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

Environmental Assessment
Cordero Rojo Mine
Campbell County, Wyoming
Mining Plan Modification
for
Federal Coal Lease WYW174407

November 2017

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1.1 Introduction

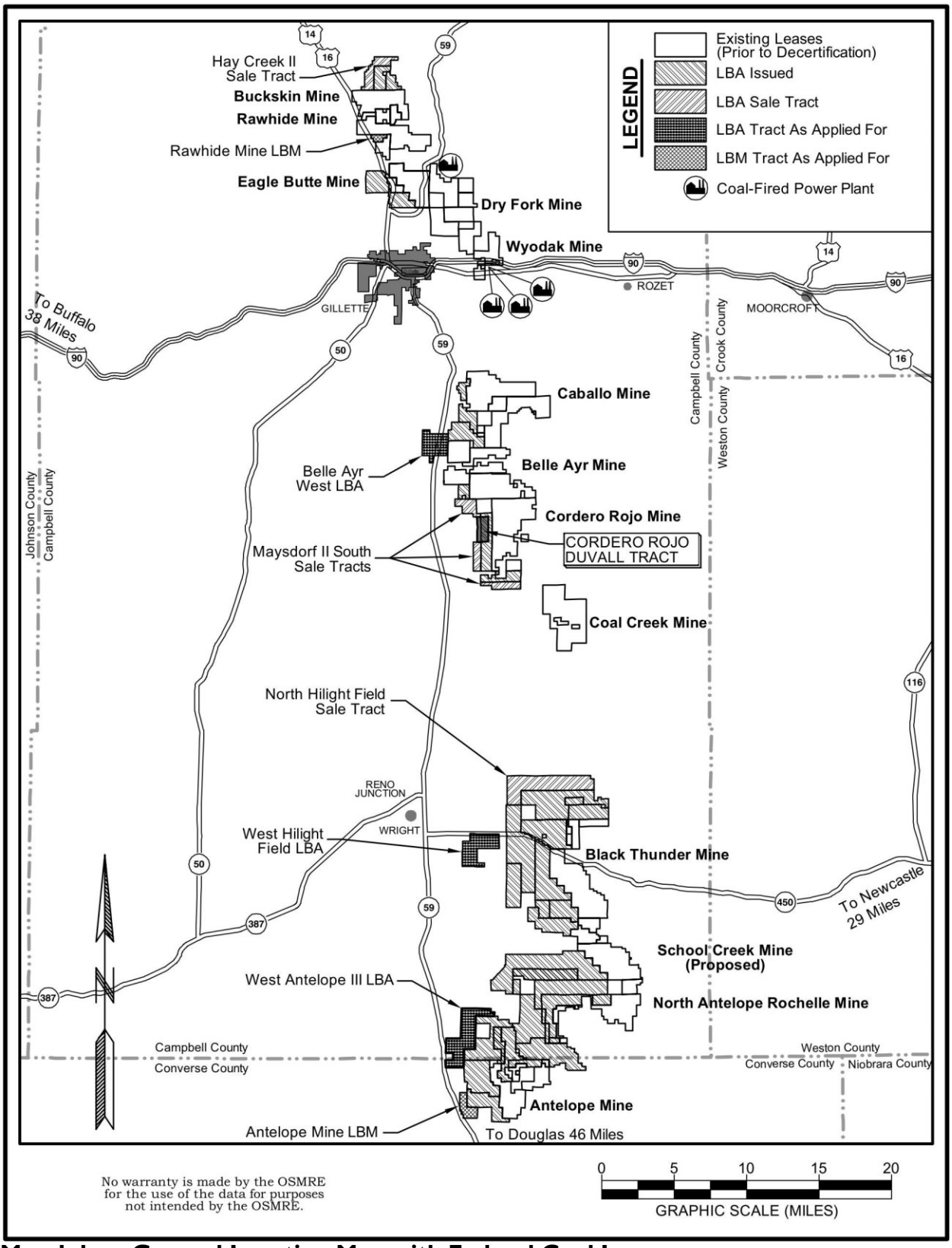
The Environmental Assessment (EA) for the Cordero Rojo Mine Federal Coal Lease WYW174407 Mining Plan Modification (Project) has been prepared by the U.S. Department of the Interior (DOI) Office of Surface Mining Reclamation and Enforcement (OSMRE), Western Region. OSMRE is the lead federal agency responsible for development of this EA because, under the Surface Mining Control and Reclamation Act of 1977 (SMCRA), OSMRE has the authority to make a recommendation to the Assistant Secretary, Lands and Minerals Management (ASLM) regarding federal mining plan modifications (OSMRE 1999). Using criteria outlined in OSMRE's Handbook for Implementing the National Environmental Policy Act (NEPA) (OSMRE 1989), the DOI's Departmental Manual (DM) Part 516 (DOI 2004), and the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (CEQ 2005), OSMRE determined that this EA could tier to, and incorporate by reference, analyses included in the Final Environmental Impact Statement for the Maysdorf Coal Lease Application (hereafter 2007 Maysdorf EIS [BLM 2007]). This EA also tiers to, and incorporates by reference, analyses included in the South Gillette Area Coal Lease Applications Final Environmental Impact Statement (hereafter 2009 SGAC EIS [BLM 2009]). Both EIS documents were prepared by the Bureau of Land Management (BLM) and OSMRE was a cooperating agency on both documents.

1.2 Background

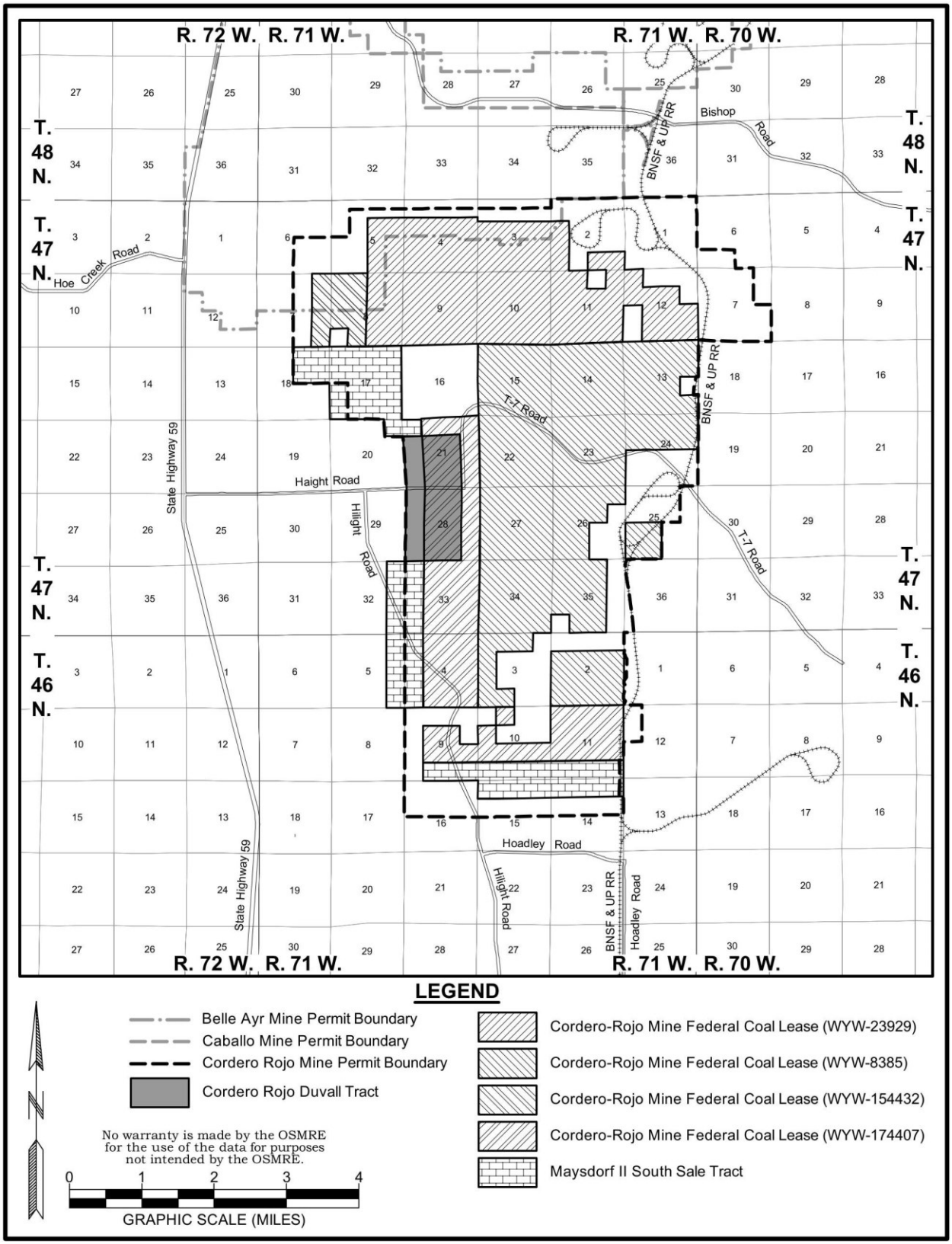
The Cordero Rojo Mine (CRM), operated by Cordero Mining LLC (CMC), is located approximately 15 miles south-southeast of Gillette, Wyoming (**map 1-1**). The CRM is one of several mines located within the Powder River Basin (PRB). CMC was formerly owned by Rio Tinto Energy America, and is currently a directly held subsidiary of Cloud Peak Energy Resources (CPE). Coal has been mined on a commercial scale at the CRM since 1976. According to information provided by OSMRE (OSMRE 2016), the CRM is currently recovering coal under five distinct state or federal coal leases and various private coal leases, as indicated below. The federal leases are shown on **map 1-2.**

1. State Coal Lease 0-26936A,
2. Federal Coal Lease WYW8385,
3. Federal Coal Lease WYW23929,
4. Federal Coal Lease WYW154432,
5. Federal Coal Lease WYW174407, and
6. Private Coal Lease (various).

Coal is mined using conventional surface-mining methods and shipped from an onsite railroad loading facility to electric utilities and industrial customers in the west, midwest, and southern, United States. In 2016, 100 percent of coal from the CRM was shipped to U.S. markets. The ASLM initially approved the mining of the federal coal associated with coal lease WYW174407 in 2012 (OSMRE 2012). As approved in the 2012 federal mining plan modification, CRM could continue mining operations (mining, processing, and shipping coal) through approximately 2027.



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



Map 1-2. Cordero Rojo Mine's Federal Coal Leases

In anticipation of needed additional coal reserves, CMC filed an application in 2001 with BLM to lease federal coal reserves in an area located west of and immediately adjacent to the CRM, under leasing by application regulations (also known as LBA regulations) at 43 Code of Federal Regulations (CFR) §3425.1 and the provisions of the Energy Policy Act of 2005 (Government Publishing Office [GPO] 1982 and Public Law No: 109-58 2005, respectively). The lease request area, which was referred to as the Maysdorf LBA Tract, was assigned case file number WYW154432. The federal coal reserves were applied for as a maintenance tract for the CRM.

The Maysdorf tract was applied for as a maintenance tract for the CRM to maintain operation at the mine's current average annual level of production. BLM prepared the 2007 Maysdorf EIS to satisfy NEPA requirements for LBAs (BLM 2007). The 2007 Maysdorf EIS analyzed the potential impacts associated with approving federal coal lease WYW154432, which would allow CRM to continue producing coal at the current rate instead of ceasing production, as recoverable coal reserves were nearly exhausted. As stated previously, OSMRE was a cooperating agency on this EIS. Based on the NEPA evaluation included in the 2007 Maysdorf EIS, BLM concluded that the coal within the tract was acceptable for leasing and that maximum economic recovery of the federal coal would be achieved by mining the tract. BLM selected Alternative 3, as described in Chapter 2 of the 2007 Maysdorf EIS. Under Alternative 3, the Maysdorf coal lease application area was divided into two tracts, referred to as the North Maysdorf LBA Tract and the South Maysdorf LBA Tract. The North Maysdorf LBA Tract associated with lease WYW154432, as modified by the BLM, included approximately 446 acres and an estimated 55 Mt of mineable federal coal resources. The South Maysdorf LBA Tract associated with lease WYW174407, as modified by the BLM, included approximately 2,900 acres and an estimated 288 Mt of mineable coal. The CMC was the successful bidder for the federal coal associated with WYW174407 and the lease was effective on August 1, 2008. The entire WYW174407 tract, as leased, is shown on **map 1-2**.

CMC submitted a permit revision/permit application package (PAP) for Permit 237 to the Wyoming Department of Environmental Quality (WDEQ)-Land Quality Division (LQD) to include the federal coal from the newly acquired lease WYW174407 on August 24, 2009. The PAP included modifications to include coal from lease WYW174407. WDEQ-LQD determined CMC's application to be administratively complete on October 27, 2009. Following a public comment period during which no comments were received, WDEQ-LQD approved the permit revision on March 9, 2011 (WDEQ-LQD 2011).

CMC also submitted a federal mining plan modification request to OSMRE associated with federal coal related to lease WYW174407. The federal mining plan modification was initially proposed by CMC in 2015. Using criteria outlined in OSMRE's NEPA Handbook (OSMRE 1989), OSMRE determined that a supplemental EA that tiers off the 2007 Maysdorf EIS and the 2009 SGAC EIS would fulfill OSMRE's responsibilities under NEPA for evaluating potential impacts resulting from mining the proposed project.

1.2.1 Statutory and Regulatory Background

For existing approved federal mining plans that are proposed to be modified, pursuant to 30 CFR Part 746 (GPO 2001), OSMRE prepares a federal mining plan decision document (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. 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 Resource Recovery and Protection Plan (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 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 WYW174407, the R2P2, and the Mineral Leasing Act of 1920, as amended (MLA),
7. findings and recommendations of WDEQ-LQD with respect to the mine permit revision application and the Wyoming State program, and
8. the findings and recommendations of OSMRE with respect to the additional requirements of 30 CFR Chapter VII, Subchapter D (30 CFR Parts 740 to 746).

1.3 Purpose and Need

As described in 40 CFR 1502.13, the purpose and need statement will 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 the SMCRA, which requires the evaluation of CMC's proposed mining plan modification for the CRM before conducting surface mining and reclamation operations to develop the Duvall Tract federal coal lease WYW174407. 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 CMC the opportunity to exercise its valid existing rights granted by the BLM under federal coal lease WYW174407 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 (MMPA),
4. Federal Coal Leasing Act Amendment, 1976 (FCLAA),
5. Federal Land Policy Management Act of 1976 (FLPMA),

6. SMCRA,
7. Multiple-Use Sustained Yield Act of 1960,
8. Endangered Species Act of 1973 (ESA),
9. Clean Air Act, as amended (CAA),
10. Clean Water Act (CWA),
11. Safe Drinking Water Act, as amended (SDWA),
12. National Historic Preservation Act, as amended (NHPA),
13. American Indian Religious Freedom Act of 1978 (AIRFA)
14. Paleontological Resources Preservation Act of 2009 (PRPA), and
15. Migratory Bird Treaty Act of 1918, as amended (MBTA).

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

1.5 Outreach and Issues

Following a review of OSMRE's 2012 federal MPDD, the 2007 Maysdorf EIS, and 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 2007, 2009, and 2012 analyses mentioned above. 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 August 4, 2016 and August 20, 2016 (**appendix A**) initiating a comment period, ending on September 5, 2016. Substantive issues identified during the public scoping period (August 4, 2016 through September 5, 2016) were also 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 (2),
2. air quality (2),
3. wildlife (1),
4. level of NEPA/ NEPA process (3),
5. reclamation (1),
6. climate change/global warming (2),
7. negative effects (loss of revenue) on economy from any delay or shutdown of mining at CRM (1), and
8. pro mining (2).

1.6 Crosswalk of Resource Areas

Table 1-1 identifies the location of resource discussions presented in the 2007 Maysdorf EIS and the 2009 SGAC EIS and lists their location in this EA, where present. While all of the resources have been considered, not all of the resources have been brought forward for analysis in this EA. OSMRE determined that those resources and potential impacts not brought forward for analysis were sufficiently documented in the 2007 Maysdorf EIS and the 2009 SGAC EIS or that new information would not affect the decision-making process. Information presented in the 2007 Maysdorf EIS and the 2009 SGAC EIS that adequately described the affected environment for

Table 1-1. Crosswalk of Resources Analyzed in the Maysdorf EIS, SGAC EIS, and the Duvall EA

Resource	Maysdorf EIS[1]		SGAC EIS[2]		Duvall EA	
	Affected Environment	Environmental Consequences	Affected Environment	Environmental Consequences	Affected Environment	Environmental Consequences
General Setting	3.1	3.1	3.1	3.1	Incorporated by reference	Incorporated by reference
Topography and Physiography	3.2.1	3.2.2	3.2.1	3.2.2	Incorporated by reference	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	3.3.1.1 3.3.2.1 3.3.3.1	3.3.1.2 3.3.2.2 3.3.3.2	Incorporated by reference	4.3
Air Quality	3.4.2.1 3.4.3.1 3.4.4.1 3.4.5.1	3.4.2.2 3.4.3.2 3.4.4.2 3.4.5.2	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	3.1	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	3.5.1.1 3.5.2.1 3.5.3.1	3.5.1.2 3.5.2.2 3.5.3.2	3.2	4.5
Alluvial Valley Floors	3.6.1	3.6.2	3.6.1	3.6.2	Incorporated by reference	4.6
Wetlands	3.7.1	3.7.2	3.7.1	3.7.2	Incorporated by reference	4.7
Soils	3.8.1	3.8.2	3.8.1	3.8.2	Incorporated by reference	4.8
Vegetation	3.9	3.9.2	3.9.1	3.9.2	Incorporated by reference	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	3.10.1.1 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	3.3	4.10
Land Use and Recreation	3.11.1	3.11.2	3.11.1	3.11.2	Incorporated by reference	4.11
Cultural Resources	3.12.1	3.12.2	3.12.1 3.12.1.1 3.12.3	3.12.2 3.12.3	Incorporated by reference	4.12
Visual Resources	3.13.1	3.13.2	3.13.1	3.13.2	Incorporated by reference	4.13
Noise	3.14.1	3.14.2	3.14.1	3.14.2	Incorporated by reference	4.14
Transportation	3.15.1	3.15.2	3.15.1	3.15.2	Incorporated by reference	4.15
Hazardous and Solid Waste	3.16.1	3.16.2	3.16.1	3.16.2	Incorporated by reference	4.16
Socio-Economics	3.17.1.1 3.17.2.1 3.17.3.1 3.17.4.1 3.17.5.1 3.17.6.1	3.17.1.2 3.17.2.2 3.17.3.2 3.17.4.2 3.17.5.2 3.17.6.2	3.17.1.1 3.17.2.1 3.17.3.1 3.17.4.1 3.17.5.1 3.17.6.1 3.17.7.1	3.17.1.2 3.17.2.2 3.17.3.2 3.17.4.2 3.17.5.2 3.17.6.2 3.17.7.2	3.5	4.17

[1] Maysdorf EIS (BLM 2007)

[2] SGAC– South Gillette Coal EIS (BLM 2009)

specific resources are incorporated by reference into this EA in their entirety and are not reiterated.

1.7 Public Involvement

On August 4, 2016, OSMRE posted an announcement of the EA on their *Initiatives* webpage (OSMRE 2016). The announcement initiated a comment period that extended from August 4, 2016 through September 5, 2016. OSMRE also published a notice of intent (NOI) to prepare this EA in the Gillette News Record on August 4, 2016 and August 20, 2016 (**appendix A**) initiating a comment period, ending on September 5, 2016. 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 four 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**. OSMRE announced the availability of the EA on their *Initiatives* webpage (OSMRE 2016) on July 6, 2017 and published a notice of availability (NOA) for the EA and unsigned FONSI in Gillette News Record on July 6, 2017. Public outreach and Tribal consultation letters were also sent out to interested parties, stakeholders and tribes that could be affected by the project. The EA and unsigned FONSI were provided to the public for review and comment for a 32-day period, ending on August 7, 2017. The comments were evaluated and considered before the EA was finalized and the FONSI was signed. OSMRE prepared responses to substantive comments in Appendix B of this EA.

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).

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

2.1 Description of Alternatives

The Proposed Action and No Action Alternative analyzed in this EA reflect the proposal for a federal mining plan modification to include adding approximately 852.1 acres to the currently approved permit boundary and adding approximately 569.1 acres of federal coal to the federal mining plan. This EA also reflects the modified alternative selected by BLM when approving the lease of the federal coal associated with lease WYW174407 (BLM 2007) and on WDEQ-LQD's 2011 written findings to CMC's 2008 PAP for a permit revision to include lease WYW174407 (WDEQ-LQD 2011). **Table 2-1** summarizes coal production, surface disturbance, and mine life for the CRM 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 WYW174407. These scenarios are described in greater detail, below.

Table 2-1. Summary Comparison of Coal Production, Surface Disturbance, Mine Life, and Employees for the No Action Alternative and Proposed Action Specific to WYW174407

Item	Projections Under No Action Alternative	Projections Under Proposed Action
Remaining Recoverable Federal Coal	232.6 Mt	288.4 Mt
Total Area to Be Disturbed	18,348 acres	19,200.1 acres
Estimated Average Annual Production	20 Mt	20 Mt
Remaining Years from Recovering Federal Mine Plan Coal	11.6[1]	14.4[1]
Average Number of Employees	383	383

[1] Mining of federal coal would be done in sequence with mining other state and private coal leases, which extends the estimated LOM beyond the years indicated

2.1.1 Proposed Action

The Proposed Action would modify the federal mining plan and authorize CMC to conduct coal removal on approximately 569.1 acres of federal coal, with approximately 852.1 acres of surface disturbance, to recover approximately 55.8 Mt of federal coal. CMC estimates that at the projected average annual production rate of 20 million tons (Mt), mining this coal would extend the mine's life by about 2.8 years. All of the federal coal included in the Proposed Action would be shipped to coal-fired power plants in the U.S. (CMC 2016a). In 2016, 100 percent of coal mined at the CRM was shipped to U.S. markets.

Under the Proposed Action, the Cordero Rojo Mine Duvall tract would be mined as an integral part of the CRM. Because the Cordero Rojo Mine Duvall tract would be an extension of the existing CRM, the facilities and infrastructure would be the same as those identified in Permit 237 Term 10, as revised on January 2017, and the BLM Resource Recovery and Protection Plan (R2P2), which was approved December 2015.

2.1.2 No Action Alternative

Under the No Action Alternative, ASLM would not approve the 2016 federal mining plan modification request described above under the Proposed Action. Under this alternative, the CRM would mine its remaining 232.6 Mt of recoverable federal coal reserves within the existing CRM leases in approximately 11.6 years at an average production rate of approximately 20 million tons per year (Mtpy).

The No Action Alternative included in this EA compares the potential environmental and economic consequences of not mining the Duvall tract, under the assumption that the additional coal within federal coal lease WYW174407 tract would not be mined in the foreseeable future if the No Action Alternative is selected. Under the No Action Alternative scenario, CMC would be limited to recovering the remaining federal coal reserves associated with federal coal leases WYW8385, WYW23929, WYW154432, and WYW174407 and coal within state and private leases. All of the federal coal included in the No Action Alternative would continue to be shipped to 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 the Duvall tract.

2.1.3 Alternatives Considered but Eliminated from Detailed Analysis

OSMRE considered alternative scenarios to the approval or denial of the federal mining plan modification. However, since 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

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

Also, lease WYW174407 is a surface reserve lease only. The lease was sold by the federal government and purchased and held by the CMC with the clear understanding by all parties concerned that the lease would be mined by surface mining methods only (BLM 2007).

This alternative is also economically infeasible at current permitted production rates, and the economics of initiating an underground longwall mining operation in the CRM are not cost effective. The facilities and equipment needed for underground mining are different from surface mining. Because the infrastructure for underground mining is not in place at the CRM, new

infrastructure for underground mining would need to be constructed. The capital expenditure to develop an underground mine would be prohibitive. In addition, all new surface facilities would need to be constructed, including, but not limited to, conveyors, coal stock piles, a wash plant, and maintenance and support facilities. In addition, all new underground mining equipment would need to be purchased such as, but not limited to, a long wall mining system, conveyor systems/drives/power stations, vehicles for transporting employees and supplies, several continuous miners, shuttle cars, large and small ventilation fans, and roof bolters.

In addition, approval by WDEQ-LQD of an application for a permit revision would be required to authorize underground mining. The process for CMC to design and engineer a new underground mine and for WDEQ-LQD to process a new permit application would take a number of years. Underground mining methods are inconsistent with the approved R2P2 and would result in much lower recovery rates; approximately 75 percent (Kentucky Geological Survey 2012) compared to 92 percent (CMC 2016b). These factors also result in this potential alternative being 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 suggested considering an alternative that required reduced air emissions at the mine by changing or modifying mining related equipment to equipment which would produce lower air emissions. The CRM is a relatively small contributor of the emissions related to engine combustion (primarily carbon dioxide [CO_2] 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 569 acres of federal coal would be cost prohibitive for the minimal benefit to the regional air quality. In addition, the use of natural gas powered engines in mining equipment is relatively new and some types of equipment would not be available for replacement with natural gas powered engines. The use of solar power to run large equipment has not been tested and is not considered technologically feasible at this time. Similarly, retrofitting existing equipment with additional emissions control devices would be expensive with limited effect on regional air emissions.

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

2.1.3.3 Air Quality Mitigation Alternatives

Some public comments suggested that OSMRE consider alternatives that mitigate air quality impacts, specifically by imposing more stringent emission limits at power plants fueled by the CRM and by requiring oil and gas operators in the region to reduce their emissions. These proposals are not alternatives to the mining plan being considered. The effects of coal combustion are analyzed in the Proposed Action as well as in the No Action Alternative because they are considered to be indirect effects. CEQ regulations at 40 CFR 1508 (b) define "indirect effects" as those which are caused by the proposed action and are later in time or farther removed in distance, but are still reasonably foreseeable. These indirect effects would occur as a result of

burning the coal that is mined. The analysis concluded there would not be significant impacts to air resources under the Proposed Action and no mitigation was 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)

2.2.1 Mining Plan and Mining Operations

The CRM is currently permitted to mine coal under the ASLM-approved federal mining plan (OSMRE 2012), the WDEQ-LQD-approved Permit 237 Term 10 (WDEQ-LQD 2017a), and the BLM-approved R2P2 (BLM 2015). CMC continues to use conventional surface-coal mining techniques described in Section 2.1 of the 2007 Maysdorf EIS. CMC is permitted to mine a maximum of 35 Mtpy under WDEQ-AQD P002248 air quality permit (WDEQ-AQD 2017a). CMC mined approximately 18.3 Mt of coal in 2016 (Wyoming Department of Workforce Services (WDWS 2016a). In 2016, all of the coal mined at the CRM was shipped to customers in the U.S. As stated in **section 1.2**, the CRM currently operates under four federal coal leases, one state coal lease, and various private coal leases. Federal coal lease areas are depicted on **map 1-2**. Through December 31, 2016, approximately 941,087,652 Mt of federal coal reserves have been recovered at the CRM.

2.2.2 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 will have sufficient funds to reclaim the site if the permittee fails to complete obligations set forth in the approved reclamation plan (OSMRE 2015). The current bond amount for the CRM is $158.7 million in the form of a Surety bond and was approved by WDEQ-LQD on July 31, 2017.

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

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

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

Final bond release on reclaimed lands indicates that the reclamation meeting permit standards has been in place in accordance with permit standards for at least 10 years and that an application for final bond release was submitted to the WDEQ. In 2014, the OSMRE Denver Field Division (DFD) evaluated reclamation plans of six approved permits in Wyoming during oversight inspections and determined that all permits evaluated were in compliance with contemporaneous reclamation requirements as defined within the approved permits (OSMRE 2014). According to CRM 2016 Annual Report, the mine has disturbed approximately 14,352 acres and has backfilled and graded approximately 6,541 acres (CMC 2016b). Approximately 2,962 acres are listed as long-term mining or reclamation facilities, which means that the mine has backfilled and graded approximately 57 percent of the disturbance that is not required for continued operations.

The acres of reclamation at the CRM from July 2011 through June 2016, by bond release phase, are indicated in **table 2-2**.

