	III	
Reptile	Prairie rattlesnake	<i>Crotalus viridis</i>					Yes	NSS4(Bc)	III	Yes
Reptile	Plains hog-nosed snake	<i>Heterodon nasicus</i>					Yes	NSSU(U)	II	
Reptile	Western milksnake	<i>Lampropeltis gentilis</i>					Yes	NSS3(Bb)	II	
Reptile	Plains gartersnake	<i>Thamnophis radix</i>					Yes	NSSU(U)	III	

USWS: ESA – status as a T&E species: NW-not warranted for listing, DM-delisted, UR-petition for listing under review

BCC – status as a USFWS bird of conservation concern

MBTA – protected under the Migratory Birds Treaty Act

BLM: Listed as a sensitive species by BLM

WYNDD: Determined to be a species of concern

WGFD: SGCN-species of greatest conservation concern, which is based upon the Native Species Status (NSS) classification system

Source: WYNDD 2019, NREX 2019

Appendix E

Species of Special Interest Summary

Amphibians	3
Birds	35
Mammals	6
Reptiles	6
Total	50

33	MBTA
14	BLM Sensitive
17	WYNDD SOC
46	WGFD SGCN
46	NSS

Highest Priority	²	- Tier I	2
Moderate Priority	³	- Tier II	34
Lowest Priority - Tier III			10

NSSU	12	NSSU	12	Undetermined
NSS1	0	NSS1	0	Imperiled/Extreme
NSS2	1	NSS2(Ba)	1	Vulnerable/Extreme
NSS3	7	NSS3(Bb)	7	Vulnerable/Severe
NSS4	26	NSS4(Bc)	21	Vulnerable/Moderate
		NSS4(Cb)	5	Stable/Severe

APPENDIX F

CLIMATE CHANGE DISCUSSION

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 CO₂, which has been identified as a principal anthropogenic greenhouse gas. According to the EPA (2017) in 2016 (the most recent year of available CO₂ data at this time):

1. CO₂ emissions represent approximately 81.6 percent of the total 2016 U.S. greenhouse gas emissions.
2. Estimated CO₂ emissions in the U.S. totaled 6,511.3 million metric tons in 2016, which was a 1.9 percent decrease from 2015.
3. Estimated CO₂ emissions from fossil fuel combustion in the U.S. totaled 4,966.0 million metric tons in 2016.
4. Estimated CO₂ emissions from the electric power sector totaled 1,809.3 million metric tons in 2014.
5. Estimated CO₂ emissions from electric power generation from coal totaled 1,241.4 million metric tons, or about 19.1 percent of total U.S. energy-related CO₂ emissions in 2016.

Approximately 98 percent of the 317.4 Mt coal mined in 2017 in Wyoming was used to generate electricity by coal-fired power plants in the U.S. (USEIA 2017). Coal production from Wyoming represented approximately 50 percent of the coal used for power generation in 2017, which means that, using a simple calculation (CO₂ emissions from item number 5 above multiplied by 50 percent), Wyoming surface coal mines were responsible for approximately 620.7 million metric tons of CO₂ emissions from coal power generation in 2017. If a more accurate method of calculating CO₂ emissions is used, based on the 1.686 metric tons of CO₂ emissions per ton of coal combusted (EPA 2008), the emissions from burning 317.4 Mt of Wyoming coal were approximately 535.1 million metric tons in 2017. The Caballo Mine produced 11.1 Mt of coal in 2017, which represents approximately 3.5 percent of the coal produced in Wyoming in 2017, or approximately 18.6 million metric tons of CO₂ emissions from coal power generation in 2017.