Table 2-2. Total Mine Disturbance/Reclamation/Bond Release July 1, 2011 through June 30, 2016[1]

Year	Total Disturbance	Facility Disturbance	Active Mining Area	Available for Seeding	Soiled & Seeded	Area Bond	Phase 1	Phase 2	Phase 3
2011-2012	13,011	4,248	4,166	299	4,298	4,597	2,275	223	223
Ratio of Total	--	33%	32%	2%	33%	35%	17%	2%	2%
2012-2013	13,352	3,028	4,697	900	4,728	5,628	3,923	222	222
Ratio of Total	--	23%	35%	7%	35%	42%	29%	2%	2%
2013-2014	13,684	2,851	4,934	700	5,199	5,899	3,923	222	222
Ratio of Total	--	21%	36%	5%	38%	43%	29%	2%	2%
2014-2015	14,137	2,962	4,985	495	5,695	6,190	3,923	222	1,159
Ratio of Total	--	21%	35%	4%	40%	44%	28%	2%	8%
2015-2016	14,352	2,962	4,659	310	6,231	6,541	3,923	222	1,159
Ratio of Total	--	21%	32%	2%	43%	46%	27%	2%	8%

[1] 2012 through 2016 Annual Mining Reports for the CRM for Permit 237 Term 10. Total disturbance includes the Facility Disturbance, Active Mining Area, and the area Available for Seeding

2.2.3 Existing Stipulations and Mitigation Measures

Mitigation measures stipulated for WYW174407 federal coal lease, in the context of resource-specific impacts, are summarized in **chapter 4**. The mitigation measures and stipulations presented in the ROD for the 2007 Maysdorf EIS remain in effect and would be carried forward if the federal mining plan modification is approved by the ASLM.

3.0 Affected Environment

This chapter discusses the existing conditions of the physical, biological, cultural, and human resources that could be affected by implementation of the alternatives described in **chapter 2** as they relate to the approval of the federal mining plan modification for the CRM. For the purpose of this analysis, the project area is considered the CRM Permit Area and a surrounding study area. Study areas vary by resource and are described below. Elements of the environment specified by statute, regulation, Executive Order, or the Standards for Public Land Health are described and analyzed in this section except where the 2007 Maysdorf EIS previously concluded they were not present, which has been verified during this EA process.

Baseline information presented in the 2007 Maysdorf EIS that has not substantively changed is incorporated by reference. Updated information pertaining to the baseline data is presented in this chapter when applicable. Unless otherwise noted below, the baseline conditions described in the 2007 Maysdorf EIS as related to lease WYW174407 have not substantively changed, no new data are available, or the condition has only been minimally affected as a result of current mining operations and further presentation of information would not affect the decision-making process.

3.1 Air Quality and Climate Change

Air Quality regulations applicable to surface coal mining may include the National Ambient Air Quality Standards (NAAQS), Wyoming Ambient Air Quality Standards (WAAQS), and Prevention of Significant Deterioration (PSD). These regulatory programs were described in section 3.4.1.1 of the 2007 Maysdorf EIS. Additional air quality regulations applicable to surface coal mining include the New Source Performance Standards (NSPS), Hazardous Air Pollutants (HAPs), Mercury and Air Toxics Standards (MATS), and the Federal Operating Permit Program (Title V).

Air quality information specific to the CRM is included in CMC's P0022480 air quality permit (WDEQ- AQD 2017b). Section 3.4 of the 2007 Maysdorf EIS includes detailed discussions of air quality issues related to the leasing and mining of coal related to lease WYW154432. The analysis presented herein serves to summarize attainment/nonattainment areas discussions; update discussions with recent air quality monitoring findings; revise air quality modeling results; and update discussions on carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3), fine particulate matter (PM_{10} and $PM_{2.5}$), lead (Pb), and HAPs (specifically mercury [Hg]). Other common HAPs include xylene, n-hexane, acetaldehyde, acrolein, benzene, 1,3 butadiene, formaldehyde, Ethylbenzene, Toluene. CRM's air quality permit limits annual coal production to 35 Mtpy.

According to EPA (IPCC 2014), there is scientific evidence that increased atmospheric concentrations of greenhouse gases (GHG) and land use changes are contributing to increases in average global temperatures. GHG are not currently regulated pollutants (not subject to NAAQS or WAAQS regulations). GHG discussions are included in **section 3.1.4.4** and **section 4.4**.

3.1.1 National and Wyoming Ambient Air Quality Standards

As summarized by U.S. Environmental Protection Agency (EPA), the Clean Air Act (CAA) requires the EPA to establish NAAQS to protect public health and welfare (EPA 2016a). These standards define the maximum level of air pollution allowed in the ambient air. The CAA established NAAQS for six pollutants, known as "criteria" pollutants, which "… cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare and the presence of which in the ambient air results from numerous or diverse mobile

or stationary sources" (U.S. Senate 2015). The six, present-day criteria pollutants are Pb, NO_2, SO_2, CO, O_3, and particulate matter (PM_{10} and $PM_{2.5}$), where PM_{10} is coarse particulate matter, with mean aerodynamic diameters less than 10 microns, and $PM_{2.5}$ is fine particulate matter, with aerodynamic diameter of less than 2.5 microns.

The CAA allows states to promulgate additional ambient air standards that are at least as stringent, or more stringent, than the NAAQS (U.S. Senate 2015). The NAAQS and WAAQS (established by the WDEQ-LQD /Air Resources Management Bureau [ARMB]) for the six criteria pollutants are listed in **table 3-1**. WAAQS also include hydrogen sulfide (H_2S).

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

Emissions	Averaging Period	Wyoming Standard (WAAQS)	Federal Standard (NAAQS)
Carbon Monoxide (CO)	1-hour 8-hour	35 ppm[a] 9 ppm[a]	35 ppm[a] 9 ppm[a]
Sulfur Dioxide (SO_2)	1-Hour 3-hour	75 ppb[d] 0.50 ppm[a]	75 ppb[d] 0.50 ppm[a]
Oxides of Nitrogen (NO_x)	1-Hour annual	100 ppb[a] 53 ppb[b]	100 ppb[i] 53 ppb[f]
Ozone (O_3)	8-hour	0.075 ppm[e]	0.070 ppm[e]
PM_{10}	24-hour annual	150 µg/m^3[a] 50 µg/m^3[f]	150 µg/m^3[c] --
$PM_{2.5}$	24-hour annual	35 µg/m^3[g] 15 µg/m^3[f]	35 µg/m^3[j] 12 µg/m^3[h]
Lead (Pb)	90-Day	0.15 µg/m^3[h]	0.15 µg/m^3[b]
Hydrogen Sulfide (H_2S)	1-Hour	70/40 µg/m^3[i]	--

[a] Not to exceeded more than once per calendar year
[b] Not to be exceeded rolling 3-month average
[c] Violation when exceeded more than once per calendar year, averaged over 3 years
[d] 99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
[e] Annual 4th-highest daily max. 8-hour concentration, averaged over 3 years
[f] Annual mean
[g] 98th percentile of 24-hour daily average concentration
[h] Annual mean, averaged over 3 years
[i] 98th percentile, averaged over 3 years
[j] ½-hour average not to be exceeded more than 2 times per year/½-hour average not to be exceeded more than 2 times in any five consecutive days
-- Values not included in NAAQS.
Source: (EPA 2016b) and WDEQ-AQD (2016)

3.1.2 Attainment/Non-Attainment Area Designations

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

Through the State Implementation Plan (SIP) process, which is approved by EPA, states use the EPA method to designate areas within their borders as being in "attainment", "nonattainment", or "unclassifiable" with the NAAQS. The CRM LBM tract is in an area that is designated as an attainment area for all pollutants (EPA 2016c). However, the town of Sheridan, Wyoming, located about 90 miles northwest of the project area, is a nonattainment area for PM_{10}.

It should be noted that WDEQ-AQD has requested that the Wyoming Air Quality Advisory Board consider a request to review the State of Wyoming's *Request for Redesignation and Limited Maintenance Plan for the Attainment in the Particulate Matter (PM_{10}) Moderate Nonattainment Area in Sheridan* (WDEQ-AQD 2017b). The request is based on the fact that WDEQ-AQD has submitted over 25 years of monitoring data demonstrating that the Sheridan nonattainment area has attained the PM_{10} NAAQS for over 25 years. Upon review and completion of a finalized draft, the request will be submitted to EPA. The final determination has not been made at this time.

3.1.3 Background

Information regarding background air quality for the CRM was included in section 3.4.1 of the 2007 Maysdorf EIS, in CMC's P0022480 air quality permit, and is summarized below.

Regulated air pollutants associated with coal extraction and processing activities and coal combustion include:

1. particulates generated from mining activities such as blasting, excavating, loading and hauling of overburden and coal, and wind erosion of disturbed and unreclaimed mining areas,
2. NO_2 produced from overburden and coal blasting,
3. CO, NO_X, particulates (PM_{10} and $PM_{2.5}$), SO_2, and volatile organic compounds (VOCs) from gasoline and diesel vehicle tailpipe emissions,
4. NO_2 and PM_{10} emissions from railroad locomotives used to haul coal, and
5. SO_2, NO_X, VOCs, CO, PM_{10}, ammonia (NH_3), HAPS (Hg, etc.) produced from power plants and regulated under the CAA (the closest coal-fired power plants are the Neil Simpson plants, Wygen Station, and Wyodak Power Plant all located about 15 miles north of the Duvall tract, although coal mined at the CRM was not shipped to these power plants).

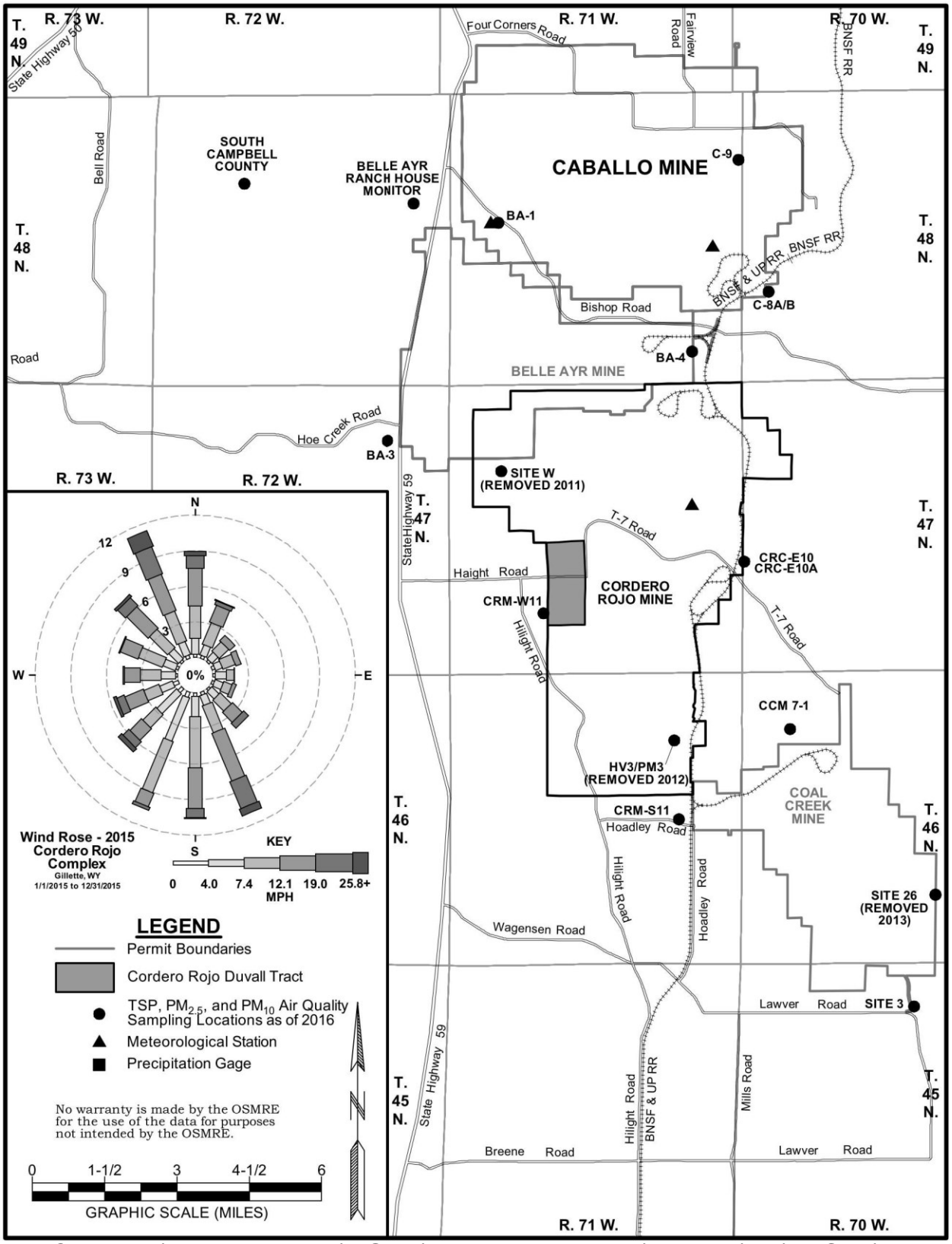
3.1.4 Existing Cordero Rojo Mine Air Quality Summary

Baseline air quality data for the surface facilities area for the CRM are found in the sections 3.4.2, 3.4.3, and 3.4.4 of the 2007 Maysdorf EIS. The following discussions include updated (2008-2016) air quality monitoring results.

3.1.4.1 Air Quality-Particulate Matter

CMC has monitored particulate matter levels around the mine throughout the life of the operation. The mine expressed particulate matter utilizing TSP concentrations until 1987. This measurement included all particulates generally less than 100 microns in diameter. In 1987, the form of the standard was changed from TSP to PM_{10} to better reflect human health effects. $PM_{2.5}$ monitoring at the CRM is not required by WDEQ-LQD and is not conducted at this time. Current, air monitoring consists of four samplers at three sites that monitor concentrations of PM_{10} and a meteorological site (**map 3-1**).

Tables 3-2 and **3-3** list the current annual mean and annual high PM_{10} concentrations for the CRM. The average annual PM_{10} concentrations for the 2010-2016 time period ranged between 8.3 and 30.9 $\mu g/m^3$. These concentrations ranged from about 17 to 62 percent of the annual



Map 3-1. Wind Rose and Air Quality and Meteorological Monitoring Stations at the Cordero Rojo Mine

Table 3-2. Average Annual PM_{10} Concentrations (µg/m^3) for the CRM, 2010 – 2016

Site Name [1]	2010	2011	2012	2013	2014	2015	2016
CRC-E10	21.2	20.7	29.0	22.7	21.0	19.7	13.6
CRC-E10A	22.2	23.9	30.9	22.9	18.9	21.7	15.9
CRM-S11	**	19.3	18.8	15.3	14.6	13.4	8.3
CRM-W11	**	19.7	20.4	17.7	15.5	12.6	8.7
Site W	21.0	14.1	**	**	**	**	**
HV3/PM3	13.8	8.7	**	**	**	**	**

[1] See **map 3-1** for site locations
** Indicates that the site is inactive
Source: Annual - U.S. EPA AirData (EPA 2016d)

standard of 50 µg/m^3. During the same time period, the 24-hour high PM_{10} values ranged between 33 and 108 µg/m^3. Thus, these maximum concentrations have ranged from approximately 22 to 72 percent of WDEQ-AQD 24-hour standard of 150 µg/m^3. Since $PM_{2.5}$ monitoring is not required by WDEQ-LQD, data were not gathered onsite. Therefore, data from $PM_{2.5}$ monitors located at the Belle Ayr Mine (approximately 3 miles north of CRM) and the Buckskin Mine (approximately 30 miles north of CRM) were used to estimate $PM_{2.5}$ emissions at the mine. $PM_{2.5}$ data from Belle Ayr BA-4 (#56-005-0892) gathered between 2010 and 2016 and from Buckskin Mine North Site (#56-005-1899) gathered between 2010 and 2016 were utilized to assess $PM_{2.5}$ levels (**table 3-4**). Exceptional events (if observed) are noted in the data acquired from the EPA database. Exceptional events are defined as occasional instances where a natural and exceptional occurring event impacts monitoring, causing a reading that is in exceedance with the NAAQS (GPO 1998). In the case that this occurs, the Final "Treatment of Data Influenced by Exceptional Events" Rule (40 CFR §50.14) allows the state to request a data flag and justify the flag by submitting documentation showing that NAAQS exceedance would not have occurred in the absence of a natural/exceptional event. Monitoring during the period of 2010-2016 demonstrated that ambient concentrations of $PM_{2.5}$, as determined by the 98th Percentile 24-hour NAAQS and WAAQS and annual WAAQS average values, were within established short-term (24-hour) and long term (annual) NAAQS values indicated in **table 3-1**.

Table 3-3. Maximum 24-hr PM_{10} Concentrations (µg/m^3) for the CRM, 2010-2016

Site Name [1]	2010	2011	2012	2013	2014	2015	2016
CRC-E10	62	83	95	64	59	88	50
CRC-E10A	66	64	108	68	67	78	50
CRM-S11	**	47	68	41	46	56	35
CRM-W11	**	66	63	55	60	51	33
Site W	83	53	**	**	**	**	**
HV3/PM3	54	27	**	**	**	**	**

[1] See **map 3-1** for site locations
** Indicates that the site is inactive
Source: U.S. EPA AirData (EPA 2016d)

Table 3-4 presents the available EPA data for these site and shows there were no exceedances of the $PM_{2.5}$ standard between 2008 and 2015 for either site.

EPA referenced emission factors are available for use in estimating $PM_{2.5}$ values based on PM_{10} values (Pace 2005). Generally accepted estimates consistently presented emission fractions of $PM_{2.5}$ values at a range of 0.1 to 0.15 of PM_{10} values for unpaved roadways and 0.15 to 0.2 for wind erosion from industrial and construction sites (Pace 2005). CRM-specific PM_{10} monitoring data were used to estimate $PM_{2.5}$ ambient concentrations for annual mean and annual maximum 24-hour concentrations by applying a 0.2 factor (**tables 3-5** and **3-6**, respectively). These data

indicate that projected $PM_{2.5}$ ambient design concentrations should be below the prescribed NAAQS, which supports the findings of Sheridan $PM_{2.5}$ data evaluation presented in **table 3-5**.

Table 3-4. Measured $PM_{2.5}$ Concentrations [1] at the Belle Ayr Mine (2010-2016) and Buckskin Mine (2010-2016)

Site ID	Year	24-hour (µg/m³)	Annual (µg/m³)
Belle Ayr Mine (BA-4)	2010[3]	18.4	6.6
	2011[3]	20.4	5.3
	2012[2]	13.5	6.4
	2013[3]	5.2	10.1
	2014[2]	7.9	3.5
	2015[3]	17.5	5.0
	2016[3]	12.2	3.4
Buckskin Mine North	2010[3]	10	4.6
	2011[3]	15.5	4.8
	2012[3]	17.9	5.9
	2013[3]	13.7	4.8
	2014[3]	12.2	5.5
	2015[2]	21	2.2
	2016[3]	11.6	1.8

[1] The 24-hour standard is met when the 98th percentile 24-hour concentration, as determined by Appendix N of 40 CFR 50 is less than or equal to 35 µg/m³. The annual standard is met when the arithmetic mean concentration, as determined by Appendix N of 40 CFR part 50 is less than or equal to 12 µg/m³.
[2] Exceptional event included
[3] Exceptional events excluded
Source: U.S. EPA AirData (EPA 2016d).

Table 3-5. Estimated Average Annual $PM_{2.5}$ Concentrations (µg/m³)

Site Name [1]	2010	2011	2012	2013	2014	2015	2016
CRC-E10	4.2	4.1	5.8	4.5	4.2	3.9	2.7
CRC-E10A	4.4	4.8	6.2	4.6	3.8	4.3	3.2
CRM-S11	**	3.9	3.8	3.1	2.9	2.7	1.7
CRM-W11	**	4.0	4.1	3.5	3.1	2.5	1.7
Site W	4.2	2.8	**	**	**	**	**
HV3/PM3	2.8	1.7	**	**	**	**	**

[1] See **map 3-1** for site locations
** Indicates that the site is inactive
Source: U.S. EPA AirData (EPA 2016d), (Pace 2005)

Table 3-6. Estimated Maximum 24-Hour $PM_{2.5}$ Concentrations (µg/m³)

Site Name [1]	2010	2011	2012	2013	2014	2015	2016
CRC-E10	12.4	16.6	19.0	12.8	11.8	17.6	10.0
CRC-E10A	13.2	12.8	21.6	13.6	13.4	15.6	10.0
CRM-S11	**	9.4	13.6	8.2	9.2	11.2	7.0
CRM-W11	**	13.2	12.6	11.0	12.0	10.2	6.6
Site W	16.6	10.6	**	**	**	**	**
HV3/PM3	10.8	5.4	**	**	**	**	**

[1] See **map 3-**1 for site locations
** Indicates that the monitoring site is inactive
Source: U.S. EPA AirData (EPA 2016d), (Pace 2005)

3.1.4.2 Emissions of Oxides of Nitrogen (NO_X), Ozone (O_3), and Sulfur Dioxide (SO_2)

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

moisture to form nitric acid and nitric oxide. Because several NO_X species can be chemically converted to NO_2 in the atmosphere, NO_2 emissions control is focused on all NO_X species, while the ambient standard is expressed in terms of NO_2. Ozone (O_3) has been included in discussions on emissions of NO_X since NO_X is one of the main ingredients involved in the formation of ground-level O_3. Ground-level O_3 is not emitted directly into the air, but is created by chemical reactions between NO_X and VOCs (precursors) in the presence of sunlight.

NO_2 concentrations (98th percentile, 1-hour) are currently being monitored in Campbell County at two active Air Quality System (AQS) monitoring sites near CRM (**table 3-7**). These monitoring sites are the closest to the CRM with distances from the Duvall tract between 3 and 13 miles (**map 3-2**). As shown in **table 3-7**, all monitored NO_2 values are well below the WAAQS of 100 ppb.

Table 3-7. Measured NO_2 Concentrations[1] in Campbell County, Wyoming, 2010-2016

AQS Site ID	Sampler ID	2010	2011	2012	2013	2014	2015	2016
56-005-0011	Hilight-Reno Junction Gas Plant	**	**	37	42	44	32.8	**
56-005-0456	Campbell County	26	26	26	26	26	26	24
56-005-0892	Belle Ayr Ba-4	27	29	27	28	28	26	21

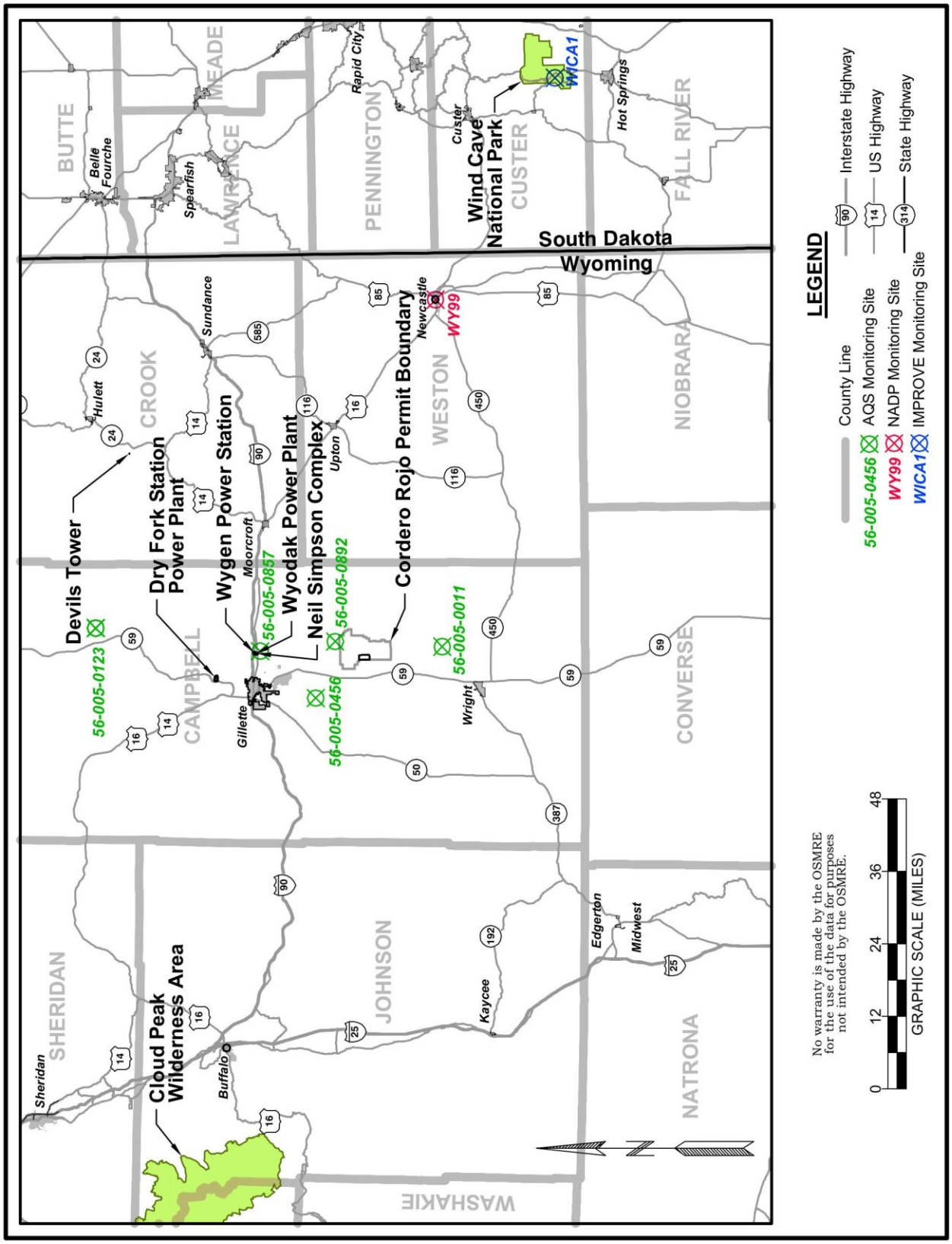
[1] 98th Percentile 1-Hour NO_2 Concentrations (ppb)
** Indicates the monitoring site was inactive
Source: U.S. EPA AirData (EPA 2016d)

Under the CAA, EPA has set protective health-based standards for O_3. Prior to May 27, 2008, the NAAQS 8-hour standard for O_3 was 0.080 ppm (157 µg/m^3 at standard temperature and pressure [STP]). On March 27, 2008 (effective May 27, 2008), EPA revised the 8-hour standard to 0.075 ppm (148 µg/m^3 at STP). EPA revised the 8-hour standard for O_3 again on October 26, 2015 (effective on December 28, 2015) to 0.070 ppm (138 µg/m^3 at STP). O_3 monitoring is not required at the CRM but levels have been monitored at the Campbell County AQS monitoring sites 056-005-0123 and 56-005-0456), which are located approximately 44 and 10 miles north of the Duvall tract (**map 3-2**). An exceedance of the O_3 8-hour standard occurs if the 4th-highest daily maximum value is above the level of the standard (0.075 ppm from 2008 to December 2015 or 0.070 ppm in 2016). **Table 3-8** shows no exceedances of the 8-hour of the NAAQS O_3 standard have occurred at during the 2010-2016 monitoring period.

SO_2 concentrations (99th percentile, 1-hour) are currently being monitored in Campbell County at one AQS monitoring site (**table 3-9**). This monitoring site is approximately16 miles north the Duvall tract (**map 3-1**). As shown in **table 3-9**, all monitored SO_2 values are well below the NAAQS and WAAQS of 75 ppb.

3.1.4.3 Air Quality Related Values (AQRVs)

AQRVs as related to the WYW174407 were discussed in sections 3.4.5 and 3.4.6 of the 2007 Maysdorf 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 and 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



Map 3-2. Regional Air Quality Monitoring Sites

Table 3-8. Measured O_3 Concentrations[1] in the PRB, 2009-2016

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

[1] 4th-highest daily maximum value. The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm (235 µg/m3) is equal to or less than 1, as determined by Appendix H of 40 CFR Part 50.
[2] See **map 3-2** for site locations
Source: EPA (2017b)

Table 3-9. Measured SO_2 Concentrations in Campbell County, Wyoming, 2011-2016, 99th Percentile 1-Hour NO_2 Concentrations (µg/m^3)

AQS Site ID[1]	Sampler ID	2011	2012	2013	2014	2015	2016
56-005-0857	Wyodak Site 4	37	39	37	32	16	14

[1] See **map 3-1** for location
Source: EPA (2017b)

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 located approximately 100 miles east of the Duvall tract at Wind Cave National Park in South Dakota. The AQRVs associated with this action include visibility and acidification of lakes.

3.1.4.3.1 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 CRM. Visibility can be defined as the distance one can see and the ability to perceive color, contrast, and detail. Particulates finer that 2.5 microns in effective diameter ($PM_{2.5}$) are 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 (the nearest PSD Class I area) for 1999 through 2015, increasing dv values represent proportionately larger perceived visibility impairment (Interagency Monitoring of Protected Environments [IMPROVE] 2016). As indicated on **figure 3-1**, the long-term trend in visibility at Wind Cave National Park appears to be relatively stable, if not improving slightly.

3.1.4.3.2 Air Quality Related Values Related to Coal Combustion

Emissions that affect air quality also result from combustion of fossil fuels. **Table 3-10** presents the estimated PM_{10}, $PM_{2.5}$, SO_2, NO_X, and Hg emissions estimates for coal mined at the CRM that was utilized for power generation. CO is created when carbon-containing fuels are burned

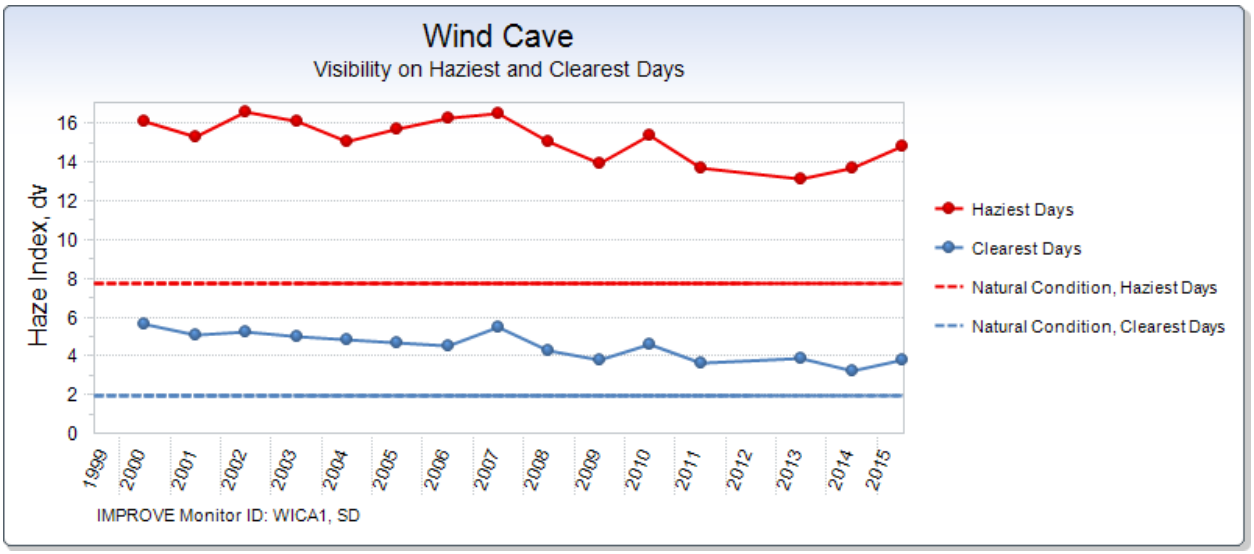


Figure 3-1. Visibility in the Wind Cave National Park – Site WICA1

Table 3-10. Estimated Annual PM_{10}, $PM_{2.5}$, SO_2, NO_X, and Hg Contributions from Coal Combustion, 2012-2016

Source	2012	2013	2014	2015	2016
Tons of Coal Recovered	39.2	36.7	34.8	22.9	18.3
PM_{10} (Tons)	27,240.8	25,479.9	24,186.6	15,892.3	12,737.7
$PM_{2.5}$ (Tons)	8,308.5	7,771.4	7,376.9	4,847.1	3,885.0
SO_2 Emissions (Tons)	343,041.4	320,866.4	304,579.6	200,129.8	160,405.4
NO_X Emissions (Tons)	141,137.1	132,013.6	125,312.8	82,339.1	65,995.4
Hg Emissions (Tons)	1.6	1.5	1.4	0.9	0.8

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

incompletely. Through natural processes in the atmosphere, it is eventually oxidized to CO_2.Carbon monoxide concentrations are both short-lived in the atmosphere and spatially variable (EPA 2017b). CO is not monitored in Campbell County.

3.1.4.3.3 Acidification of Lakes/Acid Deposition

Acid deposition causes acidification of lakes and streams, which has direct impacts on aquatic habitats, and contributes to the damage of trees at high elevation and many sensitive forest soils (EPA 2016e). According to the EPA (2002), hydrogen ion (H^+) concentrations are the primary indicator of precipitation acidity. **Table 3-11** provides the measured hydrogen ion concentrations as determined at the Site WY99 in Newcastle, WY, the closest site to the CRM for the years 2009 through 2015 (approximately 60 miles east of CRM). The location of WY99 in relationship to the CRM is depicted on **map 3-2.**

Table 3-11. Measured Hydrogen Ion (H+) Concentrations1 at Monitoring Site WY99, 2009 – 2015

Parameter	2009	2010	2011	2012	2013	2014	2015
pH	5.5	5.6	5.8	5.8	No Data	5.7	6.9
Wet (kg/hectare)	0.01	0.01	0.01	<0.01	No Data	0.01	0.01

[1] Measured as pH and wet deposition

Source: NADP 2010-2016

As indicated in **table 3-10,** the 2009-2015 trend in H+ at monitoring site WY99 appears to be relatively stable.

3.1.4.4 Greenhouse Gases (GHGs) and Climate Change

According to the EPA, GHGs include CO_2, methane (CH_4), nitrous oxide (N_2O) and several fluorinated species of gas (EPA 2016f). CO_2 is emitted from the combustion of fossil fuels, including coal. CH_4 can be emitted during the production and transport of coal and 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 greenhouse gases 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 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 carbon dioxide equivalent (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). The GWP conversion factor for the three primary GHGs are provided in **table 3-12**.

Table 3-12. Global Warming Potential (as CO_2e) Conversion Factors for Selected GHGs

GHG	Conversion Factor
Carbon dioxide CO_2	1
Methane CH_4	28
Nitrous oxide N_2O	265

The CO_2e emissions that occurred at the CRM from 2012 through 2015 have been estimated, based on estimated annual coal production (**table 3-13**). The inventories included 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); and mining processes (i.e., blasting, coal fires caused by spontaneous combustion, and methane released [vented] from exposed coal seams). CO_2e emissions generated by transporting the coal to power plants are also estimated, using an average of 1,060 rail miles from the CRM to destination power plants.

The amount of CO_2e emitted during the combustion of fossil fuels varies according to the carbon content and heating value of the fuel used (EPA 2008). As indicated in **table 3-13**, approximately30.7 million metric tons of CO_2e were produced in 2016 from the combustion of 18.3 million tons of coal (WWC 2017).

Approximately 98 percent of the coal mined in 2015 in the PRB was used to generate electricity by coal-fired power plants in the United States (U.S. Energy Information Administration [USEIA] 2016a).

Table 3-13. Estimated Equivalent CO_2 (CO_2e) Emissions [1] at the CRM, 2012-2016

	2009	2010	2011	2012	2013	2014	2015	2016	Average
General									
Mt of Coal Recovered	39.4	38.5	39.5	39.2	36.7	34.8	22.9	18.3	33.7
Average Transport Miles (One Way)	1,060	1,060	1,060	1,060	1,060	1,060	1,060	1,060	1,060
Number of Train Trips (One Way)	2,546	2,489	2,550	2,534	2,370	2,250	1,478	1,185	2,175
Direct Emissions Sources									
Fuel	128,654	125,775	128,897	128,078	119,799	113,718	74,720	59,889	109,941
Electricity Consumed in Mining Process	105,151	102,798	105,350	104,681	97,914	92,944	61,070	48,948	89,857
Mining Process	45,198	44,186	45,283	44,995	42,087	39,950	26,250	21,040	38,624
Total Direct Emissions	**279,002**	**272,760**	**279,531**	**277,754**	**259,799**	**246,612**	**162,041**	**129,877**	**238,422**
Indirect Emissions Sources									
Rail Transport[2]	1,457,498	1,424,886	1,460,259	1,450,975	1,357,181	1,288,292	846,497	678,473	1,245,508
From Coal Combustion[3]	65,963,115	64,487,180	66,088,113	65,667,934	61,423,004	58,305,246	38,310,561	30,706,177	56,368,916
Total Indirect Emissions	**67,420,612**	**65,912,066**	**67,548,373**	**67,118,910**	**62,780,185**	**59,593,538**	**39,157,058**	**31,384,650**	**57,614,424**
Total Estimated CO_2e Emissions	**67,699,615**	**66,184,825**	**67,827,904**	**67,396,664**	**63,039,984**	**59,840,150**	**39,319,099**	**31,514,527**	**57,852,846**

[1] In metric tons - see **appendix E** for calculations

[2] Coal haulage emissions based on 130-car trains with four locomotives, train trips per year; 488.2 kg CO_2e per mile per loaded train, 96.1 Kg CO_2e 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 CO_2e per ton of coal burned for electrical generation (EPA 2008) and calculated by WWC (2017)

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

3.2 Water Resources

Section 3.5 of the 2007 Maysdorf EIS included detailed discussions of water resources related to lease WYW174407. The analysis included herein serves to update discussions with recent groundwater and surface-water quality monitoring findings and update groundwater and surface-water rights discussions.

There are three major shallow geologic units related to lease WYW174407 containing groundwater that could be impacted by coal mining. These shallow units are the Quaternary alluvium, Wasatch Formation overburden, and the Wyodak coal seam and are described in **figure 3-2**.

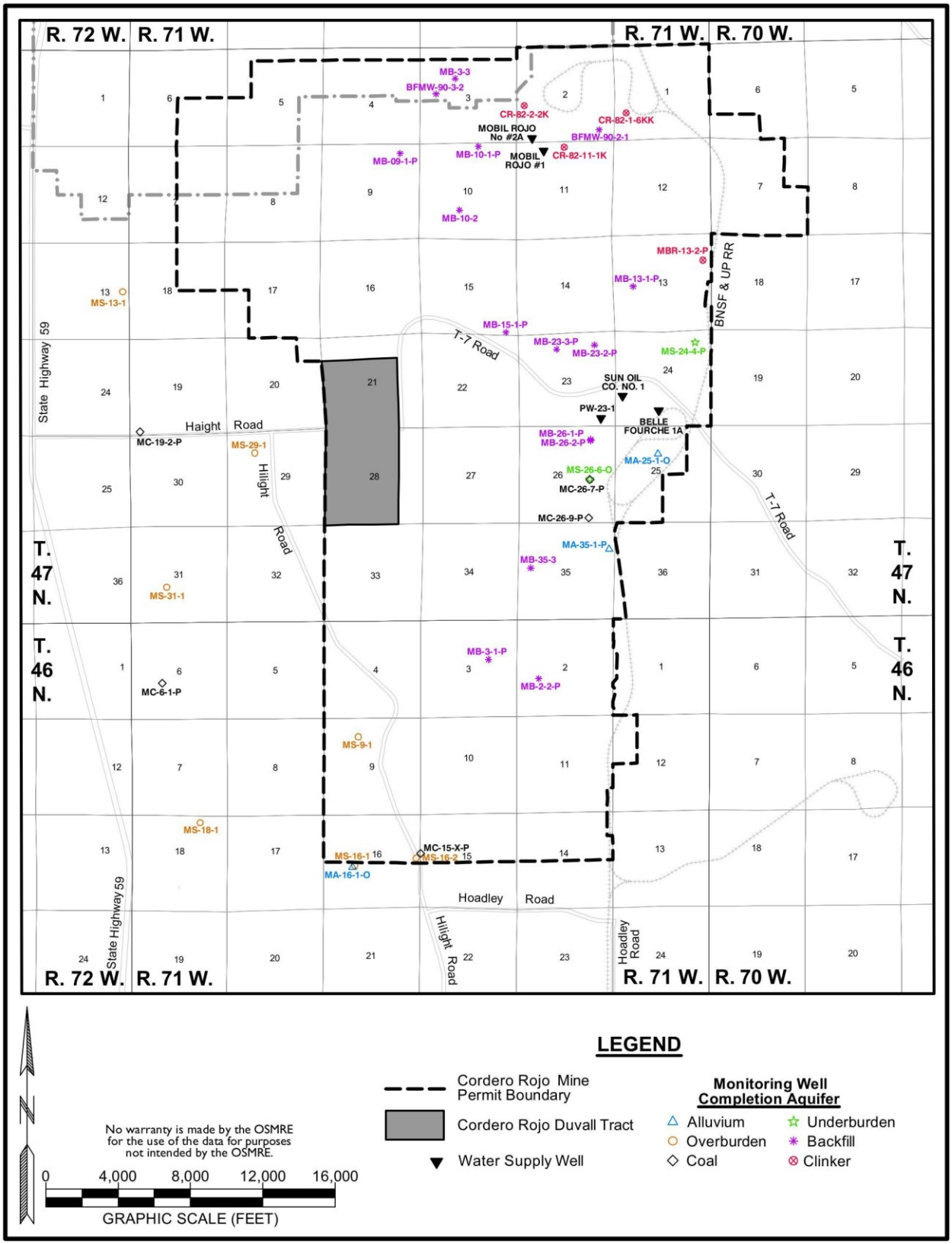
3.2.1 Groundwater

Groundwater resources are discussed in depth in section 3.5.1 of the 2007 Maysdorf EIS. Current groundwater monitoring well locations are depicted on **map 3-3**. Monitoring wells are identified by well number and completion aquifer, such as Quaternary alluvium (three wells), Wasatch Formation overburden (seven wells), clinker (four wells), underburden (two wells), Wyodak coal (five wells), and backfill (15 wells).

According to the groundwater quality monitoring results included in the CRM 2015-2016 Annual Hydrology Report submitted to WDEQ-LQD, groundwater quality analyzed during the July 1, 2015 through June 30, 2016 reporting period generally tracked with historical levels. (CMC 2016b). In addition, backfill water quality monitoring data from four backfill wells show that between 2011 and 2015, total dissolved solids (TDS) levels ranged between 1,780 mg/L and 6,150 mg/L (Hydro-Engineering 2011). A comparison of the median concentrations of the major ions in backfill aquifers evaluated in the 2011 CHIA to the other shallow aquifers in the area shows the water quality in the backfill aquifer is similar to the water quality in the alluvial, clinker, and the Wasatch aquifers (Ogle et al. 2011).

Water quality can be highly variable depending on the source aquifer; however, groundwater across the CRM is classified as Class III, suitable for livestock. As the groundwater moves downward through the Wasatch Formation overburden and into the Wyodak coalbed aquifers, the water becomes less mineralized, which is due mainly to cation exchange (softening and sulfate reduction) mechanisms. According to the 2011 CHIA, the median concentrations of major ions in backfill aquifers generally meet the livestock water quality standards (Ogle et al. 2011).

Based on the 2011 Middle Powder River Basin CHIA, the flow direction of the groundwater system is from recharge zones east of the mine toward northwest. Current groundwater conditions have changed in the CRM area as a result of CBNG development and ongoing mining operations at the CRM and neighboring mines. A continuous cone of depression



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

currently exists around the Belle Ayr, Coal Creek, Caballo, and Cordero Rojo mines due to their closeness to each other and the cumulative drawdown effects from pit dewatering and nearby CBNG discharges (Hydro-Engineering 2011). Because CBNG production requires the reduction of pressure head, pumping produced substantial, widespread water level decline in coal aquifers in the PRB. The monitored coal wells at the CRM show water levels in the coal aquifer have stabilized as CBNG production has declined (CMC 2016b).

Properties of coal and overburden aquifers, such as hydraulic conductivity and the capacity to store water, are changed in the process of removing overburden strata and returning it as spoil to mined-out pits. The relatively homogenous spoil backfill has a more uniform hydraulic conductivity in contrast to undisturbed, bedded lithology where vertical conductivity is usually lower than horizontal conductivity. Dewatering and removal of aquifers during mining has caused temporary modifications of flow direction in the vicinity of the mine pits as groundwater moves toward depressed water levels in the pit area (Hydro-Engineering 2011).

3.2.2 Surface Water

Surface water conditions related to lease WYW174407 were thoroughly discussed in section 3.5.2 of the 2007 Maysdorf EIS. The Duvall tract is located within the Belle Fourche River watershed, a tributary of the Mississippi River. Local watersheds are shown on **map 3-4**. The main surface water features within and adjacent to the area proposed for mining activities include the Belle Fourche River, Coal Creek, and Caballo Creek, which are perennial streams. The tributary stream flows in the Belle Fourche River, Coal Creek and Caballo Creek watershed basins are ephemeral, occurring only in direct response to rainfall or snowmelt runoff events. Snowmelt runoff events can last for several days or more but rarely have large peak flows. Most of the peak annual flow events occur during the late spring and summer as a result of precipitation events.

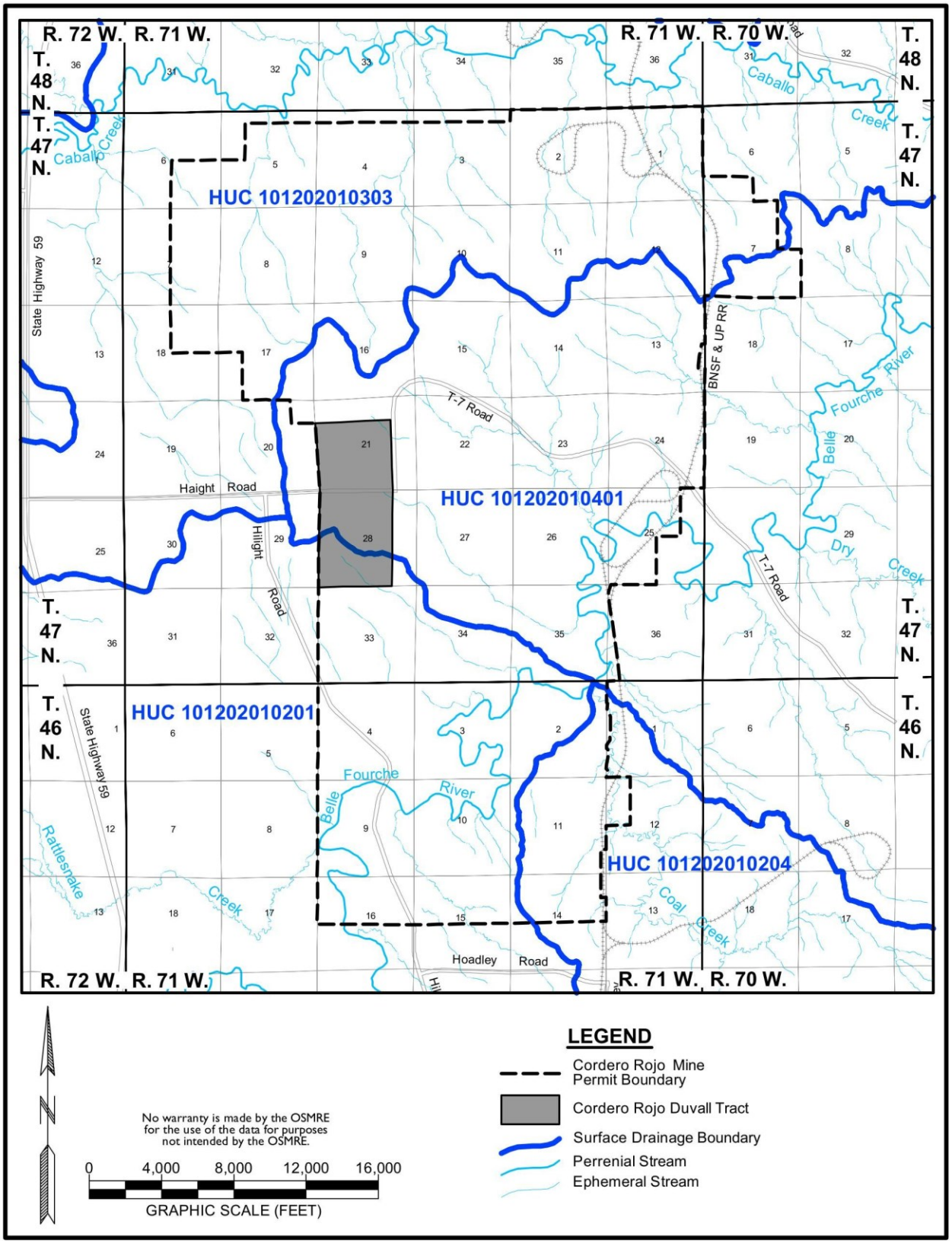
Streamflow and surface-water quality associated with the CRM are currently being monitored at 10 monitoring sites (**map 3-5**). Four surface-water monitoring sites (BF-1, BF-2, CC-3 and Kicken Draw) have been removed and five sites (BF-5, BF-6, BF-7, BF-8, and BF-9) have been added to the WDEQ-LQD-approved existing surface-water monitoring network of five stations (Upper Belle Fourche River Station [UBFR], Lower Belle Fourche River Station [LBFR], BF-3, BF-4, and CC-4) for the CRM since the publication of the 2007 Maysdorf EIS.

Baseline water quality data are discussed in section 3.5.2.1 of the 2007 Maysdorf EIS. Monitoring focuses on the local Belle Fourche River and Coal Creek. Surface water quality fluctuates with seasonal flow patterns and varies with significant rainfall events as streamflow increases, TDS concentration decreases, while TSS concentration increases. Conversely, as streamflow decreases, the TDS concentration increases, while the TSS concertation decreases. Due to the sparse vegetative cover and the infrequent occurrence of surface runoff in this semi-arid environment, high TSS concentrations can be expected, especially from floods caused by thunderstorms. In general, laboratory results are within the typical ranges established by long-term monitoring. Ongoing testing is being conducted regarding selenium as requested by WDEQ. Monitoring sites UBFR, LBFR, BF-5, BF-7, BF-8, BF-3, BF-4, BF-9, and CC-4 all reported below the detection limit for selenium when sampled in the fall of 2016 (IML 2016). Surface water quality are depicted graphically in the 2015-2016 Annual Report (CRM 2016b). Reservoirs on Bengal Draw and Butte Draw discussed in the 2007 Maysdorf EIS were removed during the mining process approved under WDEQ-LQD Permit No. 237 T10.

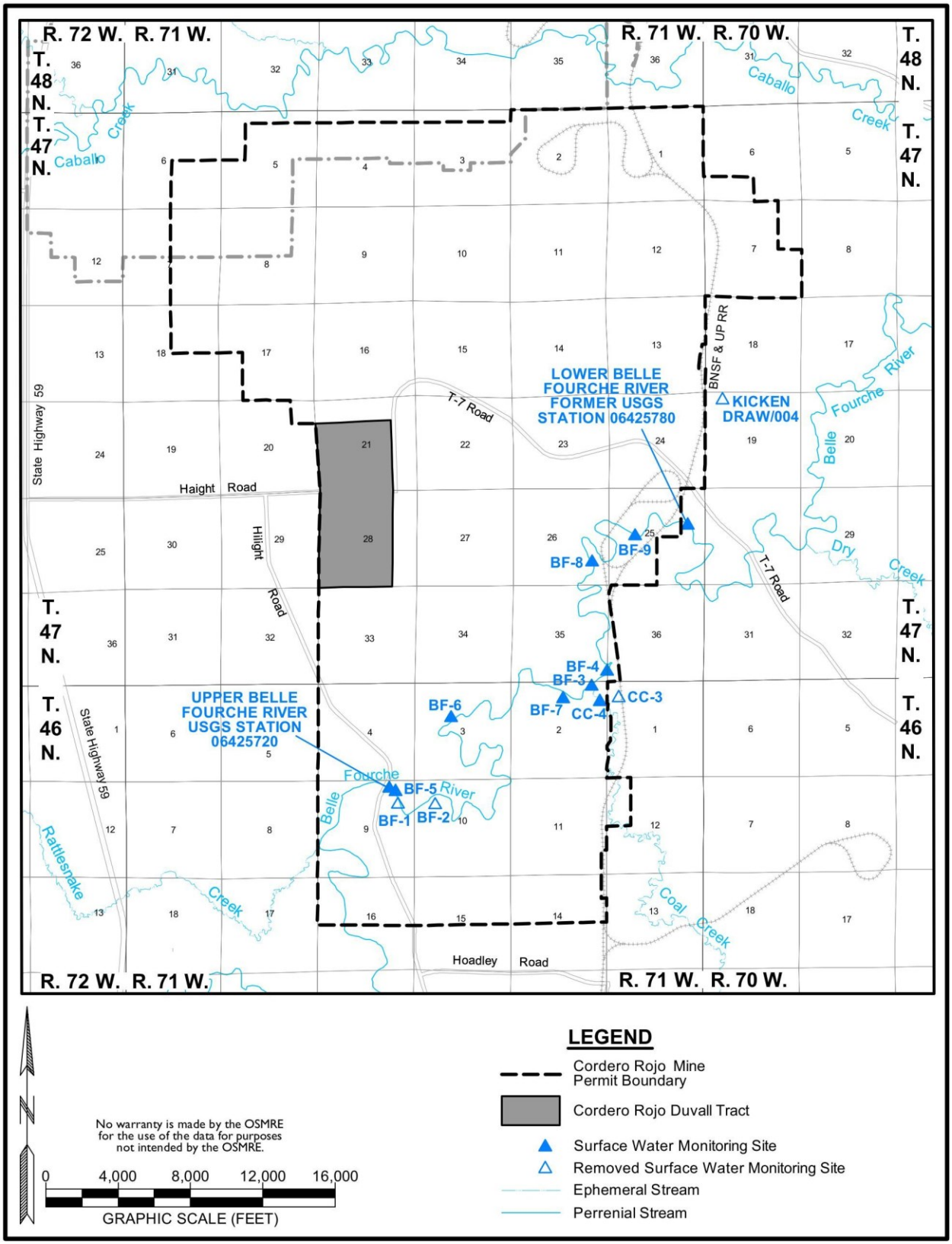
Geologic Unit			Hydrologic Characteristics
RECENT ALLUVIUM HOLOCENE			Typically fine grained and poorly sorted sands interbedded with silts and clays in ephemeral drainages. Occasional, very thin, clean, interbedded sand lenses. More laterally extensive, thicker, and coarse-grained along the larger stream courses. Excessive dissolved solids generally make this aquifer unsuitable for domestic and agricultural use and marginal for livestock (Class III) use standards. Low infiltration capacity in ephemeral draws unless covered by sandy eolian blanket.
CLINKER HOLOCENE TO PLEISTOCENE			Baked and fused bedrock resulting from burning coal seams which ignite on the outcrop from lightning, manmade fires or spontaneous combustion. The reddish clinker (locally called scoria, red dog, etc.) formed by melting and partial fusing of overburden above the burning coal. The baked rock varies greatly in the degree of alteration; some is dense and glassy while some is vesicular and porous. It is commonly used as a road construction material and is an aquifer wherever saturated. Considered to be part of the Wasatch Formation.
WASATCH FORMATION EOCENE			Lenticular fine sands interbedded in predominantly very fine-grained siltstone and claystone may yield low to moderate quantities of poor to good quality water. The discontinuous nature and irregular geometry of these sand bodies result in low overall permeabilities and very slow groundwater movement in the overburden on a regional scale. Water quality in the Wasatch Formation generally does not meet Wyoming Class I (drinking water) standards due to the dissolved mineral content. Some wells do, however, produce water of considerably better quality that does meet the Class I standard.
FORT UNION FORMATION PALEOCENE	TONGUE RIVER MEMBER	W, A, C	The coal serves as a regional groundwater aquifer and exhibits highly variable aquifer properties. Permeability and porosity associated with the coal arise almost entirely from fractures. Coal water typically does not meet Class I or Class II (irrigation) use standards. In most cases, water from coal wells is suitable for livestock use. The coal water is used throughout the region as a source of stock water and occasionally for domestic use. W = Wyodak Coal; A = Anderson Coal; C = Canyon Coal
	LEBO MEMBER		The Lebo member, also referred to as the "Lebo Confining Layer" or "Lebo Shale". Has a mean thickness of 711 ft in the PRB and a thickness of about 400 ft in the vicinity of Gillette. The Lebo typically yields small quantities of poor quality groundwater. Where sand content is locally large, caused by channel or deltaic deposits, the Lebo may yield as much as 10 gpm.
	TULLOCK MEMBER		The Tullock member has a mean thickness of 785 ft in the PRB and a mean sand content of 53 percent which indicates that the unit generally functions well as a regional aquifer. Yields of 15 gpm are common but vary locally and may be as much as 40 gpm. Records from the SEO indicate that maximum yields of approximately 300 gpm have been achieved from this aquifer. Water quality in the Tullock Member often meets Class I standards. The extensive sandstone units in the Tullock Member are commonly developed regionally for domestic and industrial uses. The City of Gillette is currently using eight wells completed in this zone to meet part of its municipal water requirements.
LANCE FORMATION UPPER CRETACEOUS	UPPER LANCE		Silty, calcareous sandstones and interbedded sandy shales, claystones, and coals. Provides yields generally less than 20 gpm. Higher yields can occur where sand thicknesses are greatest. Water quality is typically fair to good. Also referred to as the "Upper Lance Confining Layer".
	FOX HILLS SANDSTONE		Marine sandstones and sandy shales. Has a mean thickness of 666 ft and a mean sand content over 50 percent in the PRB. Yields up to 200 gpm are common; however, yields can be significantly less. Water quality is good, with TDS concentrations commonly less than 1,000 mg/L. The City of Gillette is currently using five wells completed in this aquifer to meet municipal water requirements.
LEWIS FORMATION UPPER CRETACEOUS	PIERRE SHALE		This unit is comprised predominantly of marine shales with only occasional local thin sandstone lenses. Maximum yields are minor and overall the unit is not water bearing. Water obtained from this unit is poor with high concentrations of sodium and sulfate as the predominant ions in solution.