As stated above, estimated CO₂ emissions in the U.S. decreased 1.9 percent from 2015 to 2016 (EPA 2017). Under the Proposed Action, CCC anticipates producing the coal included in the Caballo West tract at 13.5 Mtpy levels, using existing production and transportation facilities. This will extend the mine's current GHG emissions by approximately 8.9 years and combustion of Caballo West tract federal coal in coal-fired power plants will also continue for approximately 8.9 additional years. Because CO₂ emissions have been declining in recent years and because CO₂ from coal mined at the Caballo Mine will remain at or only slightly above current levels, climate impacts associated with direct/indirect emissions from the Caballo West tract from mining, transportation, and combustion will be moderate but short term.

A protocol to estimate what is referenced as the "social cost of carbon" (SCC) associated with GHG emissions was developed by a federal Interagency Working Group (IWG), to assist agencies in addressing EO 12866. That EO required federal agencies to assess the cost and the benefits of intended regulations as part of their regulatory impact analyses. The SCC protocol was also developed for use in cost-benefit analyses of proposed regulations that could impact cumulative global emissions (Shelanski and Obstfeld 2015).

Notably, the SCC protocol does not measure the actual incremental impacts of a project on the environment and does not include all damages or benefits from carbon emissions. The SCC protocol estimates economic damages associated with an increase in carbon dioxide emissions - typically expressed as a one mt increase in a single year - and includes, but is not limited to, potential changes in net agricultural productivity, human health, and property damages from increased flood risk over hundreds of years. The estimate is developed by aggregating results “across models, over time, across regions and impact categories, and across 150,000 scenarios” (Rose et al. 2014). The dollar cost figure arrived at based on the SCC calculation represents the value of damages avoided if, ultimately, there is no increase in carbon emissions.

EO 13783, issued March 28, 2017, directed that the IWG be disbanded and that technical documents issued by the IWG be withdrawn as no longer representative of federal policy. The 2017 EO further directed that when monetizing the value of changes in greenhouse gas emissions resulting from regulations, agencies follow the guidance contained in OMB Circular A-4 of September 17, 2003. In all cases, a Federal agency should ensure that its consideration of the information and other factors relevant to its decision is consistent with applicable statutory or other authorities, including requirements for the use of cost-benefit analysis.

Based on emission estimates for coal combustion, SCC calculations can quickly rise to large values; however, specific threshold levels for the determination of significance can vary depending on numerous project factors. OSMRE has elected not to specifically quantify the SCC in its assessment of the Caballo Mine mining plan modification. NEPA does not require a cost-benefit analysis (40 C.F.R. § 1502.23) or the presentation of the SCC cost estimates quantitatively in all cases, and that analysis was not undertaken here. Without a complete monetary cost-benefit analysis, which will include the social benefits of energy production to society as a whole and other potential positive benefits, inclusion solely of a SCC analysis will be unbalanced, potentially inaccurate, and not useful.

Given the uncertainties associated with assigning a specific and accurate social cost of carbon resulting from 8.9 additional years of operation under the mining plan modification, and that the SCC protocol and similar models were developed to estimate impacts of regulations over long time frames, this EA quantifies direct and indirect GHG emissions and evaluates these emissions in the context of U.S. and State/County GHG emission inventories as discussed in **section 4.5.4**.

Further, any increased economic activity, in terms of revenue, employment, labor income, total value added, and output, that is expected to occur with the Proposed Action is simply an economic impact, rather than an economic benefit, inasmuch as such impacts might be viewed by another person as negative or undesirable impacts due to potential increase in local population, competition for jobs, and concerns that changes in population will change the quality of the local community. Economic impact is distinct from “economic benefit” as defined in economic theory and methodology, and the socioeconomic impact analysis required under NEPA is distinct from cost-benefit analysis, which is not required.

To summarize, this EA does not undertake an analysis of SCC because 1) it is not engaged in a rulemaking for which the protocol was originally developed; 2) the IWG, technical supporting documents, and associated guidance have been withdrawn; 3) NEPA does not require cost-benefit analysis and the agency did not undertake one here; and 4) because the full social benefits of coal-fired energy production have not been monetized, quantifying only the costs of GHG emissions will provide information that is both potentially inaccurate and not useful.