Compiled from Hodson et al. (1973) and Lewis and Hotchkiss (1981).

Figure 3-2. Stratigraphic Relationship and Hydrologic Characteristics of Upper Cretaceous, Lower Tertiary, and Recent Geologic Units, PRB, Wyoming



Map 3-4. Watersheds and Surface Drainages Associated with the Cordero Rojo Mine



Map 3-5. Surface Water Monitoring Sites at the Cordero Rojo Mine

3.2.3 Water Rights

The Wyoming State Engineer's Office (SEO) administers water rights in Wyoming. Water rights are granted for both groundwater and surface water appropriations. Prior to development of water resources associated with energy development, water appropriations (either groundwater of surface water) in the PRB were typically for livestock use. Currently, mining companies and CBNG development companies hold the majority of water rights in the general analysis area. Records of the SEO were searched for surface-water and groundwater rights within a 2-mile radius of the Duvall tract to update water-rights information.

SEO records indicate that as of November 2016 (SEO 2016), there were 25 surface-water rights within the 2-mile search area, of which 20 were owned by coal mining companies and were related to industrial or stock uses. Of the other five non-coal mine-related, permitted surface water rights, four were permitted for livestock and one is without a listed use.

SEO records indicate that, as of November 2016, there were 494 permitted groundwater wells within 2-mile search area, of which, 390 are owned by coal mining companies. The other 104 non-coal mine related, permitted water wells are permitted for the following uses:

1. 47 CBNG
2. 17 CBNG, Miscellaneous
3. 3 CBNG, Miscellaneous, Stock
4. 9 CBNG, Stock
5. 1 Domestic, Stock
6. 3 Industrial
7. 3 Miscellaneous
8. 2 Monitoring
9. 19 Stock

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

3.3 Wildlife

The initial wildlife baseline inventory for the CRM was conducted in 1974, with additional baseline inventories conducted periodically since that time to accommodate permit expansion. Annual monitoring was initiated in 1978 and continues at present. The information included in the 2007 Maysdorf EIS was derived from the baseline data and the subsequent studies and WDEQ-LQD Annual Reports. The occurrence of wildlife related to the mining of the federal coal within the Cordero Rojo LBA tracts was thoroughly discussed in section 3.10 of the 2007 Maysdorf EIS. No significant changes to wildlife use areas for other mammals, upland game birds (excluding the Greater sage-grouse [GRSG] [*Centrocercus urophasianus*]), other birds, reptiles and amphibians, and aquatic species populations have been noted from the discussion presented in the 2007 Maysdorf EIS. There have been changes in discussions related to big game; raptors; threatened, endangered, and candidate (T&E) species; and other species of special interest (SOSI-federal Birds of Conservation Concern and Species of Greatest Conservation Concern). The status of GRSG has also changed since publication of the 2007 Maysdorf EIS. Therefore, these species discussions have been updated in this EA.

3.3.1 Big Game

Extensive discussions of big game species (primarily pronghorn [*Antilocapra americana*] and mule deer [*Odocoileus hemionus*]) were included in the 2007 Maysdorf EIS and in subsequent annual wildlife monitoring reports. The Wyoming Game and Fish Department (WGFD) recognizes no crucial big game habitat or migration corridors within the Duvall tract.

3.3.2 Raptors

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

The 2015-2016 Annual Report identified the location and annual status of raptor nests for 2015-2016 (CMC 2016b). The location and status of raptor nests monitored at the CRM are included on **map 3-6**. No intact raptor nests are located within the boundaries of the Duvall tract; two active nests (GE11 and SH6C/RTH23/GHO17) are located west of the Duvall tract.

CMC has developed a general management plan regarding SOSI that are known to or could occur in the vicinity of the mine. The intent of this SOSI monitoring and management plan is to provide broad, long-term direction for

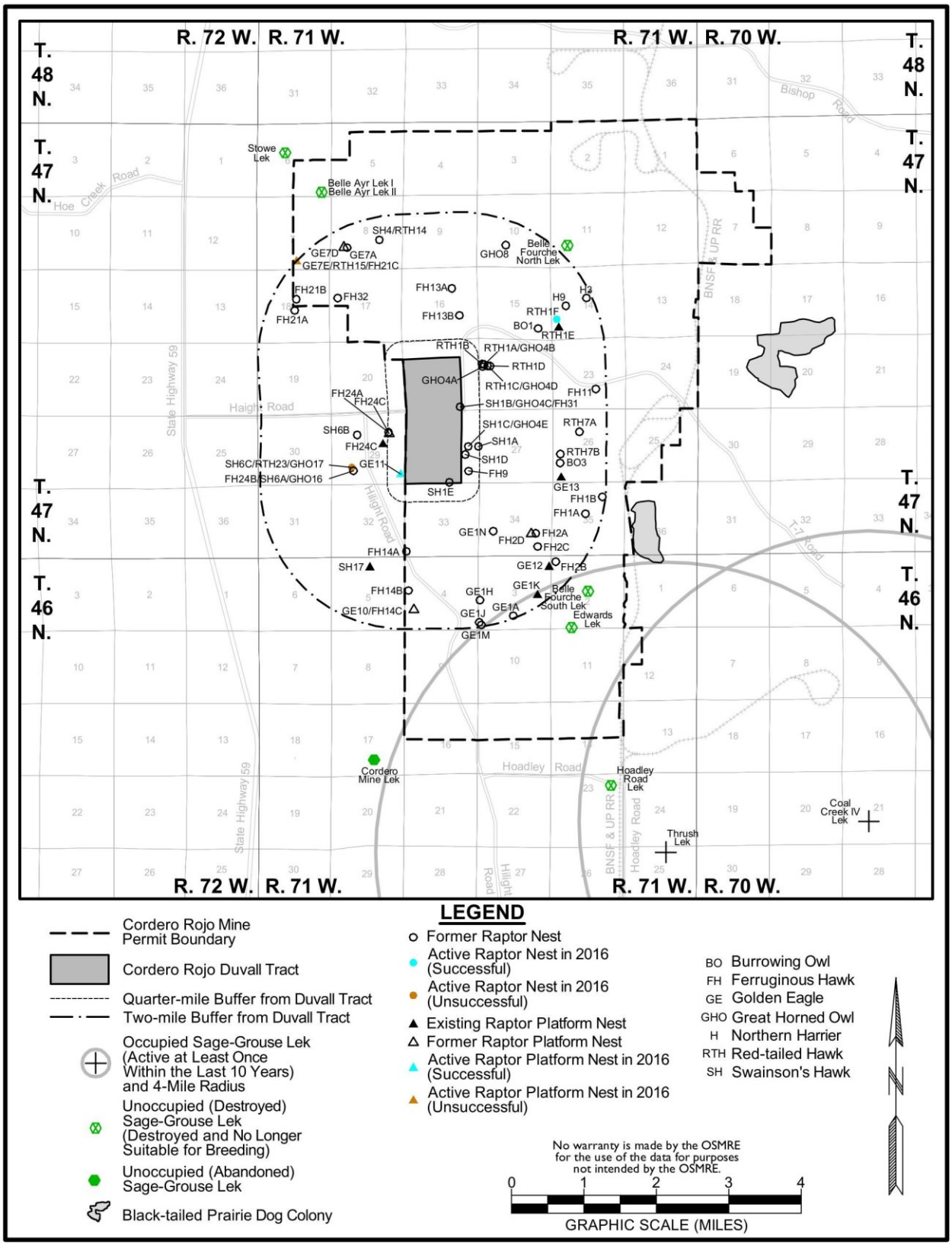
1. monitoring populations of SOSI within the CMC wildlife study area boundary,
2. eliminating, minimizing, or mitigating potential impacts to these species due to mine operations, and
3. maintaining, enhancing, and/or reclaiming habitats upon which such species depend.

3.3.3 Greater Sage-Grouse (GRSG)

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

Executive Order 2015-4 established sage-grouse core area protection on state trust lands (Office of the Governor 2015). The sage-grouse 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 Executive Order, it has been determined that the closest core area is approximately 9 miles east of the Duvall tract.

Three GRSG leks, the Edwards Lek, Belle Fourche South Lek, and Belle Fourche North Lek historically occurred in the southern and northern portions of the CRM permit area. These leks were destroyed over 20 years ago by mining activities. One GRSG lek complex (Belle Ayr



Map 3-6. Raptor Nest Sites, Greater Sage Grouse Leks, And Black Tailed Prairie Dog Towns Within And Adjacent To The Cordero Rojo Duvall Tract

I-II leks) also occurred about 0.5-mile west of the former CRM permit area and is located within the adjacent Belle Ayr Mine Permit Area. Another lek, the Stowe Lek, was identified by the Belle Ayr Mine on their permit area in 2000, west of the current CRM permit area. The Belle Ayr I-II and Stowe leks have been impacted by mining activities from the adjacent Belle Ayr Mine and these two leks are considered abandoned. The Cordero Mine Lek, which has been classified as unoccupied (has not been active during a period of 10 consecutive years), is located approximately 4 miles south of the Duvall tract and outside of the CRM permit area. There are no occupied GRSG leks (active during at least one strutting season within the prior ten years) within 4 miles of the Duvall tract. The nearest occupied GRSG lek (Thrush Lek) is 5.8 miles to the southeast of the Duvall tract, as shown on **map 3-6**.

3.3.4 Threatened, Endangered, and Candidate Species and Other Species of Special Interest

3.3.4.1 Threatened, Endangered, and Candidate Species

The USFWS maintains a list of T&E species, and designated critical habitats on their official website for each county in Wyoming (USFWS 2016). The USFWS also provides the Information for Planning and Conservation (IPaC) system to evaluate the potential of encountering USFWS trust resources, including T&E species, related to a specific project area. The agency updates those species lists annually, or more frequently if any listing changes occur.

Vertebrate T&E species were discussed in section 3.10.8 of the 2007 Maysdorf EIS, which included evaluations of bald eagles and black-footed ferrets (*Mustela nigripes*). The bald eagle was removed from the federal list of T&E species on August 9, 2007 (USFWS 2011). The current USFWS list of T&E species that may occur in Campbell, County, Wyoming includes the black-footed ferret, the northern long-eared bat (*Myotis septentrionalis*), and the Ute Ladies'-tresses (ULT) (*Spiranthes diluvialis*) (USFWS 2016). Habitat suitable for the black-footed ferret, the northern long-eared bat, and the ULT is not present on the permit area (CRM 2016b). In addition, the USFWS has not designated any "critical" habitat for these species in the vicinity of the CRM at this time (USFWS 2016).

On March 6, 2013, the USFWS issued a letter acknowledging 'block clearance' for the State of Wyoming in response to a request from the WGFD. This letter provides acknowledgement that the likelihood of identifying wild ferrets in Wyoming, outside of those resulting from reintroductions, is distinctly minimal. Consequently, the USFWS no longer recommends surveys for the black-footed ferrets in either black- or white-tailed prairie dog towns in the State of Wyoming (USFWS 2016b). Prairie dog towns, which provide habitat for black-footed ferrets, are not found within the Duvall tract.

While 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 [2016c]) is not present in the Duvall tract to support the threatened northern long-eared bat. No northern long-eared bat populations have been documented within Campbell County and the area of the proposed project as defined in this EA does not fall within the area of influence (AOI) for the northern long-eared bat (USFWS 2017).

The ULT is a threatened plant species with an affinity for wetlands. Surveys at CRM for this plant species are conducted in suitable habitats within one year of disturbance of those habitats. Surveys were not completed in 2016 as no disturbance in suitable habitat is planned to occur during that year. No ULTs have been found during previous surveys within the permit area or

adjacent areas. Habitat for ULT within the permit area is considered to be poor to unsuitable (CRM 2016b)

3.3.4.2 Other Species of Special Interest

The Duvall tract provides habitat for wildlife species that are classified as SOSI. Watch was kept during all surveys and site visits for species that are listed as SOSI.

For the purposes of this discussion, other SOSI include federal birds of conservation concern and Wyoming Natural Diversity Database (WYNDD) species of concern. The USFWS has identified birds of conservation concern as species, subspecies, and populations of migratory and non-migratory birds that "…without additional conservation actions, are likely to become candidates for listing under the Endangered Species Act" (USFWS 2008). As defined by the USFWS, bird species considered for inclusion on lists of birds of conservation concern include nongame birds, gamebirds without hunting seasons, candidate and proposed endangered or threatened species, and recently delisted species (USFWS 2008). These species represent the USFWS's highest conservation priorities beyond those species already designated as T&E species. The conservation concerns may be related to population declines, small range or population sizes due to natural or human-caused influences, threats to habitat, or other factors.

The most current list of birds of conservation concern is presented in **appendix D**. The bald eagle is present on the study area as a migrant and winter resident. The Brewer's sparrow is common during the spring and summer as a breeder. The ferruginous hawk is a seasonal resident and breeder on the CRM. The golden eagle is a yearlong resident and was observed on the CRM raptor study area in 2016. The prairie falcon has previously been observed at the CRM but was not observed in 2016. The Swainson's hawk was present as a spring and summer breeder and nested within the CRM tract in 2016. The grasshopper sparrow (*Ammodramus savannarum*), loggerhead shrike (*Lanius ludovicianus*), sage thrasher (*Oreoscoptes montanus*), short-eared owl, burrowing owl, GRSG, long-billed curlew (*Numenius americanus*), McCown's longspur (*Calcarius mccownii*), red-headed woodpecker (*Melanerpes erythrocephalus*), and upland sandpiper (*Bartramia longicauda*) have been recorded within the CRM wildlife study area. The American bittern (*Botaurus lentiginosus*), dickcissel, mountain plover, pinyon jay (*Gymnorhinus cyanocephalus*), western grebe (*Aechmophorus occidentalis*), and Sprague's pipit have not been recorded on the study area, as habitat for most of these species does not occur on the study area.

3.4 Cultural Resources

Information regarding background cultural resources within the current Permit 237 Term 10 permit boundary was included in section 3.12 of the 2007 Maysdorf EIS. A Class III cultural resource survey that included the Duvall tract was performed in 2005. According to information provided in the 2007 Maysdorf EIS, six cultural resource sites and nine isolated finds are located in the Duvall tract. A prehistoric isolated find is defined by the Wyoming State Historic Preservation Office (2012) as 14 or fewer spatially associated artifacts where no buried cultural materials or features are thought to exist and a historic isolated find is 49 or fewer spatially associated artifacts where no buried cultural material or features are thought to exist. No mitigation measures are necessary for isolated finds. Of the six cultural resource sites, three are lithic scatter and three are open campsites. None of the sites in the Duvall tract have been designated as eligible for listing on the National Register of Historic Places (NHRP).

3.5 Socioeconomics

Information regarding socioeconomics was included in section 3.17 of the 2007 Maysdorf EIS. Discussions related to housing, local government services, and environmental justice have not

significantly changed enough to require reevaluation in this EA. Updated discussions on the local economy, population, and employment are included below.

3.5.1 Local Economy

Wyoming's coal mines produced an estimate 375.7 million tons in 2015, a decrease of about 90.6 million tons (19%) over the record 466.3 million tons produced in 2008. Coal produced from 14 active mines in Campbell County accounted for approximately 97% of total statewide coal production in 2015 (WDWS 2015). According to coal production numbers from the USEIA, the coal from Campbell County accounted for approximately 41 percent of the coal produced in the U.S. in 2015 (USEIA 2016a).

The estimated total fiscal impact from coal production in Campbell County to the State of Wyoming in 2016 was calculated by including half of the bonus bid payments, half of the federal mineral royalties based on current prices, a designated portion the Abandoned Mine Land Fund (AML) fees, and all of the ad valorem taxes, severance taxes, and sales and use taxes for coal produced in Campbell County in 2015. The Wyoming tax revenue results in an estimated $922.5 million, or $2.48 per ton (**figure 3-3**).

Recent (2015) Gross Domestic Product (GDP) calculations for Wyoming indicate that the minerals industry (mining and oil and gas) accounted for about 23 percent of the state's total GDP of $38.6 billion, which made it the largest sector of the Wyoming economy. The contribution of mining was nearly 1.4 times that of government, the next largest sector, and two times more than the contribution of the real estate industry, the next largest private sector. In 2015, mining accounted for 22 percent of the Wyoming GDP (WDAI/EAD 2016).

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

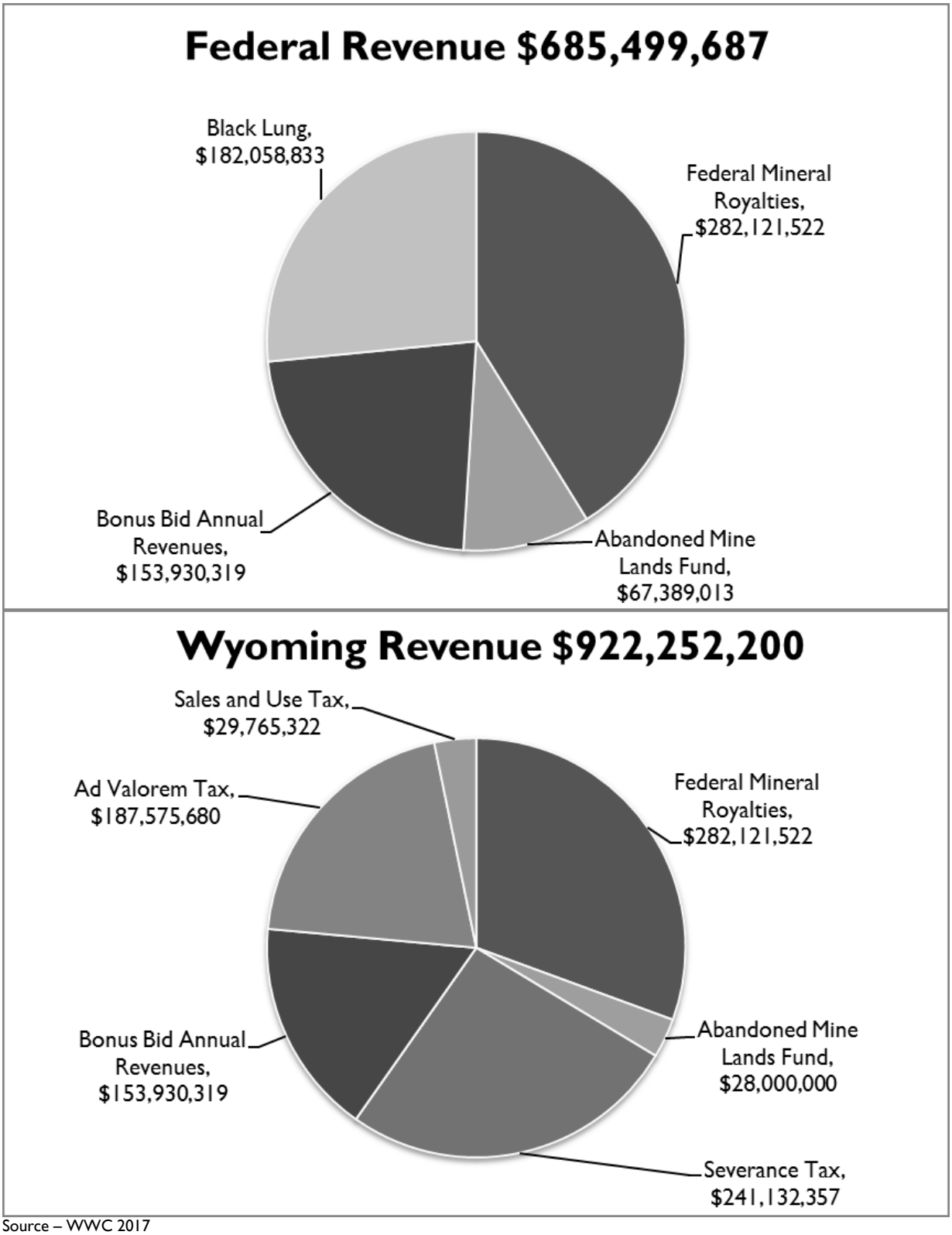
3.5.2 Population

According to U.S. census data, in 2015 Campbell County had a population of 49,220 (U.S. Census Bureau 2016a). As of the 2010 census, Campbell County's population ranks it as the third most populous of Wyoming's 23 counties (U.S. Census Bureau 2016b).

The majority of the Campbell County mine employees and support services reside in Gillette. The total population in the Gillette city limits increased from 19,646 in 2000 to 32,649 in 2015, an increase of 66.2 percent over the period (U.S. Census Bureau 2016). **Table 3-14** presents the population changes for Campbell County and Gillette. As of 2015, Gillette accounted for roughly 66 percent of the county's residents. Gillette is the fourth largest city in the state, following Cheyenne, Casper, and Laramie (U.S. Census Bureau 2016a).

3.5.3 Employment

Table 3-15 presents the employment changes for Wyoming and Campbell County. The statewide total employment increased by 4,243 jobs (1.5 percent) from 2011 to 2015 while the employment in Campbell County increased by 338 (1.4 percent) during the same time period (Bureau of Labor Statistics 2015). The average unemployment rate in Campbell County for



Source – WWC 2017

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

Table 3-14. Campbell County and City of Gillette Population Change, 2000 to 2015

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

Source: U.S. Census Bureau (2016a)

Table 3-15. Wyoming and Campbell County Employment Rate Change, 2000 to 2015

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

Source: Bureau of Labor Statistics 2015

2011 was 4.9 percent and 3.8 percent for 2015 (Bureau of Labor Statistics 2015). Between the second quarter of 2014 and the second quarter of 2016, the mining sector was projected to lose approximately 1,644 jobs (WDWS 2015b). The Natural Resources and Mining sector in Campbell County experienced an approximate 14.7 percent decline in employment between June 2015 and June 2016 (WDWS 2016b).

4.0 Environmental Consequences/Cumulative impacts

4.1 Introduction

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

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

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

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

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

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

No Impact: No discernible or measurable impacts.

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

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

The direct, indirect, and cumulative effects of the Proposed Action and No Action Alternative are comparable to those described in the 2007 Maysdorf EIS, except as noted herein. In addition to addressing the specific issues identified in **chapter 1**, this updated environmental consequences analyses reflect changes to the mining operations presented in **chapter 2** and any updated descriptions of the affected environment presented in **chapter 3** that have taken place since the 2007 Maysdorf EIS and the 2012 federal mining plan modification were approved.

Regarding relevant regional activity, the Caballo, Belle Ayr, Cordero Rojo, and Coal Creek mines make up the middle group of mines in the PRB, as shown on **map 1-1**. Information regarding ownership, permitted areas, and 2015 coal production from these mines is included in **table 4-1**.

Table 4-1. Ownership, Permitted Acres, and Coal Production of the Middle Group of Mines

Mine	Ownership	Permitted Acres	2016 Production (Mt)
Caballo	Peabody Caballo Coal, LLC	21,269	11.2
Belle Ayr	Contura Coal West, LLC	12,091	14.8
Cordero Rojo	Cloud Peak Energy LLC	22,537	18.3
Coal Creek	Thunder Basin Coal Co.	9,741	8.1
Total		**64,786**	**52.4**

The environmental and cumulative effects discussions below assume that under the Proposed Action, the federal mining plan modification to mine coal in the remaining federal coal lease WYW174407 would be approved. Coal recovery is projected to continue within the CRM permit boundary at an estimated annual rate of 20 Mt, which is consistent with the 2015-2016 average annual recovery rate. The recovery of the remaining federal coal would continue for approximately 2.8 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 Duvall tract would not be approved. Currently approved mining operations associated with federal coal would continue for approximately 11.6 years within federal leases WYW8385, WYW23939, WYW154432 and WYW174407 (232.6 Mt), at a rate of approximately 20 Mtpy. The newly approved WDEQ-LQD Permit to Mine allows disturbance of the entire Duvall tract even if the No Action Alternative is selected. The disturbance would be similar to those under the Proposed Action although the impacts to approximately 852.1 acres to recover federal coal within the Duvall tract would not occur.

4.1.1 Summary Comparison of Direct and Indirect Environmental Impacts

A summary comparison of the direct and indirect environmental impacts is included in **table 4-2** and in Table 2-2 of the 2007 Maysdorf EIS.

4.2 Topography and Physiography

4.2.1 Direct and Indirect Effects

4.2.1.1 Proposed Action

The direct and indirect effects to topography and physiography would not be different than those described in the 2007 Maysdorf EIS. The Proposed Action would impact the topography and physiography of the remaining portions of lands included in lease WYW174407 but these impacts would be similar to those currently occurring on the existing CRM coal leases as coal is

Table 4-2. Summary Comparison of Direct and Indirect Environmental Impacts

Resource Name	Proposed Action	No Action Alternative
Added Recoverable Coal (Mt)	55.8	0.0
Added disturbance	852.1 Acres	0 Acres
Topography and Physiography	Moderate, permanent on the Duvall tract. Local impacts only.	Moderate, permanent on the Duvall tract due to mine related activity authorized under a state mine permit and federal mining plan. Local impacts only.
Geology, Minerals and Paleontology	Moderate, permanent on the Duvall tract. Recovery of 55.8 Mt of Wyodak coal and CBNG within Wyodak coal. While CBNG is not part of the Proposed Action, there would be a loss of CBNG through venting and/or depletion of hydrostatic pressure in Wyodak-Anderson coal resulting from mining adjacent areas. However, CBNG recovery has been greatly reduced in the area. Local impacts only.	Moderate, permanent on the Duvall tract due to mine related activity authorized under a revised state mine permit and federal mining plan. Approximately 55.8 Mt of coal would not be removed on the CMC but loss of CBNG would occur though venting and/or depletion of hydrostatic pressure in Wyodak coal resulting from mining adjacent areas. Local impacts only.
Air Quality and Climate Change	Negligible to moderate and short to long term from full mining on the Duvall tract. Primarily local impacts, with the potential for regional and global impacts from transportation and combustion of coal.	Moderate, short term on the Duvall tract due to mine related activity authorized under a state mine permit and federal mining plan. Primarily local impacts, with the potential for regional and global impacts from transportation and combustion of coal.
Water Resources – Surface Water	Moderate, short term (extended by 2.8 years) on the Duvall tract from full mining. Primarily local impacts, with the potential for regional impacts.	Moderate, short term on the Duvall tract due to mine related activity authorized under a state mine permit and federal mining plan. Primarily local impacts, with the potential for regional impacts.
Water Resources-Groundwater	Moderate, short and long term on the Duvall tract due to aquifer (alluvial, overburden, and coal) removal. Local impacts only.	Moderate, short and long term on the Duvall tract due to mine related activity authorized under a state mine permit and federal mining plan. Local impacts only.
Alluvial Valley Floors	No impact – Not present	Same as Proposed Action
Wetlands	Moderate, short term to non-jurisdictional wetlands on the Duvall tract from full mining. Local impacts only. No impacts to jurisdictional wetlands	Moderate, short term to non-jurisdictional wetlands on the Duvall tract due to mine related activity authorized under a state mine permit and federal mining plan. Local impacts only. No impacts to jurisdictional wetlands.

Table 4-2. Continued

Resource Name	Proposed Action	No Action Alternative
Soils	Moderate, short term (2.8 years) on the Duvall tract from full mining. Local impacts only.	Moderate, short term on the Duvall tract due to mine related activity authorized under a state mine permit and federal mining plan. Local impacts only.
Vegetation	Moderate, short term (extended by 2.8 years) on the Duvall tract from full mining. Local impacts only.	Moderate, short term on the Duvall tract due to mine related activity authorized under a state mine permit and federal mining plan. Local impacts only.
Wildlife	Moderate, short term (extended by 2.8 years) on the Duvall tract from full mining. Local impacts only.	Moderate, short term on the Duvall tract due to mine related activity authorized under a revised state mine permit and federal mining plan. Local impacts only.
Ownership and Use of Land	Moderate, short term (extended by 2.8 years) on the Duvall tract from full mining. Local impacts only.	Moderate, short term on the Duvall tract due to mine related activity authorized under a state mine permit and federal mining plan.
Cultural Resources	Negligible, long term on the Duvall tract from full mining. Local impacts only.	Negligible, long term on the Duvall tract due to mine related activity authorized under a revised state mine permit and federal mining plan. NRHP sites would not be disturbed. Local impacts only.
Visual Resources	Moderate, short term (extended by 2.8 years) on the Duvall tract from full mining. Local impacts only.	Moderate, short term on the Duvall tract due to mine related activity authorized under a state mine permit and federal mining plan. Local impacts only.
Noise	Minor to moderate, short term (extended by 2.8 years) on the Duvall tract from full mining. The moderate effects would attenuate rapidly due to the reduction effect related to distance Local impacts only.	Minor to moderate, short term on the Duvall tract due to mine related activity authorized under a state mine permit and federal mining plan. Local impacts only.
Transportation facilities	No impact	Same as Proposed Action
Hazardous and Solid Waste	No impact	Same as Proposed Action
Socioeconomics	Moderate, beneficial, short and long term (extended by 2.8 years) on the Duvall tract from full mining. LOM State and Federal revenues from tract coal would be $280.9 million. Local and regional impacts.	Moderate, beneficial short term on the Duvall tract due to mine related activity authorized under a revised state mine permit and federal mining plan. LOM State and Federal revenues reduced by $280.9 million, compared to Proposed Action. Local and regional impacts.

mined and the mined-out areas are reclaimed. After mined-out areas are reclaimed, the land surfaces are typically gentler, with more uniform slopes and restored basic drainage networks. The direct effects on topography and physiography resulting from the Proposed Action are expected to be moderate and permanent on the Duvall tract. There would be no indirect effects under the Proposed Action.

4.2.1.2 No Action Alternative

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the coal included in the Duvall tract. The impacts to topography under the No Action Alternative would be similar to those under the Proposed Action although the impacts to approximately 852.1 acres to recover federal coal within the Duvall tract would not occur.

4.2.2 Cumulative Effects

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

4.2.3 Mitigation Measures

No mitigation measures would be necessary for topography.

4.3 Geology, Mineral Resources, and Paleontology

4.3.1 Direct and Indirect Effects

4.3.1.1 Proposed Action

The direct and indirect effects to geology, mineral resources, and paleontology would not be different than those described in the 2007 Maysdorf EIS. The geology from the base of the Wyodak coal seam to the land surface would be subject to permanent change on the areas of coal removal and mining would substantially alter the resulting subsurface physical characteristics of these lands. As described in Section 3.3.1.2.1 of the 2007 Maysdorf EIS, the replaced overburden and interburden would be a relatively homogeneous (compared to the premining layered overburden and interburden) and partly recompacted mixture. These impacts are occurring on the existing CRM coal leases as coal is mined and the mined-out areas are reclaimed. The Proposed Action would result in the recovery of approximately 55.8 Mt of federal coal within the Wyodak coal seam. The direct and indirect effects on geology and coal resources are expected to be moderate and permanent on the Duvall tract.

According to the Wyoming Oil and Gas Conservation Commission (WOGCC), as of November 2016, 254 CBNG wells and 135 oil and gas wells had been permitted within 2 miles of the Duvall tract (including 24 CBNG wells within the Duvall tract (WOGCC 2016). There are 12 CBNG wells completed within the Duvall tract and one of those wells is currently producing gas. As of November 2016 there are 13 oil and gas wells (excluding CBNG) permitted within the Duvall tract, three of the wells are currently producing oil and one is an active injector. Conventional oil and gas wells and CBNG wells located on the Duvall tract will be abandoned and mined through as mining progresses. CBNG would be recovered from the Wyodak coal seam within the Duvall tract until mining approaches near enough to the wells to result in loss through venting

and/or depletion of hydrostatic pressure. CBNG reserves not recovered from the Wyodak coal seam prior to mining would be vented to the atmosphere. The direct effects on CBNG resources resulting from the Proposed Action are expected to be moderate and permanent for CBNG on the Duvall tract due to the loss of any remaining CBNG within the Wyodak coal seam. Current conventional oil and gas drilling techniques (horizontal drilling) allow extraction of oil and gas from areas not available using vertical drilling techniques (USEIA 2016b). Therefore, the effects would be minor and short term for conventional oil and gas due to the surface disturbance that could prohibit recovery of the resource.

Section 3.3.3 of the 2007 Maysdorf EIS provides a detailed discussion of paleontological resources associated with the Duvall tract (BLM 2007). No unique or significant paleontological resources have been identified or are suspected to exist on the CRM. The likelihood of encountering significant paleontological resources is very small. While vertebrate fossils appear to be very scarce, should previously unknown, potentially significant paleontological sites be discovered, BLM imposed lease and permit conditions require that work in the area would stop and measures would be taken to assess and protect the site. The direct effects on paleontological resources resulting from the Proposed Action are expected to be moderate and permanent on the Duvall tract.

4.3.1.2 No Action Alternative

Under the No Action Alternative, ASLM would not approve the modification of the existing federal mining plan to recover the coal included in the Duvall tract. Impacts to the geological resources have resulted from current mining activity in 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 852.1 acres less than the Proposed Action. Impacts to CBNG resources will be moderate and permanent as a result of mining activities in adjacent lands.

4.3.2 Cumulative Effects

The cumulative impacts to geology, mineral resources, and paleontology would not be significantly different than those described in the 2009 SGAC EIS. The PRB coalfield encompasses an area of about 12,000 square miles. The USGS estimate that there are approximately 162 billion tons of recoverable coal in the PRB, of which, an estimated 25 billion tons are considered economically recoverable coal, with a maximum stripping ratio of 10:1 (U.S. Geological Survey [USGS] 2013). The cumulative effects would primarily be related to the existing CRM and the adjacent Caballo, Belle Ayr, and Coal Creek mines.

According to October 17, 2016 information from the WOGCC website, 21,360 CBNG wells have been drilled in Campbell County. The WOGCC records indicate that a majority of the wells are privately held or state minerals, with approximately 36.7 percent of the wells (7,846 of 21,360) being federal minerals. Status of these wells includes shut-in, producing, plugged and abandoned, and injection. Currently, one of the 254 CBNG wells permitted in the analysis area is considered to be in production. The pace of CBNG development in Wyoming has recently slowed considerably (WOGCC 2016).

Impacts to paleontological resources as a result of the already-approved cumulative energy development occurring in the PRB consist of losses of plant, invertebrate, and vertebrate fossil material for scientific research, public education (interpretive programs), and other values. Losses have and would result from the destruction, disturbance, or removal of fossil materials as a result of surface-disturbing activities, as well as unauthorized collection and vandalism. A beneficial

impact of surface mining can be the exposure of fossil materials for scientific examination and collection, which might never occur except as a result of overburden removal, exposure of rock strata, and mineral excavation.

The cumulative effects on the geology, mineral resources, and paleontology are expected 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

CMC projects that the annual coal production is expected to average 20 Mt with mining the remaining federal coal within the Duvall tract. CRM's air quality permit (P0022480) limits annual coal production to 35 Mt of coal. According to CMC, production would continue at an average rate of 20 Mtpy for approximately 2.8 additional years under the Proposed Action. Public exposure to particulate emissions from surface mining operations is most likely to occur along publicly accessible roads and highways that pass through the area of the mining operations. Occupants of residences in the area could also be affected. As indicated on Figure 3-8 of the 2007 Maysdorf EIS, the closest residence is located approximately 11,000 feet from the Duvall tract disturbance and the closest public transportation route is the Haight Road, which bisects the Duvall tract.

WDEQ-AQD issued air quality permit MD-9943 for the CRM on August 3, 2010. This air quality permit was issued based on an analysis using emission factors, estimation methods, and model selection consistent with WDEQ-LQD policy. In November 2016, CRM submitted an application to modify MD-9943 to update pit progression areas to include the Duvall lease reserves, update the mining schedule, revise the lands necessary to conduct mining (LNCM) to accommodate new pit progression areas, and reduce the permitted coal production totals from 65 Mtpy to 35 Mtpy. The modification request included an emissions inventory based on the above-mentioned operating parameters. On July 18, 2017 WDEQ-AQD issued air quality permit number P0022480 for the CRM. This occurred during the public comment on this EA and as such the EA has been updated to reflect the conditions within air quality permit P0022480.

PM_{10} inventories for the mining activities at CRM were prepared for all years in the currently anticipated LOM. Two years were then selected for worst-case dispersion modeling of PM_{10} based on mine plan parameters and emission inventories. Fugitive emission sources and point sources were modeled using the Industrial Source Complex 3 Long-Term (ISCLT3) dispersion model. This model is recommended by WDEQ for use with modeling coal mine impacts in Wyoming (Redhorse 2016).

Modeling indicates the currently projected mine activities would be in compliance with the annual PM_{10} ambient air standard for the life of the CRM. Based on mine plan parameters and highest emissions inventories, the years 2017 and 2023 were selected as the worst-case years for evaluation, since those years had the highest modeled PM_{10} concentrations. Coal production in

both years was modeled at the proposed maximum production level of 35 Mt (Redhorse 2016). The results of annual dispersion modeling are included in **table 4-3**. The locations of the modeled PM_{10} annual concentrations for 2017 and 2023 are shown on **map 4-1**. Under the modified mining plan proposed, the CRM would not cause or contribute to a violation of the annual PM_{10} WAAQS of 50 µg/m^3 (Redhorse 2016).

Table 4-3. MD-9943 Modification Request Annual Particulate Matter Dispersion Modeling Results

Pollutant	Averaging Period	Modeled Concentration[a] (µg/m^3)	Background Concentration (µg/m^3)	Total Concentration (µg/m^3)	WAAQS (µg/m^3)
		2017	**Mine**	**Year**	
PM_{10}	Overall Maximum	26.06	9.50	35.56	50 [c]
	CRM Maximum	21.70	9.50	31.20	50 [c]
		2023	**Mine**	**Year**	
PM_{10}	Overall Maximum	15.58	9.50	25.08	50 [c]
	CRM Maximum	15.58	9.50	25.08	50 [c]

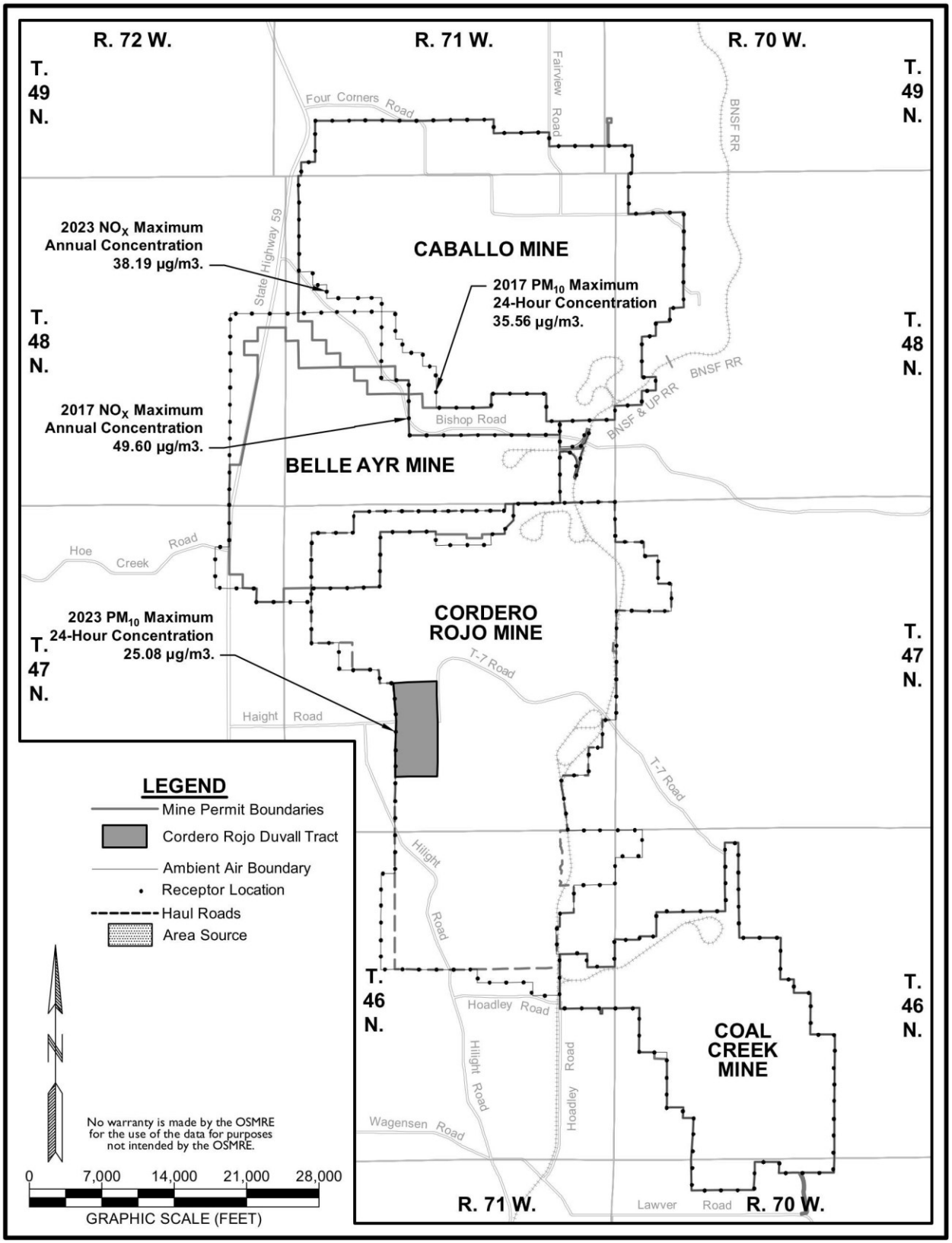
PM_{10} modeled concentrations include the emissions from Belle Ayr, Coal Creek, and Cordero Rojo Mines plus the regional background concentration (Caballo Mine's emissions are not included per Redhorse 2016) a Violation occurs with more than one expected exceedance per calendar year, averaged over 3-years

Compliance with the 24-hour PM_{10} ambient air quality standard has been demonstrated by ambient air monitoring conducted at CRM and other nearby mines. A discussion of PM_{10} monitoring results for the CRM is included in **section 3.1.4.1**.

As shown in **table 3-2**, there have been no recorded exceedances of the 24-hour PM_{10} NAAQS or WAAQS or annual PM_{10} WAAQS at the CRM, and 2016 ISCLT3 modeling conducted for the current CRM permit predicted no future exceedances of the annual PM_{10} WAAQS at a 35-Mtpy production rate (Redhorse 2016). At the estimated average annual production rate of 20 Mt there would be an extension of approximately 2.8 years in the time the mine would produce and there would be an increase in overburden thickness but fugitive dust emissions are projected to remain within daily NAAQS and WAAQS and annual WAAQS limits. The direct and indirect effects from particulate matter emissions resulting from the Proposed Action are expected to be moderate and short term on the Duvall tract because modeled particulate matter emissions would be below the NAAQS and WAAQS thresholds and particulate matter emissions related to the Proposed Action would only occur for 2.8 years. It is expected that there will be no impact to the Sheridan non-attainment area for PM_{10} due to mining of the Duvall tract. The effects of particulate matter emissions from coal combustion are included in **section 4.4.3**.

4.4.1.1.2 No Action Alternative

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the coal included in the Duvall tract. 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 2.8 years.



Map 4-1. Maximum Modeled PM_{10} NOx Concentrations at the Middle Group of PRB Mines for the Years 2017 and 2023

4.4.1.2 Cumulative Effects

The locations of PM_{10} and $PM_{2.5}$ emission monitoring samplers within Coal Mine Subregion 2 (Belle Ayr, Coal Creek, Caballo, and Cordero Rojo mines) are depicted on **map 3-1**. Monitoring during the 2009-2016 period demonstrated that ambient concentrations of PM_{10} were within established short-term (24-hour) presented in **table 4-4**. During this period, no exceedances of the PM_{10} standards were reported at the Belle Ayr, Coal Creek, Caballo, or Cordero Rojo mines. The highest 24-hour average concentration reported from any individual station during the 2009-2016 monitoring period was 122 µg/m^3, recorded at Caballo/C-8A/B (56-005-0886). This site is approximately 6 miles northeast of the Duvall tract.

Table 4-4. PM_{10} Concentration Values (24-Hour, First Maximum Value - µg/m3) for 2009-2016 Associated with the Middle Group[2] of Mines in the PRB

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

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

[2] Belle Ayr, Caballo, Cordero Rojo, and Coal Creek mines (See **map 3-1**)

[3] See **map 3-1** for site locations

** Indicates that the site is inactive

Source: WDEQ-AQD (2016)

The cumulative effects from particulate matter emissions are expected to be moderate and short term because modeled PM_{10} emissions would be below NAAQS and WAAQS thresholds and they would be extended by approximately 2.8 years.

4.4.1.3 Mitigation Measures

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

4.4.2 Emissions of Nitrogen Oxides (NO_X) and Ozone (O_3)

4.4.2.1 Direct and Indirect Effects

4.4.2.1.1 Proposed Action

CMC projects that the annual coal production is expected to average 20 Mt with mining of the remaining federal coal associated with the Duvall tract. CRM's currently approved air quality permit from WDEQ-LQD limits annual coal production to 35 Mt of coal. According to CMC,

the recovery of federal coal would continue at an average rate of 20 Mtpy for approximately 2.8 additional years under the Proposed Action.

As presented in **table 3-7**, NO_2 data collected at the currently active AQS monitoring sites in Campbell County nearest to the CRM were below the 1-hour NAAQS 98th percentile concentration of 100 ppb (188 µg/m^3, as indicated in **table 3-1**) and below the 1-hour WAAQS 98th percentile concentration of 188 µg/m^3 indicated in **table 3-1**. Therefore, ambient air quality within the vicinity of the proposed action is currently in compliance with the NO_2 WAAQS and NAAQS.

CRM did include modeled results for NO_X emissions for 2016 through 2035 as a part of the MD-9943 air quality permit modification request. As with particulate matter modeling, the years 2017 and 2023 were selected as the worst-case years, since those years had the highest modeled NO_X concentrations. NO_X modeling closely followed many of the same procedures used in the PM_{10} analysis. Emissions were apportioned in a similar manner and the same meteorological data set was used. Area source, haul road, and point source information for the Caballo, Belle Ayr, Cordero Rojo, and Coal Creek mines and information for railroads, roads, power plants, and regional sources provided by WDEQ-LQD ARMB were included in the model. The amount of NO_X emissions from blasting is related to the amount of ammonium nitrate fuel oil (ANFO) blasting agent utilized. NO_X emission rates for the middle group of mines 2017 and 2023 are expected to be 7,516 tpy and 6,278 tpy, respectively. The locations of the maximum-modeled NO_X concentrations along the CRM ambient air boundary for 2017 and 2023 are shown on **map 4-1**. 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 Haight Road, which currently runs through the Duvall tract and there is an occupied residence located approximately 11,000 feet east of the Duvall tract. Estimated NO_X emissions determined from modeling would be below the NAAQS and WAAQS thresholds and would only be extended by 2.8 years (Redhorse 2016). The direct and indirect effects from NO_X emissions resulting from the Proposed Action are expected to be moderate and short term on the Duvall tract.

As indicated in **section 3.1.4.2**, O_3 monitoring is not required at the CRM and O_3 emissions were not modeled for the air quality permit MD-9943 modification request. However, as shown in **table 3-8,** O_3 levels have been monitored at AQS Sites 56-005-0123 and 56-005-0456 since 2009. No exceedances of the 8-hour O_3 standard in place at the time have occurred at the monitoring sites since monitoring began in 2010. Based on information provided by CMC that mining methods would not be significantly different that those currently employed at the mine (CMC 2016b) and coal recovery would continue at the estimated annual rate of 20 Mt, which is consistent with the 2015-2016 average annual recovery rate, the direct and indirect effects from O_3 emissions resulting from the Proposed Action are expected to be minor and short term.

4.4.2.1.2 No Action Alternative

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the coal included in the Duvall tract. Impacts from NO_X and O_3 emissions have resulted from current mining activity and therefore the impacts related to NO_X and O_3 emissions under the No Action Alternative would be similar to those under the Proposed Action but would not be extended for an additional 2.8 years.

4.4.2.2 Cumulative Effects

The adjacent middle group of mines would contribute additional NO_X and O_3 emissions to the surrounding area. Modeling for NO_X conducted for the CRM air quality permit includes the effects of the adjacent middle group of mines. As discussed in **section 4.4.1.1.1**, CRM recently submitted an application to WDEQ-AQD to modify air quality permit MD-9943 to reduce to permitted tons of coal removal from 65 Mtpy to 35 Mtpy. This permit has since been issued by WDEQ-AQD on July 18, 2017 and CRM is currently permitted to mine 35 Mtpy. The most recent modeling for NO_X conducted by Redhorse was based on mining at the rate of 35 Mtpy, which is more than the 20 Mtpy rate discussed throughout this EA (Redhorse 2016). The modeling results and past monitoring results show that mining at a rate of 35 Mtpy would not result in exceedances of WAAQS/NAAQS (Redhorse 2016). Cumulative impacts from NO_X could be higher in the short term in this area due to coal mining activities if surface inversion occurs in the northern portion of the PRB. This would be temporary, lasting only during the inversion. Impacts from NO_X related to the Proposed Action would cease to occur after mining has been complete. Therefore, the cumulative effects from NO_X emissions are expected to be moderate and they would be extended by approximately 2.8 years.

O_3 monitoring at AQS sites 56-005-0123 and 56-005-0456 (**map 3-2**) has been conducted since 2009. Monitoring at these sites provide an estimate of cumulative O_3 emissions effects. No exceedances of the 8-hour O_3 standard in place at the time have occurred at the monitoring sites since at least 2009. Coal recovery is projected to continue within the CRM permit boundary at an estimated annual rate of 20 Mt, which is consistent with the 2015-2016 average annual recovery rate. Therefore, the cumulative effects from O_3 emissions resulting from the Proposed Action are expected to be minor and short term and they would be extended by approximately the 2.8 years.

4.4.2.3 Mitigation Measures

No mitigation measures beyond those required by the CRM air quality permit would be required for emissions of NO_X or O_3.

4.4.3 Air Quality Related Values (AQRVs)

4.4.3.1 Direct and Indirect Effects

4.4.3.1.1 Proposed Action

Visibility

WDEQ-LQD has determined that the CRM 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.

Because WDEQ does not require the CRM 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 Duvall tract have been inferred from the currently permitted impacts of mining the existing coal leases at the CRM. The nearest Class I area is located approximately 100 miles east of the Duvall tract at the Wind Cave National Park in South Dakota. As indicated on **figure 3-1**, the long-term trend in visibility at the Wind Cave National Park appears to be relatively stable, if not improving slightly. If the coal within the Duvall tract is mined, the Duvall tract would be mined as an integral part of the CRM. The average annual coal production for the mine is anticipated to be approximately 20 Mt if the federal mining

plan modification is approved to include the remaining federal coal in the Duvall tract. Impacts to visibility under the Proposed Action would be minor but they would be extended by approximately 2.8 years.

Overburden is generally thicker in the Duvall tract than the other lease areas currently being mined; therefore, state-of-the-art methods to minimize any increases in blast sizes and/or blasting agents would be employed. Thus, emissions from blasting are not expected to increase significantly, notwithstanding the increased thicknesses of overburden that would be excavated in the Duvall tract. The expected levels of pollutants and particulates that effect visibility would be within the approved air quality permit P0022480. The proposed project area is not directly influenced by other air quality regulations (i.e. Class I air shed). The direct and indirect effects to visibility resulting from the Proposed Action are expected to be moderate and short term because and they would be extended by approximately 2.8 years.

Air Quality Related Values Related to Coal Combustion

Emissions that affect air quality also result from combustion of fossil fuels. **Table 4-5** presents the estimated 2017-2029 PM_{10}, $PM_{2.5}$, SO_2, NO_2, Hg, and CO emissions for coal mined at the CRM that would be utilized for power generation in comparison with 2010 through 2016 values. Emission estimates for 2017 through 2029 are also provided based on the projected average coal recovery for the time period. Using information from **table 4-5**, comparisons can be made between combustion emissions from coal mined CRM and emissions from coal mined from Campbell County. Total U.S. emissions are also included in the table.

Table 4-5. Estimated Annual PM10, PM2.5, SO_2, NOX, and Hg Contributions from Combustion of Coal Mined at the CRM for 2009-2016 and 2017-2029, 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)
2009	39.4	27,363.3	8,345.8	344,583.4	141,771.5	1.6	9,845.2
2010	38.5	26,751.0	8,159.1	336,873.3	138,599.3	1.6	9,625.0
2011	39.5	27,415.1	8,361.6	345,236.4	142,040.1	1.6	9,863.9
2012	39.2	27,240.8	8,308.5	343,041.4	141,137.1	1.6	9,801.2
2013	36.7	25,479.9	7,771.4	320,866.4	132,013.6	1.5	9,167.6
2014	34.8	24,186.6	7,376.9	304,579.6	125,312.8	1.4	8,702.3
2015	22.9	15,892.3	4,847.1	200,129.8	82,339.1	0.9	5,718.0
2016	18.3	12,737.7	3,885.0	160,405.4	65,995.4	0.8	4,583.0
2017-2029 Annual Average	20.0	13,896.7	4,238.5	175,000.0	72,000.0	0.8	5,000.0
Total Campbell County[1]	386.2	13,896.7	4,238.5	175,000.0	72,000.0	0.8	5,000.0
2017-2029 Average Percent of Campbell Co.	--	268,345.3	81,845.3	3,379,250.0	1,390,320.0	16.0	96,550.0
Total U.S. Coal Emissions (2015)	--	573,077.7	174,788.7	7,216,720.0	2,969,164.8	34.2	206,192.0
2017-2029 Average Percent of U.S.	--	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%

[1] Based on an estimated production of 386.2 Mt (average of 2011 through 2016 production)
Source: WWC 2017, calculations provided in **appendix E**.

Impacts to air quality related to coal combustion under the Proposed Action would be similar to the conditions currently experienced. When compared to Campbell County emissions, direct and indirect effects would be minor (approximately 5.2 percent of the Campbell County average emissions) but they would be extended by approximately 2.8 years.

Hg is a heavy metal that is a known persistent, bioaccumulative and toxic (PBT) substance that occurs naturally in coal. Air releases of Hg are associated with a variety of important environmental and human health consequences (CEC 2011). Power plants can release trace metals, such as Hg, during the combustion of coal to generate electricity. The Hg emissions from CRM supplied coal-fired power plants are indicated in **table 4-5**.

Based on an average of 20 Mtpy, the estimated Hg emissions resulting from the proposed action would contribute approximately 0.8 tons of Hg emissions per year for an additional 2.8 years (WWC 2017). Therefore, the Proposed Action would not increase Hg emissions but would extend the emissions by approximately 2.8 years.

Impacts to air quality related to coal combustion under the Proposed Action would be similar to the conditions currently experienced and the anticipated future production at the CRM is consistent with the 2009 through 2016 average annual recovery rate. In addition, when compared to emissions from Campbell County mines, direct and indirect effects would be minor (approximately 5.2 percent of the Campbell County average emissions) but they would be extended by approximately 2.8 years.

Acidification of Lakes/Acid Deposition

Because the CRM is not required by WDEQ to monitor H_2S, a direct comparison to WAAQS standards is not possible. Because factors affecting H_2S emissions would not change as a result of the Proposed Action, the direct and indirect effects have been inferred from the currently permitted impacts of mining the existing coal leases at the CRM. As indicated in **table 3-10**, the 2011-2015 trend in H+ at monitoring site WY99 appears to be relatively stable. Coal recovery is projected to continue within the CRM permit boundary at an estimated annual rate of 20 Mt, which is consistent with the 2015-2016 average annual recovery rate. Based on this comparison of the current information available, the Proposed Action is not expected to contribute to increased direct or indirect effects to acidification of lakes or acid deposition that may impact soils and therefore, the effects would be negligible.

4.4.3.1.2 No Action Alternative

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the coal included in the Duvall tract. Impacts to air quality related values have resulted from current mining activity and therefore the impacts related to AQRVs under the No Action Alternative would be similar to those under the Proposed Action but would not be extended for an additional 2.8 years.

4.4.3.2 Cumulative Effects

Mines in Campbell County would affect the cumulative AQRVs. One method of evaluating the cumulative effects of the Proposed Action on AQRVs would be to assess the air quality index (AQI) for Campbell County. As described by the AirNow website, the AQI provides an index of how clean or polluted the air is within an area and what associated health effects might be a concern (AirNow 2016). The AQI focuses on health affects experienced within a few hours or days after breathing polluted air. EPA calculates the AQI for five major air pollutants regulated by the Clean Air Act: ground-level ozone, particle pollution (also known as particulate matter), CO, SO_2, and NO_2. For each of these pollutants, EPA has established national air quality standards to protect public health. Ground-level ozone and airborne particles are the two pollutants that pose the greatest threat to human health in this country. The AQI evaluates air quality based on six levels (categories) of health concern that correspond to a different level of health concern.

The six categories of health concern are:

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

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

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

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

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

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

According to information obtained from the AirNow Website, approximately 98.8 percent of the days between 2012 and 2016 were classified as having a good or moderate AQI and no days were classified as very unhealthy or hazardous (**table 4-6**).

Table 4-6. Average Annual Campbell County Air Quality Index Values, 2012-2016

	Days With AQI	Good	Moderate	Unhealthy for Sensitive Groups	Unhealthy	Very Unhealthy	Hazardous
2012	366	130	221	13	2	0	0
2013	365	222	142	1	0	0	0
2014	365	262	102	1	0	0	0
2015	365	252	110	2	1	0	0
2016[1]	274	195	79	0	0	0	0
Average	--	**212.2**	**130.8**	**3.4**	**1.0**	**0**	**0**
Percent of Total Average	--	61.2%	37.7%	1.0%	0.2%	0.0%	0.0%

[1] Annual statistics for 2016 are not final until May 1, 2017
Source: AirNow (2017)

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

The Proposed Action would not increase Hg emissions but would extend the emissions by approximately 2.8 years. Based on an average of 20 Mtpy, which is consistent with the 2015-2016 average annual recovery rate, the estimated Hg emissions resulting from the burning of the coal recovered under the Proposed Action would contribute approximately 0.8 ton of Hg emissions per year (from **table 4-5**) for an additional 2.8 years (WWC 2017).

Blasting, coal crushing, loading and hauling of coal, moving equipment, and other activities associated with surface coal mining and the combustion of coal at power plants produce particulates that can be released into the air, which could impact AQRVs. 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 2.8 years. Impacts to AQRVs from mining the federal coal within the Duvall tract would cease to occur after mining and reclamation are completed.

4.4.3.3 Mitigation Measures

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

4.4.4 Greenhouse Gas Emissions

4.4.4.1 Direct and Indirect Effects

4.4.4.1.1 Proposed Action

CRM estimated emissions from combined sources based on annual coal recovered from 2012 through 2016 and known production and variables used to calculate CO_2e emissions, and for the 2017-2029-time period using estimated production and estimated variables (**table 4-7**). CO_2e emissions are projected to remain constant at the CRM for the LOM. The Proposed Action would not increase annual production but would extend the life of the mine by approximately 2.8 years. The direct and indirect effects from GHG emissions at the mine resulting from the Proposed Action are expected to be minor but they would be extended by approximately 2.8 years. OSMRE has elected to quantify direct and indirect GHG emissions and evaluated these emissions in the context of Wyoming and national GHG emission inventories, as discussed in **section 4.4.5.1**. Because emissions would remain constant and because 2017-2029 emissions are estimated to represent only 0.59 percent of the projected 2020 U.S. CO_2 emission, impacts would be potentially detectable but slight, meeting the definition of "minor" as described in the EA.

As presented in **table 4-7**, the combustion of the coal is the primary contributing factor related to CO_2e emissions from the Proposed Action, accounting for approximately 99.6 percent of the emissions. Based on estimated average annual CO_2e emissions of 34,381,898 metric tons (34.4 million metric tons) from coal mined from 2017 through 2029, the total estimated CO_2e emissions at the CRM (including coal combustion) resulting from the Proposed Action would be 446,694,675 metric tons (446.69 million metric tons). The direct and indirect effects from GHG emissions when rail transport to final destinations at power plants and loading terminals and coal combustion are included are expected to be moderate and they would be extended by approximately 2.8 years.

4.4.4.1.2 No Action Alternative

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the coal included in the Duvall tract. The impacts directly resulting from GHG emissions under the No Action Alternative would be similar to those under the Proposed Action but would not be extended by approximately 2.8 years. While annual CO2e emissions would remain the same as the Proposed Action for approximately 11.6 years, the LOM CO_2e emissions would decrease by approximately 22 percent as a result of the No Action Alternative, based on 2.8-fewer years of combustion of CRM coal.

Table 4-7. Estimated Equivalent CO_2 (CO_2e) Emissions for the Proposed Action at the CRM, (2009-2016 and 2017-2029 Average)

	2009	2010	2011	2012	2013	2014	2015	2016	2017-2029 Average
General									
Mt of Coal Recovered	39.4	38.5	39.5	39.2	36.7	34.8	22.9	18.3	20.0
Average Transport Miles (One Way)	1,060	1,060	1,060	1,060	1,060	1,060	1,060	1,060	1,060
Number of Train Trips (One Way)	2,546	2,489	2,550	2,534	2,370	2,250	1,478	1,185	1,293
Direct Emissions Sources									
Fuel	128,654	125,775	128,897	128,078	119,799	113,718	74,720	59,889	65,338
Electricity Consumed in Mining Process	105,151	102,798	105,350	104,681	97,914	92,944	61,070	48,948	53,402
Mining Process	45,198	44,186	45,283	44,995	42,087	39,950	26,250	21,040	22,954
Total Direct Emissions	**279,002**	**272,760**	**279,531**	**277,754**	**259,799**	**246,612**	**162,041**	**129,877**	**141,694**
Indirect Emissions Sources									
Rail Transport[2]	1,457,498	1,424,886	1,460,259	1,450,975	1,357,181	1,288,292	846,497	678,473	740,204
From Coal Combustion[3]	65,963,115	64,487,180	66,088,113	65,667,934	61,423,004	58,305,246	38,310,561	30,706,177	33,500,000
Total Indirect Emissions	**67,420,612**	**65,912,066**	**67,548,373**	**67,118,910**	**62,780,185**	**59,593,538**	**39,157,058**	**31,384,650**	**34,240,204**
Total Estimated CO_2e Emissions	**67,699,615**	**66,184,825**	**67,827,904**	**67,396,664**	**63,039,984**	**59,840,150**	**39,319,099**	**31,514,527**	**34,381,898**

[1] In metric tons - see **appendix E** for calculations

[2] Coal haulage emissions based on 130-car trains with four locomotives, train trips per year; 488.2 kg CO_2e per mile per loaded train, 96.1 Kg CO_2e 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 CO_2e per ton of coal burned for electrical generation (EPA 2008) and calculated by WWC (2017)

4.4.4.2 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.

4.4.4.3 Mitigation Measures

A majority (approximately 99.6 percent) of the GHG emitted identified in the EA are from non-mining activities, not controlled by CMC (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 (for emissions at the CRM) 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.

4.4.5 Climate Change Cause and Effect

4.4.5.1 Proposed Action/No Action Alternative

Although the effects of GHG emissions and other contributions to climate change in the global aggregate are estimable, it is currently not feasible to determine what effect GHG emissions in a specific area resulting from a specific activity might have on climate change and resulting environmental impacts. It is therefore not currently possible to associate any particular action with the creation or mitigation of any specific climate-related environmental effects.

Historically, the coal mined in the PRB has been used as one of the sources of fuel to generate electricity in power plants located throughout the U.S. Coal-fired power plant emissions include CO_2, which has been identified as a principal anthropogenic greenhouse gas. According to the EPA (2016g) in 2014 (the most recent year of available CO_2 data at this time):

1. CO_2 emissions represent approximately 81 percent of the total 2014 U.S. greenhouse gas emissions.
2. Estimated CO_2 emissions in the U.S. totaled 6,870.5 million metric tons in 2014, which was a 3.1 percent decrease from 2012.
3. Estimated CO_2e emissions from energy-related consumption in the U.S. totaled 5,556 million metric tons in 2014.
4. Estimated CO_2 emissions from the electric power sector totaled 2,080.7 million metric tons, or approximately 37 percent of total U.S. energy-related CO_2 emissions in 2014.
5. Estimated CO_2 emissions from electric power generation from coal totaled 1,570 million metric tons, or about 28.3 percent of total U.S. energy-related CO_2 emissions in 2014.

Approximately 98 percent of the 394.6 Mt coal mined in 2014 in Wyoming was used to generate electricity by coal-fired power plants in the U.S. (USEIA 2016a). Coal production from Wyoming represented approximately 46.9 percent of the coal used for power generation in 2014, which means that, using a simple calculation (CO_2 emissions from item number 5 above multiplied by 46.9 percent), Wyoming surface coal mines were responsible for approximately 736.3 million metric tons of CO_2 emissions from coal power generation in 2014. If a more accurate method of calculating CO_2 emissions is used, based on the tons of CO_2 emissions per ton of coal combusted (EPA 2008), the emissions from burning 386.7 Mt of Wyoming coal were

approximately 647.7 million metric tons in 2014 (see appendix E). The CRM produced 34.8 Mt of coal in 2014, which represents approximately 8.8 percent of the coal produced in Wyoming in 2014, or about 58.3 million metric tons of CO_2 emissions from coal power generation and approximately 9.0 percent of the CO_2 produced from Wyoming coal. In 2016, 100 percent of coal mined at the CRM was burned in U.S. power plants (CMC 2016b).

As stated above, estimated CO_2 emissions in the U.S. decreased 3.1 percent from 2012 through 2014 (EPA 2016g). Under the Proposed Action, CMC anticipates producing the coal included in the Duvall tract at 20 Mtpy levels, using existing production and transportation facilities. This would extend the mine's current GHG emissions by approximately 2.8 years and combustion of Duvall tract federal coal in coal-fired power plants would also continue for approximately 2.8 additional years. Because CO_2 emissions have been declining in recent years and because CO_2 from coal mined at the CRM would remain at or only slightly above current levels, climate impacts associated with direct/indirect emissions from the Duvall tract from mining, transportation, and combustion would be moderate but short term (2.8 years). The impacts would diminish after the life of the mine.

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 Executive Order (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.

A recent EO entitled, "Promoting Energy Independence and Economic Growth," 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 CRM 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 would include the social benefits of energy production to society as a whole and other

potential positive benefits, 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 resulting from 2.8 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 4.4.4 of the EA.

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 would provide information that is both potentially inaccurate and not useful.

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.

4.4.5.2.1 Direct and Indirect Effects on the Proposed Action/No Action Alternative

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

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

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

Hydrology

The potential changes to the annual snowfall, precipitation levels, and streamflow could impact area surface water body levels, groundwater recharge, and soil erosion. During the anticipated 2.8-year life of the project, natural variations results in dryer or wetter years. Considering the overall climate change timeframe of centuries, it is possible that decreased snowpack may be observable locally, or may not during the project timeframe. Likewise, decreases in streamflow may be observed, but during the mining dewatering timeframe of 2.8 years, mine dewatering may compensate for climate change related stream flow reduction, or may have no additional influence on streamflow. Therefore, there will be no climate change impacts on streamflows where project impacts occur or they may be negligible during the project timeframe. The Proposed Action would have moderate, short-term 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 852.1 acres. As described in **section 4.8.1.1**, the direct and indirect effects related to the Proposed Action to soils would be moderate and they would be extended by approximately 2.8 years on the Duvall tract. However, the USGS climate viewer does not predict any annual mean changes to runoff so there would be negligible impacts from climate change on soils.

Reclamation

The post-reclamation land use would be wildlife habitat and 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 and the surface effects of underground coal mining on federal lands within the state of Wyoming. Federal coal leaseholders in Wyoming must submit a permit application package to OSMRE and WDEQ-LQD for any proposed revisions to reclamation operations on federal lands in the state. Therefore, any change to reclamation practices (i.e., seed mix) at the CRM would require the approval of WDEQ. Climate change impacts on reclamation during the life of the project would be negligible. Reestablishment of wildlife and vegetation in areas that have been disturbed is reliant on the reclamation process which would be negligibly impacted by climate change; therefore, climate change impacts to wildlife and vegetation in reclaimed areas would be negligible and long-term.

4.5 Water Resources

4.5.1 Groundwater

4.5.1.1 Direct and Indirect Effects

4.5.1.1.1 Proposed Action

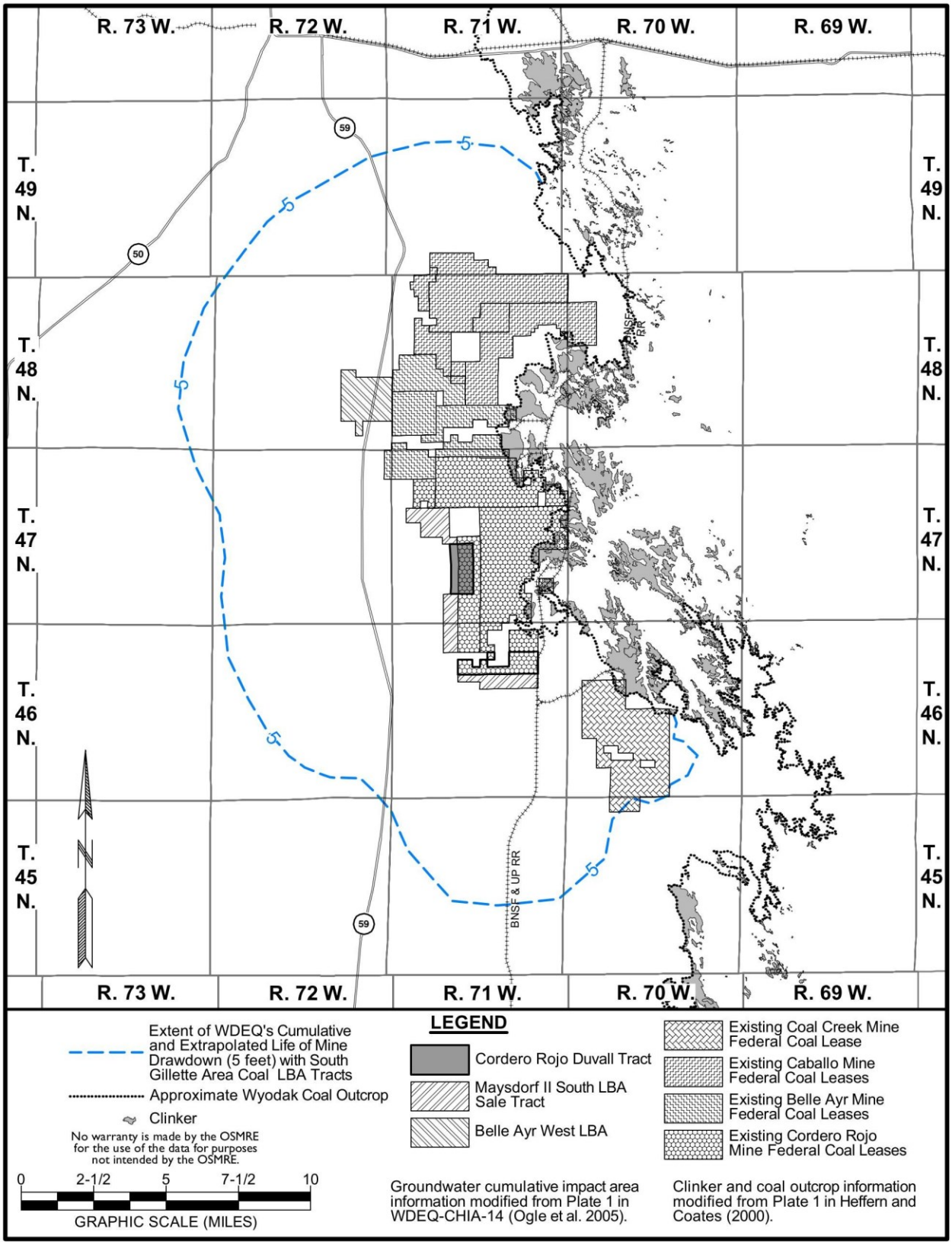
Additional discussions regarding groundwater can be found in sections 3.5.1.1 and 3.5.1.2 of the 2007 Maysdorf EIS. Additional discussions can also be found in the groundwater portion of the CHIA for the Middle Powder River Basin (Ogle et al. 2011). The existing federal leases at the CRM include approximately 15,330.8 acres, including the WYW174407 federal lease tract. Under the Proposed Action, continued mining of the Duvall tract would extend the area of coal removal on approximately 569.1 acres.

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

1. The removal of the coal aquifer and any overburden and alluvial aquifers within the areas that are mined would continue, as would the replacement of these aquifers with backfilled overburden material. under provisions of WDEQ-LQD Permit 237 T10, alluvial materials have been salvaged, which will be replaced when the Belle Fourche River is reconstructed.
2. A lowering of static water levels in the coal and overburden aquifers around the mine would continue due to dewatering associated with removal of these aquifers within the mine boundaries. This reduction in static water levels would not be permanent, and recharge to the backfill and adjacent undisturbed aquifers would occur as mined areas are reclaimed. Based on groundwater modeling results, groundwater elevations in the coal aquifer will recover 25 percent within the first 5 years after mining ceases, 75 percent within 75 years, and 100 percent within 300 years (Ogle et al. 2011).
3. Other groundwater impacts may or may not occur, or may occur only at specific locations, include changes in water quality (usually deterioration) outside the area that is mined and reclaimed. This would result from communication between the reclaimed aquifer and the unmined aquifer, and changes in recharge-discharge conditions and/or groundwater flow patterns.

Additional alluvium, overburden, and Wyodak coal aquifers would be removed in the Duvall tract during the mining process. These aquifers would be replaced with backfilled overburden and interburden materials. The physical characteristics of the reclaimed backfill material are dependent upon mining methods and premining overburden lithology. Information provided in the 2011 CHIA for the Middle Powder River Basin states that the backfill aquifers will likely have hydraulic conductivities at least that of the overburden and possibly even greater than the fractured coal (Ogle et al. 2011). In addition, permeability and porosity of the backfill within the CRM are expected to be greater than the original material. Data compiled and analyzed for backfill aquifer from the middle PRB coal mines for the period from 1977 to 2011 shows that the median concentration of the major ions and TDS concentrations are below the WQD livestock water standards of 3,000 mg/l for sulfate (SO_4) and 5,000 mg/l for TDS (Ogle et al. 2011). Based on existing groundwater quality monitoring, it is anticipated that TDS concentrations will not exceed premine conditions, and the water will be suitable for the post-mine land use after reclamation and recovery are complete (Ogle et al. 2011). Therefore, the reclaimed spoil aquifer could provide adequate water quality for stock wells. Predicted drawdowns for the Wyodak coal seam included in the 2016 Gillette Area Groundwater Monitoring Organization (GAGMO) report is presented on **map 4-2** (Hydro-Engineering 2016). According to the 2011 CHIA, the groundwater migrating from the backfill aquifer in the future is not expected to cause material damage to the coal aquifer (Ogle et al. 2011). This statement is supported by the results of backfill well monitoring, discussed in **section 3.2.1**. Therefore, mining the Duvall tract is not expected to change the potential for material damage to groundwater quality.

Overall, evaluation of the three material damage indicators (physical characteristics, water level recovery, and water quality of the backfill aquifer) suggests that there is limited potential for the Duvall tract at the CRM to cause material damage to the native aquifers outside the coal mine permit boundaries (Ogle et al. 2011). As discussed in **section 3.2.1**, that while the physical characteristics of the backfill is different from premine conditions, backfill recharge has been documented. In addition, as discussed in **section 3.2.1** and in the 2011 CHIA (Ogle et al.



Map 4-2. Predicted drawdowns for the Wyodak-Anderson coal seam

2011), backfill water quality is generally suitable for livestock use and wildlife habitat, which are the planned post-mining land uses. These water quality values are consistent with premine water quality discussions presented in Section 3.5.1.1 of the 2007 Maysdorf EIS (BLM 2007). Therefore, the direct and indirect effects to groundwater resources resulting from the Proposed Action are expected to be moderate and short and long term on the Duvall tract due to aquifer removal.

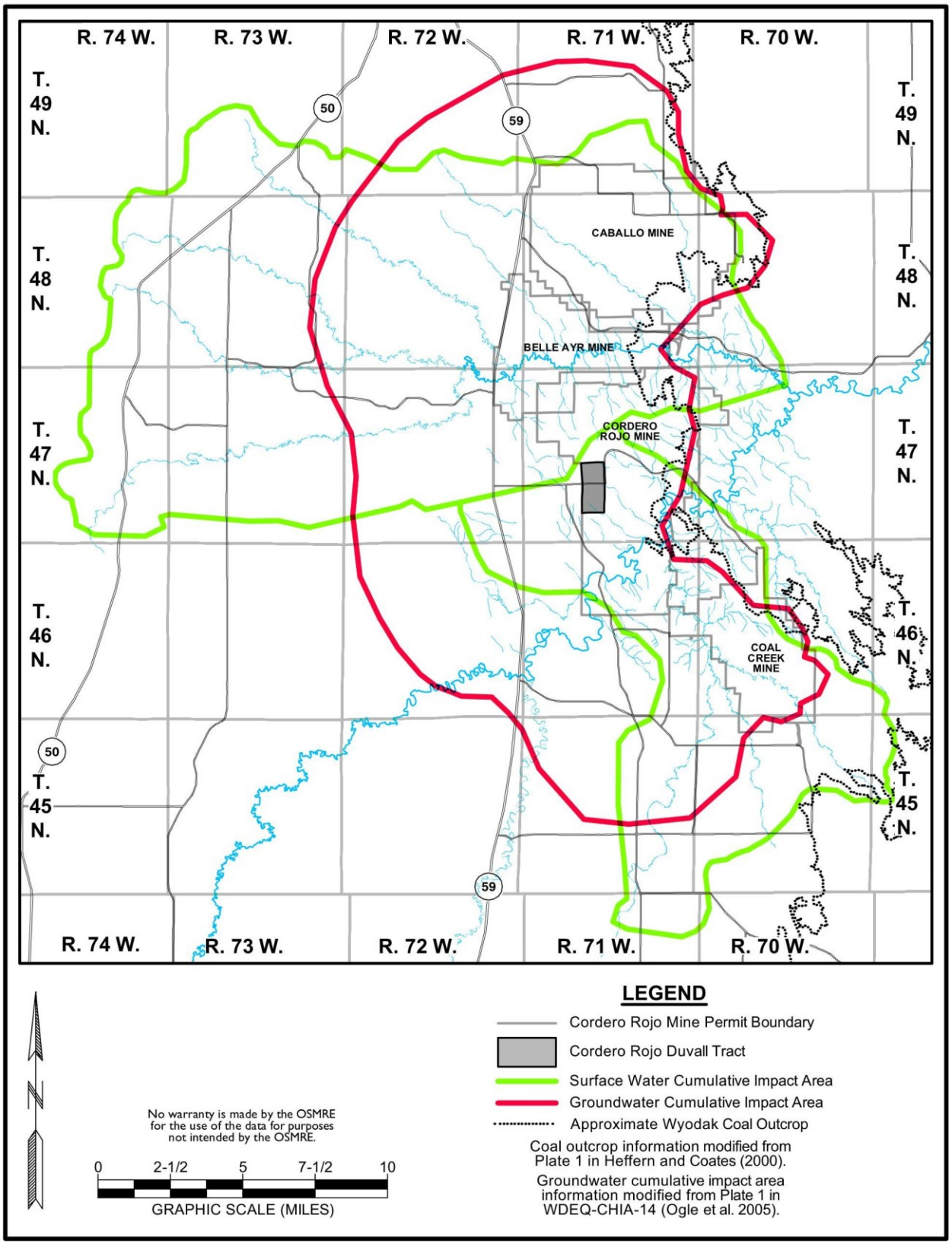
4.5.1.1.2 No Action Alternative

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the coal included in the Duvall tract. The impacts to groundwater under the No Action Alternative would be similar to those under the Proposed Action but the extent of Wyodak coal aquifer removal would be reduced by approximately 569.1 acres. Impacts to Wasatch Formation overburden aquifers have already occurred within the Duvall tract related to coal recovery on adjacent federal coal leases (overstripping and highwall backsloping, etc.), as approved by CMC's WDEQ-LQD Permit 237 T10 and OSMRE's 2012 federal MPDD. Impacts to the Wyodak coal aquifer have also already occurred within the Duvall tract related to CBNG recovery. In addition, as discussed in **section 3.2.1**, a continuous cone of depression currently affects the overburden and coal aquifers around the CRM due to ongoing mining activities; its proximity to the Coal Creek, Caballo, and Belle Ayr mines; and the cumulative drawdown effects from pit dewatering and nearby CBNG discharges (Hydro-Engineering 2011). Therefore, implementation of the No Action Alternative would have negligible effect on reducing the extent of these impacts.

4.5.1.2 Cumulative Effects

The cumulative impact analysis area (CIAA) for potential surface water impacts includes proposed LOM disturbance areas for the adjacent middle group of mines within local drainage basins (**map 4-3**). The 5-foot drawdown area was selected as the CIAA for groundwater since this limit would detect the extent of minor groundwater impacts. The effects of removal of the coal and overburden aquifers and replacing them with backfilled overburden are the foremost groundwater concern regarding cumulative effects. Continued mining of the Duvall tract would increase the cumulative size of the backfill area in the middle group of mines in the PRB. The extent of water level drawdown in the coal and shallower aquifers in the area surrounding the mines also would be expected to increase slightly as a result of continued mining in the Duvall tract and from dewatering the active mine pits. Where the effects of pumping from Caballo, Belle Ayr, Cordero Rojo, and Coal Creek mines overlap, additional water level declines result from concurrent operations.

As described in the 2011 CHIA for the middle group of mines, CBNG dewatering in the CIAA has caused drawdown of water levels in the Wyodak-Anderson coal aquifer within the CIAA, making it difficult to accurately distinguish the impacts caused by mining and to estimate groundwater recovery rates. However, the saturated thickness of the coal seams increases to the west as the coal seams dip below the water table. Therefore, the effect of this predicted mining induced drawdown on the Wyodak-Anderson coal seam is likely minor. According to the 2011 CHIA, modeling conducted for the Cordero Rojo Mine predict that the coal aquifers are expected to achieved 25 percent recovery within 5 years of cessation of mining and would be 75 percent recovered within 75 years (Ogle et al. 2011).



Map 4-3. Cumulative Impact Area for Potential Surface Water and Groundwater Impacts

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

As discussed in section 4.5.1.1.1, while the physical characteristics of the backfill is different from premine conditions, backfill recharge has been documented at the CRM. In addition, backfill water quality is generally suitable for livestock use and wildlife habitat, which are the planned post-mining land uses. Similar groundwater quality and quantity results have been noted within the CIAA (Ogle et al. 2011). Information from the Wyoming State Geological Survey (WSGS) shows that average monthly CBNG water production in the PRB had declined by 72 percent over 2006 when water production reached peak levels (WSGS 2017), which has likely reduced effects on groundwater. Therefore, cumulative effects to groundwater resources resulting from the Proposed Action are expected to be moderate but long term and they would be extended by approximately 2.8 years on the Duvall tract due to aquifer removal.

4.5.1.3 Mitigation Measures

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

Under provisions of WDEQ-LQD Permit 237 T10, CRM is required to monitor water levels and water quality in the overburden, coal, interburden, underburden, and backfill. Operational groundwater monitoring programs are dynamic and modified through time as wells are removed by mining, discontinued from monitoring to eliminate redundancy, or added to replace those removed by mining and to facilitate monitoring of future mine expansion areas as mining has progressed. Additional wells have also been installed in the reclaimed backfill to monitor recovering, postmine groundwater conditions. Many groundwater monitoring wells installed by CRM 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. Also under provisions of WDEQ-LQD Permit 237 T10, alluvial materials have been salvaged, which will be replaced when the Belle Fourche River is reconstructed.

4.5.2 Surface Water

4.5.2.1 Direct and Indirect Effects

4.5.2.1.1 Proposed Action

Additional discussions regarding surface water can be found in sections 3.5.2.1 and 3.5.2.2 of the 2007 Maysdorf EIS. Additional discussions can be found in the Surface Water portion of the CHIA for the CRM (Ogle et al. 2011). As discussed in **section 3.2.2**, surface water quality monitored

by the CRM fluctuates with seasonal flow patterns and varies with significant rainfall events. In general, laboratory results are within the typical ranges established by long-term monitoring. Changes in surface runoff characteristics and sediment discharges would occur during mining on Duvall tract because of the mining and reconstruction of drainage channels as mining progresses and because of the use of sediment control structures to manage discharges of surface water from the mine permit areas. Since the Duvall tract would be mined as extension of the existing CRM 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. In accordance with SMCRA and Wyoming State Statutes, the Belle Fourche River channel would be restored after surface mining operations are completed on the Maysdorf LBA Tract. Surface water flow, quality, and sediment discharge would approximate premining conditions. The drainages that intersect the permit area would be reclaimed to exhibit channel geometry characteristics similar to the premining characteristics. The Belle Fourche River would be restored in approximately the same location as the natural channel and its hydrologic functions, including the alluvial groundwater-surface water interaction and the premining pools and runs features would be restored. The direct and indirect effects to surface water would not be significantly different than those described in the 2007 Maysdorf EIS and are expected to be moderate and short term.

4.5.2.1.2 No Action Alternative

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the coal included in the Duvall tract. 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 Duvall tract related to coal recovery on adjacent federal coal leases, as approved by CMC's WDEQ-LQD Permit No. 237 T10. In addition, the recently revised mining permit includes the entire Duvall tract in the CRM affected area boundary. Therefore, implementation of the No Action Alternative would have negligible effect on reducing the extent of surface water impacts.

4.5.2.2 Cumulative Effects

The CIAA for potential surface water impacts includes proposed LOM disturbance areas for the adjacent middle group of mines within local drainage basins (**map 4-3**). The CIAA for surface water impacts includes parts of the Caballo Creek and Belle Fourche River drainage basins. The CIAA 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. Pre-mine stream morphology measurements have been used to design and evaluate reconstructed stream channels. Runoff modeling is used to evaluate hydraulic suitability and predict post-mine discharges in reconstructed channels for varied recurrence intervals. The reclaimed topography includes the reconstruction of portions of several of the main channels associated with the CRM and adjacent mines, including Caballo Creek, and the Belle Fourche River. Cumulative mining related impacts to surface water resources associated within the Caballo Creek/Belle Fourche River CIAA were analyzed in the 2011 CHIA for the middle group of mines (Ogle et al. 2011).

While the physical characteristics of the surface is different from premine conditions, surface water quality monitoring from area mines shows that surface water quality is generally suitable for livestock use and wildlife habitat, which are the planned post-mining land uses (Ogle et al. 2011). Stream channels in the CIAA would be restored after surface mining operations are completed on area mines. Information from the WSGS shows that average monthly CBNG water production in the PRB had declined by 72 percent over 2006 when water production reached peak levels (WSGS 2017), which has likely reduced effects on surface water. Therefore, the

cumulative effects to surface water are expected to be moderate and long term (until the disturbed areas within the CIAA have been reclamation).

4.5.2.3 Mitigation Measures

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

Under provisions of WDEQ-LQD Permit No. 237 T10, the CRM is required to restore stream channels after surface mining operations are completed on the Duvall tract. The drainages that intersect the CRM permit area will be reclaimed to exhibit channel geometry characteristics similar to the premining characteristics. The Caballo Creek stream channel would be restored in approximately the same location as the natural channel, and its premining hydrologic functions would be restored. Other WDEQ-LQD permit requirements for the CRM include constructing sediment control structures to manage discharges of surface water from the mine permit area, treating all surface runoff from mined lands as necessary to meet effluent standards, and restoring stock ponds, playas, and in-channel impoundments disturbed during mining. Also under provisions of WDEQ-LQD Permit 237 T10, alluvial materials have been salvaged, which will be replaced when the Belle Fourche River is reconstructed.

4.5.3 Water Rights

4.5.3.1 Direct and Indirect Effects

4.5.3.1.1 Proposed Action

The type and number of groundwater and surface-water rights within 2 miles of the Duvall tract are discussed in **section 3.2.3** of this EA. Additional discussions regarding water rights can be found in sections 3.5.3.1 and 3.5.3.2 of the 2007 Maysdorf EIS. Prior to energy development in the area, water appropriations (both groundwater and surface water) were typically for livestock use. Currently, mining companies hold the majority of the water rights in the vicinity of the EA project area. According to Wyoming Rules and Regulations, proposed mining operations must be designed and conducted in a way to prevent material damage to the hydrologic balance outside the permit area (WDEQ-LQD 2012). According to W.S. 35-11-415(b) (xii), the CRM must replace, in accordance with state law, the water supply of an owner of interest in real property, who obtains all or part of his supply of water for domestic, agricultural, industrial or any other legitimate use from an underground or surface source where the supply has been affected by contamination, diminution or interruption resulting from the surface coal mine operation. Ogle et al. (2011) assessed the potential for coal mining to result in material damage to groundwater and surface water resources in the middle group of mines. Material damage is presumed to occur when the median concentrations of a given constituent exceed WDEQ-WQD surface water standards, and the available evidence suggests the cause of exceedance is due to coal mining activity and will contribute to permanent or long-term change of use suitability. Groundwater-quality parameters for domestic (Class I), agriculture (Class II), and livestock (Class III) are included in Chapter 8 of Wyoming Rules and Regulations and surface water-quality parameters for outstanding waters (Class 1), fisheries and drinking water (Class 2), aquatic life and other fish (Class 3), and agriculture, industry, recreation, and wildlife (Class 4) are included in Chapter 1 of Wyoming Rules and Regulations (WDEQ-Water Quality Division [WQD] 2013).

Monitoring wells are placed between mine operations and nearby private wells to monitor for water level and water quality changes to anticipate any downgradient impacts. Currently, CBNG production has exceeded the amount of drawdown predicted to result from mining. Therefore, potential impacts from mining to stock and domestic wells completed in the overburden or Wyodak coal aquifer in the area have become largely irrelevant (Hydro-Engineering 2011). The postmining land use plan for grazing land includes a commitment to provide water for livestock, so the water will be replaced using a combination of stock reservoirs, water wells, and reclaimed creek channels. Typically, the wells that replace premine stock wells are drilled into deeper aquifers that produce more water, so there are fewer wells overall but the amount of water available for livestock is the same or greater. As stated in Section 3.5.3.2.1 of the 2007 Maysdorf EIS, some privately permitted water wells in the vicinity of the Duvall tract have been or will likely be impacted (either by removing the well or by water level drawdown) by mining and CBNG development (BLM 2009). Future drawdowns to the Wyodak coal aquifer are expected to be negligible because the coal seam has essentially been dewatered due to ongoing CRM mining activities; its proximity to the Coal Creek, Caballo, and Belle Ayr mines; and the cumulative drawdown effects from pit dewatering and nearby CBNG discharges (Hydro-Engineering 2011).

In general, the proposed federal mining plan amendment would contribute to additional, more extensive mining disturbance that may impact groundwater and surface-water rights in the CRM area. As stated in section 3.2.1, current groundwater conditions have already changed in the CRM area as a result of CBNG development and ongoing mining operations at the Caballo, Belle Ayr, Cordero Rojo, and Coal Creek mines. Therefore, the Proposed Action would not result in substantial declines in the groundwater availability, due to reduced groundwater quantity and quality, over what is currently being experienced. In addition, only a slight reduction in streamflow downstream of the CRM during mining is expected because runoff is currently being controlled within the CRM as a result of mining unrelated to the Proposed Action. Therefore, impacts to groundwater or surface-water rights have already occurred from mining within the CRM and from CBNG development and implementation of the Proposed Action would have negligible effect on increasing the extent of impacts.

4.5.3.1.2 No Action Alternative

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the coal included in the Duvall tract. The impacts to surface and groundwater rights under the No Action Alternative would be similar to those under the Proposed Action since impacts to groundwater and surface-water impacts have already occurred within the Duvall tract related to coal recovery on adjacent federal coal leases, as approved by CMC's WDEQ-LQD Permit No. 237 T10. In addition, the recently revised mining permit includes the entire Duvall tract in the CRM affected area boundary. Therefore, implementation of the No Action Alternative would have negligible effect on reducing the extent of these impacts.

4.5.3.2 Cumulative Effects

The CIAA 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 Duvall tract are discussed in **section 3.2.3** of this EA. A continuous cone of depression that affects overburden and coal aquifers currently exists around the CRM due to ongoing mining activities; its proximity to the Coal Creek, Caballo, and Belle Ayr mines; and the cumulative drawdown effects from pit dewatering and nearby CBNG discharges (Hydro-Engineering 2016). The physical characteristics of the backfill in the CIAA is different from premine conditions but backfill aquifer recharge has been documented. Backfill water quality from monitoring wells in the CIAA is generally

suitable for livestock use and wildlife habitat, which are the planned post-mining land uses (Ogle et al. 2011). Cumulative effects on groundwater rights would be similar to direct and indirect effect described in **section 4.5.3.1**.

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

While the approval of the federal mining plan modification request would contribute to additional, more extensive mining disturbance in the Caballo, Belle Ayr, Cordero Rojo, and Coal Creek mine areas, there would be minor additional cumulative water rights impacts because groundwater systems have already been affected by CBNG removal and ongoing mining and because runoff is currently being controlled in within the Caballo, Belle Ayr, Cordero Rojo, and Coal Creek mines. Regarding water quality within the CIAA analyzed in the 2011 CHIA, current mining at the Caballo, Belle Ayr, and Cordero Rojo mines is not expected to cause long-term or permanent damage to surface water quantity in the CIAA (Ogle et al. 2011). In addition, as discussed above, CRM must replace, in accordance with state law, the water supply of an owner of interest in real property, who obtains all or part of his supply of water for domestic, agricultural, industrial, or any other legitimate use from an underground or surface source where the supply has been affected by contamination, diminution, or interruption resulting from the surface coal mine operation.

4.5.3.3 Mitigation Measures

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

Under provisions of WDEQ-LQD Permit 237 T10, the CRM is required to update the list of potentially impacted private water supply wells and predict impacts to those wells within the 5-foot drawdown contour as part of the permitting process. The operator would be required to replace those water supplies affected by mining with water of equivalent quality and quantity. Any impacts to downstream water rights would fall under the jurisdiction of the State Engineer. If it is determined that a water right has been impacted by activities of the CRM, that impact will be mitigated.

4.6 Alluvial Valley Floors

4.6.1 Direct and Indirect Effects

4.6.1.1 Proposed Action

Additional discussions regarding alluvial valley floors (AVF) can be found in sections 3.6.1 and 3.6.2 of the 2007 Maysdorf EIS. The direct and indirect effects to AVF would not be significantly different than those described in the 2007 Maysdorf EIS. No AVFs have been delineated within the Duvall tract so there would be no direct or indirect effects to AVFs from the Proposed Action.

4.6.1.2 No Action Alternative

Impacts to the AVFs have resulted from current mining activity outside the Duvall tract, and therefore under this alternative, impacts to alluvial valley floors in the area would remain as described in **section 4.6.1.1**.

4.6.2 Cumulative Effects

The cumulative effects to AVFs would not be significantly different than those described in the 2009 SGAC EIS. AVF investigations conducted within and adjacent to the general analysis area have identified three small AVF areas that occur along Caballo Creek north of the Duvall tract. No AVFs have been identified within the Duvall tract.

The Cordero Rojo Mine is required to monitor impacts to downstream AVFs by measuring discharges from sediment ponds for quantity and quality. The mine is also required to restore the essential hydrologic functions of any affected AVFs, if delineated, and preserve the hydrologic functions of the AVFs on adjacent lands. WDEQ-LQD does not believe that the Cordero Rojo mining operation will result in any material damage to the any AVFs downstream of the current Cordero Rojo mine, and that reclamation will replace the alluvial materials and restore the hydrologic function of the Belle Fourche River (WDEQ-LQD 2017).

The cumulative effects on AVF emissions are expected to be negligible and short term.

4.6.3 Mitigation Measures

No mitigation measures would be necessary for AVFs.

4.7 Wetlands (Aquatic Resources)

4.7.1 Direct and Indirect Effects

4.7.1.1 Proposed Action

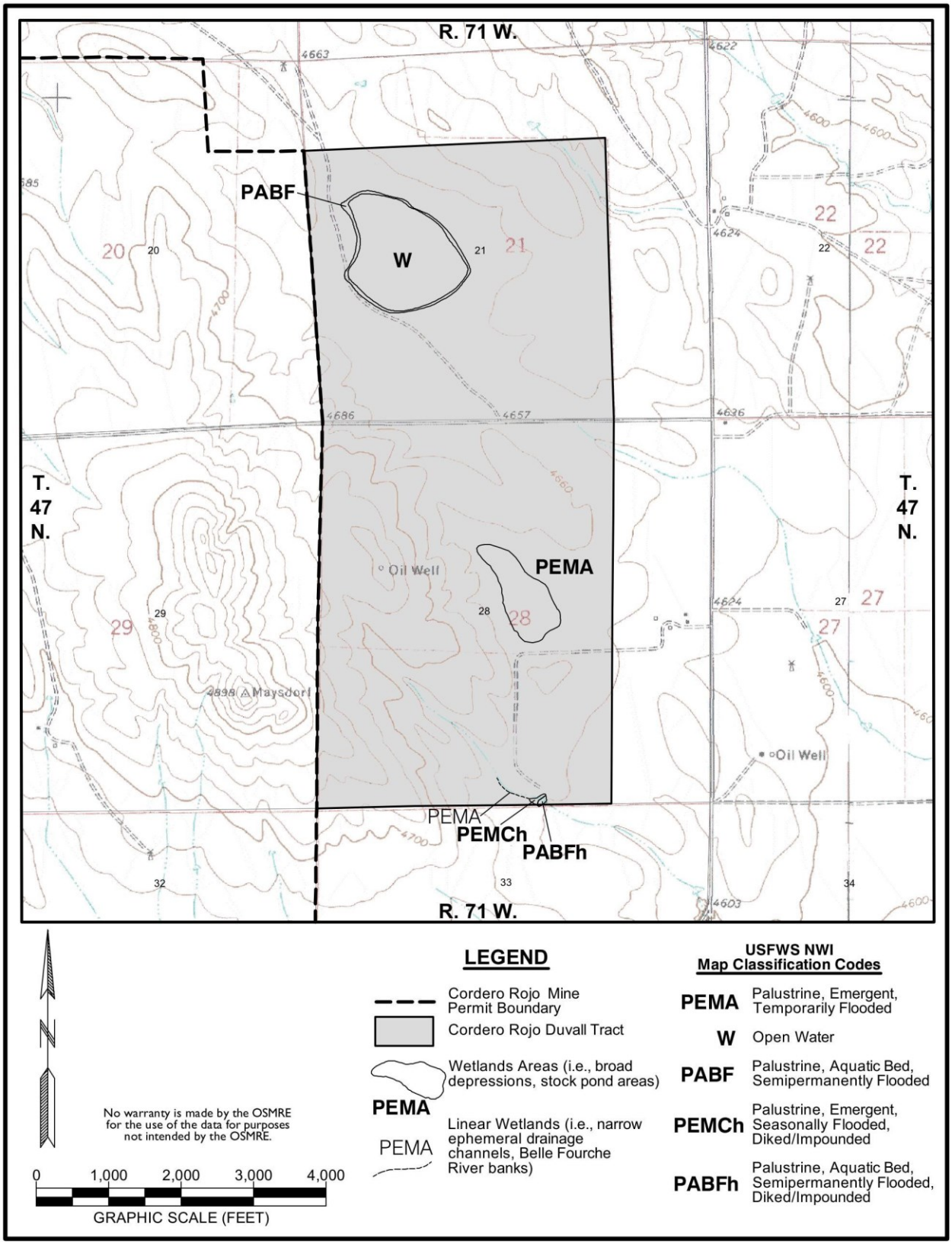
Additional discussions regarding aquatic resources can be found in sections 3.7.1 and 3.7.2 of the 2007 Maysdorf EIS. Three wetland (aquatic resources) sites have been delineated within the Duvall tract but since these sites are not continuously linked to "Waters of the U.S." that are regulated under the federal Clean Water Act, and these three wetland sites are therefore regarded as non-jurisdictional (Johnson, 2015). The aquatic resources associated with the tract are shown on **map 4-4**. The direct and indirect effects related to the Proposed Action to non-jurisdictional wetlands would be moderate and short term. There would be no direct or indirect effects to jurisdictional wetlands from the Proposed Action.

4.7.1.2 No Action Alternative

Three wetland (aquatic resources) sites have been delineated within the Duvall tract but since these sites are not continuously linked to Waters of the U.S., they are regarded as non-jurisdictional. There would be no direct or indirect effects to jurisdictional wetlands from the No Action Alternative.

4.7.2 Cumulative Effects:

No jurisdictional wetlands would be disturbed if the federal mining plan modification is approved. Wetlands disturbance within the CRM permit boundary are under the jurisdiction of the U.S. Army Corps of Engineers.



Map 4-4. Wetlands Associated with the Duvall Tract

4.7.3 Mitigation Measures

No mitigation measures would be necessary for wetlands (aquatic resources).

4.8 Soil

4.8.1 Direct and Indirect Effects

4.8.1.1 Proposed Action

Additional discussions regarding soils can be found in sections 3.8.1, 3.8.2 and 4.2.6 of the 2007 Maysdorf EIS. The direct and indirect effects to soils would not be significantly different than those described in the 2007 Maysdorf EIS. Soils within the Duvall 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 post-mining land uses (i.e., rangeland and wildlife habitat). The direct and indirect effects related to the Proposed Action to soils would be moderate and short term on the Duvall tract and they would increase disturbance by approximately 852.1 acres.

4.8.1.2 No Action Alternative

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the coal included in the Duvall tract. The WDEQ-LQD approved Permit to Mine No. 237 T10 includes the Duvall tract within the disturbance area and allows for soil disturbance independent of the decision from OSMRE. Therefore, under this alternative, disturbance related impacts to soils in the area would remain as described in **section 4.8.1.1**.

4.8.2 Cumulative Effects

Cumulative effects would be related to disturbance at Caballo, Belle Ayr, Cordero Rojo, and Coal Creek mines. According to the 2011 Middle Powder River Basin CHIA, approximately 50,000 acres of land have been approved for disturbance within the middle group of mines (Ogle, Kunze, & Reckentine, 2011). Areas within active mines are progressively disturbed. Likewise, these areas would be progressively 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 because reclamation would occur after approximately 2.8 years of mining.

4.8.3 Mitigation Measures

Section 3.8.3 of the 2007 Maysdorf EIS provides additional discussions regarding mitigation measures related to the Duvall Tract. Suitable soil will 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. Topsoil will also be protected from acid or toxic materials and will be preserved in a usable condition for sustaining vegetation when placed over affected land (WDEQ-LQD 2012). After backfill has been placed, at least 4 feet of suitable overburden will be selectively placed below topsoil to meet guidelines for vegetation root zones. These measures are required by state regulations and are therefore considered part of the Proposed Action.

4.9 Vegetation

4.9.1 Direct and Indirect Effects

4.9.1.1 Proposed Action

Additional discussions regarding vegetation can be found in sections 3.9.1 and 3.9.2 of the 2007 Maysdorf EIS. The direct and indirect effects to vegetation would not be significantly different than those described in the 2007 Maysdorf EIS. Short-term impacts associated with the removal of vegetation from the Duvall tract would include increased soil erosion and habitat loss for wildlife and livestock. Potential long-term impacts on reclaimed lands include loss of habitat or loss of habitat carrying capacity for some wildlife species as a result of reduced plant species diversity or plant density, particularly big sagebrush. However, livestock and grassland-dependent wildlife species would benefit from the increased grass cover and production.

Reclamation, including revegetation of these lands, would occur contemporaneously with mining on adjacent lands, i.e., reclamation would begin once an area is mined. In an effort to approximate premining conditions, CMC would plan to reestablish vegetation types during the reclamation operation that are similar to the premine types. Reestablished vegetation would be dominated by species mandated in the reclamation seed mixtures (to be approved by WDEQ-LQD). The reclamation plan for the CRM 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

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the coal included in the Duvall tract. The WDEQ-LQD approved Permit to Mine No. 237 T10 includes the Duvall tract within the disturbance area and allows for surface disturbance independent of the decision from OSMRE. Therefore, under this alternative, disturbance related impacts to vegetation in the area would remain as described in **section 4.9.1.1** but the duration of impacts would be reduced by approximately 2.8 years.

4.9.2 Cumulative Effects

Cumulative effects would be related to disturbance at Caballo, Belle Ayr, Cordero Rojo, and Coal Creek mines. According to the 2011 Middle Powder River Basin CHIA, approximately 50,000 acres of land have been approved for disturbance within the middle group of mines (Ogle et al., 2011). The overall contribution to cumulative impacts to vegetation under Proposed Action would be minor due to the localized effects and the improved productivity on mined lands that have been reclaimed.

4.9.3 Mitigation Measures

No mitigation measures would be necessary for vegetation resources.

4.10 Wildlife

Additional discussions regarding wildlife can be found in section 3.10 of the 2007 Maysdorf EIS. If the federal mining plan modification for the CRM is approved by the ASLM to include recovering coal within the Duvall tract, disturbance would continue on the Duvall tract. Mining would be extended by approximately 2.8 years at the CRM. Impacts to wildlife that would be caused by mining the Duvall tract have been addressed by the WGFD and WDEQ-LQD when the mining and reclamation permits were amended to include the Duvall tract.

Mining directly and indirectly impacts local wildlife populations. These impacts are both short term (until successful reclamation is achieved) and long term (persisting beyond successful completion of reclamation). The direct impacts of surface coal mining on wildlife occur during mining and are therefore short-term. They include road kills by mine-related traffic, restrictions on wildlife movement created by fences, spoil piles, and pits, and displacement of wildlife from active mining areas. Displaced animals may find equally suitable habitat that is not occupied by other animals, occupy suitable habitat that is already being used by other individuals, or occupy poorer quality habitat than that from which they were displaced. In the second and third situations, the animals may suffer from increased competition with other animals and are less likely to survive and reproduce. If the proposed federal mining plan modification is approved, the direct impacts related to mine operations would be extended by approximately 2.8 years.

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

The environmental consequences related to mining the Duvall tract for other mammals; upland game birds (excluding the GRSG); other birds; and amphibians, reptiles, and aquatic species are not significantly different than those presented in 2007 Maysdorf EIS and are not presented herein. Updated discussions for big game, raptors, GRSG, T&E species, and other species of special interest are included below.

4.10.1 Big Game

4.10.1.1 Direct and Indirect Effects

4.10.1.1.1 Proposed Action

Under the Proposed Action, big game would be displaced from portions of the Duvall tract to adjacent ranges during mining. Mule deer would be most affected as the Duvall tract contains good quality habitat. Pronghorn would not be substantially impacted, given that they are scattered throughout the site and there is suitable habitat available in adjacent areas. White-tailed deer would not be affected, as they have not been observed on the Duvall tract. Big game displacement would be incremental, occurring over several years and allowing for gradual changes in distribution patterns. Big game residing in the adjacent areas could be impacted by increased competition with displaced animals. Noise, dust, and associated human presence would cause some localized avoidance of foraging areas adjacent to mining activities. However, big game species have continued to occupy areas adjacent to and within active mine operations at the CRM, suggesting that some animals may become habituated to such disturbances.

The CRM would be required to reclaim disturbed habitats within the area back to wildlife habitat, as outlined in the reclamation requirements of revised state and federal mine permits. After mining and reclamation, alterations in the topography and vegetative cover, particularly the reduction in sagebrush density, would cause a decrease in carrying capacity and diversity on the Duvall tract. Sagebrush would gradually become re-established on the reclaimed land, but the topographic changes would be permanent. The direct and indirect effects related to the Proposed Action on big game would be moderate and short term.

4.10.1.1.2 No Action Alternative

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the coal included in the Duvall tract. The WDEQ-LQD approved Permit to Mine No. 237 T10 includes the Duvall tract within the disturbance area and allows for surface disturbance independent of the decision from OSMRE. Therefore, under this alternative, disturbance related impacts to big game in the area would remain as described in **section 4.10.1.1.1** but the duration of impacts would be reduced by approximately 2.8 years.

4.10.1.2 Cumulative Impacts

Cumulative effects would be related to disturbance at Caballo, Belle Ayr, Cordero Rojo, and Coal Creek mines. According to the 2011 Middle Powder River Basin CHIA, approximately 50,000 acres of land have been approved for disturbance within the middle group of mines (Ogle et al., 2011). The overall contribution to cumulative impacts to big game species under Proposed Action would be moderate due to the localized effects and the improved productivity on mined lands that have been reclaimed. No severe mine-caused mortalities have occurred and no long-lasting impacts on big game species have been noted on the CRM. The cumulative effects on regional big game populations would be moderate and they would be extended by approximately 2.8 years.

4.10.1.3 Mitigation Measures

No mitigation measures specific to big game are necessary. General reclamation practices for establishing or enhancing post-mine wildlife habitat at the CRM described in the Reclamation Plan of Permit 237 T10 are in place.

4.10.2 Raptors

4.10.2.1 Direct and Indirect Effects

4.10.2.1.1 Proposed Action

No intact raptor nests are located within the Duvall tract boundary. CMC has approved plans and procedures in place to minimize impacts to nesting raptors and ensure proper reclamation techniques are implemented to enhance habitat in the post-mine landscape for both raptors and their primary prey species. Inactive, non-eagle raptor nests may be removed from areas likely to be impacted in potential disturbance areas to discourage nesting of raptors and other migratory birds, in accordance with USFWS guidance provided in the *Migratory Bird Permit Memorandum* (USFWS 2003). Decisions as to whether nest removal or relocation is the most appropriate approach would be based on the long-term history of the nest site including historic and recent raptor use; presence/absence, location, and potential vulnerability of alternate nests within the territory; number, proximity, and/or orientation of conspecific territories; historical use of artificial nest structures, if any; timing, duration (e.g., continuous and ongoing or short-term); proximity, and visibility of potentially disturbing mine activities; and other pertinent factors. In addition, CMC conducts annual surveys at multiple prairie falcon nest sites throughout the monitoring area and on neighboring lands as part of required and/or voluntary monitoring for this species.

Based on the lack of nesting raptors within the Duvall tract and the CRM'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.

4.10.2.1.2 No Action Alternative

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the coal included in the Duvall tract. The WDEQ-LQD approved Permit to Mine No. 237 T10 includes the Duvall tract within the disturbance area and allows for surface disturbance independent of the decision from OSMRE. Therefore, under this alternative, disturbance related impacts to raptors in the area would remain as described in **section 4.10.2.1.1** but the duration of impacts would be reduced by approximately 2.8 years.

4.10.2.2 Cumulative Impacts

Cumulative effects would be related to disturbance at Caballo, Belle Ayr, Cordero Rojo, and Coal Creek mines. According to the 2011 Middle Powder River Basin CHIA, approximately 50,000 acres of land have been approved for disturbance within the middle group of mines (Ogle et al., 2011). The overall contribution to cumulative impacts to raptors under Proposed Action would be moderate due to the localized effects and the improved productivity on mined lands that have been reclaimed. Approved mine permits include regulations specifying mitigation measures for wildlife, including minimization of disturbance, reclamation of habitats, and raptor-safe power line construction. The measures specified in mining permits and enforced by WDEQ-LQD ensure compliance with the Migratory Bird Treaty Act, the Bald and Golden Eagle Protection Act, and the ESA. The cumulative effects on regional raptor populations would be moderate and they would be extended by approximately 2.8 years.

4.10.2.3 Mitigation Measures

No mitigation measures specific to raptors are necessary. General reclamation practices for establishing or enhancing post-mine wildlife habitat at the CRM described in the Reclamation Plan of Permit 237 T10 are in place. CMC also has developed plans and procedures to minimize impacts to nesting raptors and ensure proper reclamation techniques are implemented to enhance habitat in the post-mine landscape for raptors and their primary prey species.

4.10.3 Greater Sage-Grouse (GRSG)

4.10.3.1 Direct and Indirect Effects

4.10.3.1.1 Proposed Action

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

Using mapping included in the Executive Order, it has been determined that the closest core area to the Duvall tract is approximately 9 miles distant.

WDEQ-LQD Permit No. 237 T10 currently contains multiple monitoring and protection plans that include numerous specific measures for GRSG and their habitats, including those mentioned above. The WDEQ has strict bonding, reclamation, and bond-release requirements for all surface coal mines in Wyoming, including detailed reclamation plans and post-reclamation monitoring requirements that extend 10 years or more to ensure that all reclamation standards have successfully been met prior to full bond release.

According to Executive Order No. 12-2015, existing land uses and activities (including those authorized by existing permit but not yet conducted) would be recognized and respected by state agencies, and those uses and activities that exist at the time the Program becomes effective would

not be managed under the stipulations included in Executive Order No. 12-2015. Because the Duvall tract evaluated under the Proposed Action is entirely within the CRM's currently approved WDEQ-LQD Permit No. 213 T10 permit boundary, these activities would not be managed according to the executive order.

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

4.10.3.1.2 No Action Alternative

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the coal included in the Duvall tract. The WDEQ-LQD approved Permit to Mine No. 237 T10 includes the Duvall tract within the disturbance area and allows for surface disturbance independent of the decision from OSMRE. Therefore, under this alternative, disturbance related impacts to GRSG in the area would remain as described in **section 4.10.3.1.1** but the duration of impacts would be reduced by approximately 2.8 years.

4.10.3.2 Cumulative Impacts

Cumulative effects would be related to disturbance at Caballo, Belle Ayr, Cordero Rojo, and Coal Creek mines. As described in the updated 2012 Task 1D Report (BLM 2012), substantial areas of GRSG habitats have been altered from their natural conditions as a result of past and on-going human activities in the Wyoming PRB study area. Human disturbances include, but are not limited to, agriculture, mining, roads, urban areas, and oil and gas development. Potential temporary impacts arise from habitat removal and disturbance associated with a project's development and operation (e.g., coal mines, CBNG wells, etc.) and would cease upon project completion and successful reclamation in a given area. Potential long-term impacts consist of permanent loss of habitats and the wildlife populations that depend on those habitats, irrespective of reclamation success, and habitat disturbance related to longer term projects (e.g., power plant facilities, rail lines, etc.) (BLM 2012). The severity of both temporary and long-term impacts to GRSG would depend on factors such as seasonal use patterns, type and timing of a project's activities, and physical parameters (e.g., topography, cover, forage, and climate).

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

The cumulative effects related to the Proposed Action on regional GRSG populations would be moderate and they would be extended by approximately 2.8 years.

4.10.3.3 Mitigation Measures

No mitigation measures specific to GRSG are necessary. The general reclamation practices for establishing or enhancing postmine wildlife habitat at the CRM described in the Reclamation Plan

of WDEQ-LQD Permit No. 237 T10 are in place. Shrub seedlings will be planted in shrub pockets in order to improve the beneficial effects of the shrubs for wildlife.

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

4.10.4.1 Direct and Indirect Effects

4.10.4.1.1 Proposed Action

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

According to the USFWS, the primary threat to the northern long-eared bat is white-nose syndrome (WNS), a disease caused by the cold-loving fungus, (*Pseudogymnoascus destructans*) (USFWS 2016c). 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.

The most current list of birds of conservation concern included in the IPaC system database (USFWS 2016a) indicates that 20 birds of conservation concern occur in the CRM area (**appendix D**). The bald eagle is present on the study area as a migrant and winter resident as discussed previously. The Brewer's sparrow is common during the spring and summer as a breeder. Golden eagle, ferruginous hawks, prairie falcons, and burrowing owls have nested within the CRM raptor study area. The Swainson's hawk was present as a spring and summer breeder and, as discussed above, nested within the Duvall tract. The grasshopper sparrow, red-headed woodpecker, loggerhead shrike, sage thrasher, short-eared owl, GRSG, long-billed curlew, McCown's longspur, and upland sandpiper have been recorded on the CRM wildlife study area. The American bittern, mountain plover, western grebe, and willow flycatcher (*Empidonax Traillii*) have not been recorded on the study area, as habitat for most of these species does not occur on the study area.

If present, these threatened, endangered, and candidate species and other species of special interest species would be temporarily displaced but current reclamation practices in-place at the CRM would promote the return of these species once reclamation has been completed. The direct and indirect effects related to the Proposed Action on species of special interest would be moderate and short term (extended by approximately 2.8 years).

4.10.4.1.2 No Action Alternative

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the coal included in the Duvall tract. The WDEQ-LQD approved Permit to Mine No. 237 T10 includes the Duvall tract within the disturbance area and allows for surface disturbance independent of the decision from OSMRE. Therefore, under this alternative, disturbance related impacts to threatened, endangered, and candidate species in the area would

remain as described in **section 4.10.4.1.1** but the duration of impacts would be reduced by approximately 2.8 years.

4.10.4.2 Cumulative Impacts

Cumulative effects would be related to disturbance at CRM, Belle Ayr, Caballo, and Coal Creek mines. According to the 2011 Middle Powder River Basin CHIA, approximately 50,000 acres of land have been approved for disturbance within the middle group of mines (Ogle et al., 2011). The overall contribution to cumulative impacts to T&E species and other species of special interest under Proposed Action would be moderate due to the localized effects and the improved productivity on mined lands that have been reclaimed. The cumulative effects on regional T&E species and other species of special interest populations would be moderate and they would be extended by approximately 2.8 years.

4.10.4.3 Mitigation Measures

No mitigation measures specific to T&E species and other species of special interest are necessary. General reclamation practices for establishing or enhancing post-mine wildlife habitat at the CRM described in the Reclamation Plan of Permit 237 T10 are in place.

4.11 Ownership and Use of Land

4.11.1 Direct and Indirect Effects

4.11.1.1 Proposed Action

Additional discussions regarding ownership and use of the land can be found in sections 3.11.1 and 3.11.2 of the 2007 Maysdorf EIS. Surface ownership in the area is private and the proposed coal removal area is managed by CMC. The major adverse environmental consequences of mining the proposed Duvall tract on land use would be reduction of livestock grazing, loss of wildlife habitat, and curtailment of other mineral development on about 852.1 additional acres during active mining. Wildlife (particularly big game) use would be displaced while the Duvall tract is being mined and reclaimed. Livestock grazing has already been prohibited due to the Duvall tract being inside the permit boundary and adjacent to active mine areas. Hunting on the Duvall tract is currently not allowed because it is within the mine permit boundary and would continue to be disallowed during mining and reclamation. Following reclamation, the land would be suitable for grazing and wildlife uses, which are the historic land uses. The direct and indirect effects related to the ownership and use of the land would be moderate and short term (extended by approximately 2.8 years).

4.11.1.2 No Action Alternative

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the coal included in the Duvall tract. The WDEQ-LQD approved Permit to Mine No. 237 T10 includes the Duvall tract within the disturbance area and allows for surface disturbance independent of the decision from OSMRE. Therefore, under this alternative, disturbance related impacts in the area would remain as described in **section 4.11.1.1** but the duration of impacts would be reduced by approximately 2.8 years.

4.11.2 Cumulative Impacts

The cumulative impacts on ownership and use of the land in the CIAA would be similar to the direct and indirect impacts, discussed above, and to the cumulative impacts discussed in section 4.2.9 of the 2007 Maysdorf EIS.

4.11.3 Mitigation Measures

No mitigation measures specific to ownership and use of the land are necessary.

4.12 Cultural Resources

4.12.1 Direct and Indirect Effects

4.12.1.1 Proposed Action

Additional discussions regarding cultural resources can be found in sections 3.12.1 and 3.12.2 of the 2007 Maysdorf EIS. The Duvall tract has been subjected to Class III cultural resource inventories. No sites within the Duvall tract have 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 18 Native American tribes/tribal representatives during the scoping process. OSMRE received a response from the Comanche Nation stating that "No Properties" were identified within the proposed project boundary.

4.12.1.2 No Action Alternative

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the coal included in the Duvall tract. The WDEQ-LQD approved Permit to Mine No. 237 T10 includes the Duvall tract within the disturbance area and allows for surface disturbance independent of the decision from OSMRE. Therefore, under this alternative, disturbance related impacts to cultural resources in the area would remain as described in **section 4.12.1.1** but the duration of impacts would be reduced by approximately 2.8 years.

4.12.2 Cumulative Impacts

The individual evaluation of cultural resource sites in the CMC study area suggests that through avoidance of sensitive site types and mitigation through data recovery for all unavoidable disturbance to NRHP eligible sites, the cumulative effects to cultural resources in the CIAA 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

Additional discussions regarding visual resources can be found in sections 3.13.1 and 3.13.2 of the 2007 Maysdorf EIS. Mining would affect landscapes classified by the BLM as visual resource management Class IV (BLM 2015a); the overall natural scenic quality of that class rating is considered relatively low. Impacts of coal mining on visibility in the general analysis area would be minor and short-term. Mining activities would be visible from State Highway 59 and the Haight Road, though the extent and duration of visibility would vary under the action alternative. No unique visual resources have been identified in or near the general analysis area, and the landscape character would not be significantly changed following reclamation. Current mining activities (blasting procedures and sizes, coal haul rates and distances, dust suppression, etc.) at the CRM would not change if the federal mining plan modification is approved. Current best available control technology measures for particulates that could contribute to impaired visibility would

continue to be employed. The direct and indirect effects related to the visual resources would be moderate and short term.

4.13.1.2 No Action Alternative

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the coal included in the Duvall tract. The WDEQ-LQD approved Permit to Mine No. 237 T10 includes the Duvall tract within the disturbance area and allows for surface disturbance independent of the decision from OSMRE. Therefore, under this alternative, disturbance related impacts to visual resources in the area would remain as described in **section 4.13.1.1** but the duration of impacts would be reduced by approximately 2.8 years.

4.13.2 Cumulative Impacts

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

4.13.3 Mitigation Measures

No mitigation measures specific to visual resources are necessary.

4.14 Noise

4.14.1 Direct and Indirect Effects

4.14.1.1 Proposed Action

Existing noise sources in the Duvall tract area includes coal mining activities, rail traffic, traffic on nearby federal and state highways, county and access roads, natural gas compressor stations, and wind. The nearest residence is approximately 11,000 feet from the Duvall tract and the Haight Road passes through the Duvall tract. Noise levels in wildlife habitat adjacent to the expansion area might increase, but anecdotal observations indicate wildlife can adapt to mine noise, especially since similar mining operations have been conducted in the area for many years. No increase in average daily railroad traffic or railroad noise would occur under any of the alternatives analyzed.

Given the proposed distance from active mining, direct and indirect effects to residences would be moderate and short term. Impacts to people using the Haight Road would increase over current conditions but would be minor considering the short duration (an additional 2.8 years) of noise exposure.

4.14.1.2 No Action Alternative

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the coal included in the Duvall tract. The WDEQ-LQD approved Permit to Mine No. 237 T10 includes the Duvall tract within the disturbance area and allows for surface disturbance independent of the decision from OSMRE. Therefore, under this alternative, disturbance related impacts to noise in the area would remain as described in **section 4.14.1.1** but the duration of impacts would be reduced by approximately 2.8 years.

4.14.2 Cumulative Effects

Cumulative effects would be related to disturbance at Caballo, Belle Ayr, Cordero Rojo, and Coal Creek mines. Potential sources of noise disturbances include, but are not limited to, agriculture, mining, roads, urban areas, and oil and gas development. Potential impacts would cease upon project completion and successful reclamation in a given area.

Recreational users, local residents and grazing lessees using lands surrounding active mining areas do hear mining-related noise, but this has not been reported to cause a substantial impact. Wildlife in the immediate vicinity of mining may be adversely affected by noise; however, observations at the CRM indicate that wildlife generally adapt to noise conditions associated with active coal mining. The cumulative impacts related to noise as discerned by the public would be moderate but short term (2.8 years).

4.14.3 Mitigation Measures

No mitigation measures specific to noise impacts are necessary.

4.15 Transportation Facilities

4.15.1 Direct and Indirect Effects

4.15.1.1 Proposed Action

Additional discussions regarding transportation facilities can be found in sections 3.16.1 and 3.16.2 of the 2007 Maysdorf EIS and the 2009 SGAC EIS. Major roads and railroads in the general area of the Duvall tract are presented on **map 1-2**. Existing transportation facilities, including roads, railroads, coal conveyors, and overhead electrical transmission lines associated with the Duvall tract would continue to be used under the Proposed Action. All of the coal mined at the CRM is transported by rail (BNSF trackage). Based on an estimated annual production rate of 20 Mt of coal shipped by rail and an estimated 15,470 tons of coal per train, the Proposed Action would result in approximately 1,293 train trips per year (one way). Employees and vendors travel the Bishop Road to access the mine. The Proposed Action will not result in increased mine related traffic but would extend the impact by 2.8 years. Therefore, mining the Duvall tract would not increase the current level of impact on the Bishop Road or the BNSF railroad.

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

Two recent Australian studies involved measuring particle concentrations in the air near a coal haul transport corridor to assess whether coal dust was being emitted from the railcars and whether any such emissions would result in particulate matter concentrations that would be

considered potentially harmful to human health. The two reports presented strong evidence that, while particulate levels were elevated for the several minutes during and after trains passed the monitoring station, coal trains did not result in any more emissions than any other freight-hauling trains (Ramboll Environ 2016). Rail traffic to and from the mines would continue at existing levels for an additional 2.8 years since coal recovery would continue at an estimated annual rate that is consistent with the 2009 through 2016 average annual recovery rate.

The mining on the Duvall tract analyzed in this EA would extend the time period over which the CRM would produce coal, which would extend the period of time coal would be transported from the mine. The added direct and indirect effects of the Proposed Action on transportation would be minor but they would be extended by approximately 2.8 years.

4.15.1.2 No Action Alternative

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the coal included in the Duvall tract. Indirect impacts on transportation have resulted from current mining activity. Therefore, under this alternative, transportation impacts in the area would remain as described in **section 4.15.1.1** but the duration of the impacts would be reduced by approximately 2.8 years.

4.15.2 Cumulative Impacts

Cumulative impacts to transportation are related to coal production levels. If coal production levels increase, cumulative impacts to transportation would increase. Highway traffic accidents and delays at grade crossings could result from train traffic. The transportation facilities for the middle group of mines are already in place, and coal production and employment levels would not change with the Proposed Action. The Proposed Action would extend the duration of mining by approximately 2.8 years at the CRM, and thus the length of employment and associated transportation utilization would be extended.

Coal extracted from the existing surface coal mines in the Wyoming PRB is transported in rail cars along the BNSF and Union Pacific (UP) rail lines. The coal mines south of Gillette, including the CRM, 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 2.8 years at the CRM, and thus the duration of utilization of BNSF and UP rail lines would be extended by that amount.

The added cumulative impacts related to transportation would be minor but they would be extended by approximately 2.8 years.

4.15.3 Mitigation Measures

No mitigation measures specific to transportation are necessary.

4.16 Hazardous and Solid Waste

4.16.1 Direct and Indirect Effects

4.16.1.1 Proposed Action

Additional discussions regarding hazardous and solid wastes can be found in sections 3.16.1 and 3.16.2 of the 2007 Maysdorf EIS and in sections 3.16.1 and 3.16.2 of the 2009 SGAC EIS. Waste is generated during mining operations at the CRM, as at all mines. While coal mining and associated coal processing associated with the Proposed Action would yield additional coal waste, mining

wastes are currently being generated on site and are handled according to WDEQ-LQD rules and regulations. Non-hazardous waste, which is similar to domestic or municipal solid waste, is currently disposed of on-site. Most of the wastes generated at the CRM that are not recycled are disposed of in a designated sanitary landfill located on a portion of the CRM area. Disposal of these non-hazardous wastes, which include abandoned mining machinery, scrap iron, scrap lumber, packing material, and other items is permitted under the mine's existing WDEQ-LQD permit to mine. No solid wastes would be deposited within the boundaries of the 100-year floodplain of a postmining stream channel, within 100 feet of the high water line of any wetland or permanent postmining impoundment, within 500 feet of a permitted well, or within eight feet of any coal outcrop (WDEQ-LQD 2017).

The CRM does utilize some non-hazardous liquids; some materials that may be classified as hazardous, or are handled as hazardous, include some greases, solvents, paints, flammable liquids; and other combustible materials determined to be hazardous by the EPA under the Resource Conservation and Recovery Act. These types of wastes are disposed of at an off-site EPA-permitted hazardous waste facility. No significant direct or indirect effects on hazardous and solid wastes are anticipated as a result of the Proposed Action.

4.16.1.2 No Action Alternative

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the coal included in the Duvall tract. Hazardous and solid wastes are currently being generated at the CRM. Therefore, under this alternative, impacts from hazardous and solid wastes in the area would remain as described in **section 4.16.1.1** but the duration of the impacts would be reduced by approximately 2.8 years.

4.16.2 Cumulative Impacts

Cumulative hazardous and solid wastes effects would be related to mining operations at Caballo, Belle Ayr, Cordero Rojo, and Coal Creek mines. The Proposed Action would extend the duration of mining by approximately 2.8 years at the CRM and, thus, the duration of effects from hazardous and solid wastes would be extended by 2.8 years.

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 1, 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 CRM. Such revenues include lease bonus bids, ad valorem taxes, severance taxes, royalty payments, sales and use taxes on equipment and other taxable purchases, and portions of required contributions to the federal AML program and Black Lung Disability Trust Fund. A summary of federal and state revenues generated from recovery of federal coal within the CRM, including federal coal within the Duvall tract, is provided in **table 4-8** and **table 4-9** provides an estimate of the revenues derived from recovering the federal coal within the Duvall tract, only.

Table 4-8. LOM Federal and State Revenues from Federal Coal Recovery within the CRM (millions of dollars)

Revenue Source	Total $ Collected	Federal Revenue	State Revenue
Federal Mineral Royalties	483.2	241.6	241.6
Abandoned Mine Lands Fund	81.7	40.8	40.8
Severance Tax	198.8	--[1]	198.8
Bonus Bid Annual Revenues[2]	0.0	0.0	0.0
Ad Valorem Tax	160.7	--[1]	160.7
Black Lung	162.3	162.3	--[1]
Sales and Use Tax	23.3	--[1]	23.3
Totals	**1,110.0**	**444.8**	**665.2**

[1] No revenues disbursed
[2] No bonus bid revenues collected after 2016
Source: WWC calculation – provided in **appendix E.**

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

Revenue Source	Total $ Collected	Fed Revenue	State Revenue
Federal Mineral Royalties	92.4	46.2	46.2
Abandoned Mine Lands Fund	15.6	7.8	7.8
Severance Tax	36.1	--[1]	36.1
Bonus Bid Annual Revenues[2]	0.0	0.0	0.0
Ad Valorem Tax	30.7	--[1]	30.7
Black Lung	32.5	32.5	--[1]
Sales and Use Tax	4.5	--[1]	4.5
Totals	**211.8**	**86.5**	**125.3**

[1] No revenues disbursed
[2] No bonus bid revenues collected after 2016
Source: WWC calculation – provided in **appendix E.**

Under the Proposed Action, Wyoming revenues generated from LOM CRM production could be increased by approximately $125.3 million and federal revenues could be increased by $86.5 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.

Continued mining in the Duvall 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 Duvall tract being mined, although the Proposed Action would extend the duration of employment for current employees and extend the economic impacts related to mining the federal coal.

No additional changes in the current socioeconomic situation, as described in **section 3.16**, are anticipated but the effects would be extended by approximately 2.8 years.

4.17.1.2 No Action Alternative

Under the No Action Alternative, the ASLM would not approve the modification of the existing federal mining plan to recover the coal included in the Duvall tract. In terms of coal conservation; the No Action Alternative would mean that approximately 55.8 Mt of federal coal within the Duvall tract would not be recovered. Wyoming revenues of approximately $129.1 million and federal revenues of approximately $86.5 million related to this coal would not be realized over the LOM under No Action Alternative. The selection of the No Action Alternative would likely not result in direct job losses, but any revenue, state program funding, abandoned mine land fees, and black lung fees that might otherwise be generated by extending the LOM by 2.8 years would not be collected.

4.17.2 Cumulative Impacts

Cumulative effects would be related to socioeconomic conditions in Campbell County. Cumulative impacts related to the Proposed Action are not substantially different than those described in **section 4.17.1.1** because Wyoming, Campbell County, Campbell County School District 1, 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 long term on the Duvall tract.

4.17.3 Mitigation Measures

No mitigation measures specific to reducing socioeconomic impacts are necessary.

4.18 Short Term Uses and Long Term Productivity

The discussions contained within this environmental consequences chapter, and the Coal Lease EIS incorporated by reference, provides the analysis and relationships of shorter uses (such as mining coal) and long-term productivity (such as generating electricity for homes, schools, and industry).

4.19 Unavoidable Adverse Effects

Unavoidable adverse impacts are the effects on natural and human resources that would remain after mitigation measures have been applied. 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 2007 Maysdorf EIS. Unavoidable adverse effects are also summarized in **table 4-10**.

Table 4-10. 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/GHGs	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, which would extend to the end of the mining term for many facilities. Noxious weeds may be introduced as a result of mining activity, potentially affecting vegetation communities and requiring implementation of control measures in the long term.
Wildlife	Wildlife would be temporarily affected by mine activities, which would alter habitat conditions, particularly in the vicinity of surface disturbance. These impacts would be short-term and habitats would be reclaimed following mining.
Cultural Resources	No sites within the Duvall tract have been designated as eligible for listing on the National Register of Historic Places (NRHP). Undiscovered cultural resources could be impacted by surface disturbing activities. All discovered sites would be mitigated as required by Section 106 of the NHPA.
Visual Resources	Mining activity and associated disturbances and facilities would unavoidably alter the landscape during the mining term, affecting the aesthetic qualities. Some features would be visible from public access points, including state highway 59. The effects would be negligible following reclamation.
Noise	Noise would result from mining activities similar to the existing condition.
Transportation Facilities	State highway 59 would continue to experience mine related traffic. The effects would occur during the mining term.
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 was activated on July 27, 2016 and was available at: http://www.wrcc.osmre.gov/initiatives/CorderoRojoMineAmendment.shtm.

OSMRE released a Public NOI to prepare the CRM Duvall tract EA in the Gillette News Record on August 4, 2016 and again on August 20, 2016. Public outreach letters describing the EA and soliciting comments were mailed on August 4, 2016 to a total of 125 recipients, including city governments, adjacent landowners, and other interested parties (see **Appendix A**). The legal notices and letters invited the public to comment on issues of concern related to the EA. OSMRE also sent letters of notification to 18 tribes/tribal representatives. These tribal notification letters were mailed on August 4, 2016. Written comments were solicited until September 5, 2016. **Appendix B** presents a summary of the scoping comments received by the public.

A total of four comment letters were received during the public scoping period. Comment letters received during the public review period for this EA will 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
Marcelo Calle	OSMRE	Project Lead
Logan Sholar	OSMRE	Project Coordination
Lauren Mitchell	OSMRE	Project Assistance
Gretchen Pinkham	OSMRE	Air Quality
Roberta Martinez Hernandez	OSMRE	Hydrology
Karen Jass	OSMRE	Geology/Physiology/Topography
Jeremy Iliff	OSMRE	Cultural/Historical/Paleontological
Jacob Mulinix	OSMRE	Soils

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

Table 5-2. Third Party Contractor Personnel

Name	Organization	Project Responsibility	Education
John Berry	WWC Engineering	Project Manager, QAQC	B.S. Wildlife Management
Chris McDowell	WWC Engineering	Primary Author	B.S. Geology
Mike Evers	WWC Engineering	QAQC	M.S. Geology

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 http://www.wrcc.osmre.gov/initiatives/CorderoRojoMineAmendment.shtm.

6.0 References and Abbreviations/Acronyms

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6.2 Abbreviations/Acronyms

AERMOD	American Meteorological Society/EPA Regulatory Model Improvement Committee Dispersion Model
ANFO	Ammonium Nitrate and Fuel Oil
AQRVs	Air Quality Related Values
ARMB	Air Resources Management Bureau
ASLM	Assistant Secretary, Land and Mineral Management (DOI)
AVF	alluvial valley floor
BLM	U.S. Bureau of Land Management
Btu	British thermal unit
CAA	Clean Air Act, as amended
CCAC	Climate Change Action Committee
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CH_4	Methane
CHIA	Cumulative Hydrologic Impacts Assessments
CIAA	Cumulative Impact Analysis Area
CMC	Cordero Rojo Coal Company
CO	Carbon monoxide
CO_2	Carbon dioxide
CO_2e	Equivalent CO_2
CPE	Cloud Peak Energy
CRM	Cordero Rojo Mine
dBA	Adjusted decibels, a logarithmic unit of sound levels
DM	Departmental Manual
DOI	U.S. Department of the Interior
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act of 1973
FCLAA	Federal Coal Leasing Act Amendment (1976)
FEIS	Final Environmental Impact Statement
FLPMA	Federal Land Policy Management Act of 1976
FONSI	Finding of No Significant Impact
GHG	Greenhouse gas
GPO	U.S. Government Publishing Office
GRSG	Greater Sage-Grouse
H+	Hydrogen ion
H_2S	Hydrogen Sulfide
Hg	Mercury
HAP	Hazardous air pollutants
LBA	Lease by Application
LOM	Life of mine

µg/m³	micrograms per cubic meter
MATS	Mercury and Air Toxic Standards
MBTA	Migratory Bird Treaty Act of 1918, as amended
MLA	Mineral Leasing Act (1920)
MPDD	Mining Plan Decision Document
Mt	million tons
Mtpy	million tons per year
N_2O	Nitrous oxide
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act (1969)
NH_3	Ammonia
NHPA	National Historic Preservation Act
NHTSA	National Highway Traffic Safety Administration
NRHP	National Register of Historic Places
NO_X	Oxides of Nitrogen
NOA	Notice of Availability
NOI	Notice of Intent
O_3	Ozone
OSMRE	Office of Surface Mining Reclamation and Enforcement
PAP	Permit Application Package
Pb	Lead
ppm	parts per million
$PM_{2.5}$	Fine particulates less than 2.5 microns
PM_{10}	Fine particulates less than 10 microns
PSD	Significant Deterioration Program
R2P2	Resource Recovery and Protection Plan
RMP	Resource Management Plan
ROD	Record of Decision
SIP	State Implementation Plan
SMP	State Mining Permit
SMCRA	Surface Mining Control and Reclamation Act (1977)
SO_2	Sulfur dioxide
SOSI	Species of Special Interest
TDS	Total dissolved solids
TSS	Total suspended solids
T&E	threatened, endangered, and candidate
tpy	tons per year
USDOE	U.S. Department of Energy
USEIA	U.S. Energy Information Administration
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOC	Volatile organic compound
VRM	Visual Resource Management

WAAQS	Wyoming Ambient Air Quality Standards
WDEQ-LQD	Wyoming Department of Environmental Quality Land Quality Division
WGFD	Wyoming Game and Fish Department
WSGS	Wyoming State Geologic Survey

APPENDIX A

LEGAL NOTICES
FOR FEDERAL LEASE MODIFICATION APPROVAL
WYW174407

Public Notice
Cordero Rojo 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 Cordero Rojo Mine's (CRM) mining plan modification for federal coal lease WYW174407 (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 by Application (LBA) application was filed with the Bureau of Land Management (BLM) by Cordero Mining Company (CMC) on September 20, 2001. BLM subsequently issued a Record of Decision (ROD) for the lease on June 6, 2007 and the lease was effective on August 1, 2008. On December 17, 2015, the Wyoming Department of Environmental Quality (WDEQ)/Land Quality Division (LQD) received an application for an amendment to CRM Permit 237, including mining portions of WYW174407.

OSMRE is preparing an EA to evaluate the environmental impacts resulting from the Project, pursuant to the requirements of the National Environmental Policy Act of 1969 (NEPA). The CRM is located approximately 15 miles south-southeast of Gillette, Wyoming. The CRM uses a combination of dragline and truck shovel mining methods. The amount of remaining recoverable federal coal authorized for removal within the currently approved federal mining plan is approximately 232.6 million tons (Mt). The Project proposes to add approximately 569.1 acres and 55.77 Mt of federal coal to the approved federal mining plan. The annual production rate used to calculate the environmental impacts resulting from the Proposed Action will be 20 million tons per year (Mtpy), which is the estimated future annual production rate suggested by CMC and is below the maximum permitted production rate of 65 Mtpy set by WDEQ/AQD air quality permit MD-9943. CRM started operation in 1976 and the mine will continue to operate until 2027 under the current, approved mining plan. Using the estimated 20 Mtpy production rate, the Project would extend the life of the mine by approximately 2.8 years, to 2030.

The EA will update, clarify, and provide new and additional environmental information for the Project. 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. The ASLM will approve, disapprove, or conditionally approve the mining plan approval document within the mining plan decision document, as required under the Mineral Leasing Act of 1920.

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: Cordero Rojo Mine Amendment 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, Cordero Rojo Mine Amendment EA. Comments should be received or postmarked no later than September 5, 2016 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/CorderoRojoMineAmendment.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

August 4, 2016
Dear Stakeholders and Interested Parties,

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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: Cordero Rojo Mine Amendment EA
C/O: Logan Sholar,
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1999 Broadway, Suite 3320,
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http://www.wrcc.osmre.gov/initiatives/CorderoRojoMineAmendment.shtm.

Sincerely,

Marcelo Calle,
Manager
Field Operations Branch

APPENDIX B

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

Mailing List

Name	**Title**	
Tribes		
Ivan Posey	Chairman	Shoshone Business Council
Glenda Trosper	Director of Cultural Preservation	Eastern Shoshone Tribe
Richard Brannan	Chairman	Arapahoe Business Council
Eugene Little Coyote	President	Northern Cheyenne Tribal Council
Carl Venne	Chairman	Crow Tribal Council
John Yellow Bird Steele	President	Oglala Sioux Tribal Council
Roger Trudell	Chairman	Santee Sioux Tribal Council
Rodney Bordeaux	President	Rosebud Sioux Tribal Council
Ron His-Horse-Is-Thunder	Chairman	Standing Rock Sioux Tribal Council
Duane Big Eagle	Tribal Council Chairman	Crow Creek Sioux Tribe
Gordon Yellowman		Cheyenne-Arapaho Tribes of Oklahoma
Joshua Weston	President	Flandreau Santee Sioux Tribe
Joe Brings Plenty Sr	Chairman	Cheyenne River Sioux Tribal Council
Michael Jandreau	Chairman	Lower Brule Sioux Tribal Council
Alonzo Chalepah	Tribal Chairman	Apache Tribe of Oklahoma
Billy Evans Horse	Chairman	Kiowa Business Committee
Anthony Addison		Northern Arapaho Business Council
Wallace Coffey	Chairman Comanche Nation Tribe	
Federal, State, and Local Agencies		
		Advisory Council on Historic Preservation
Mitchell Leveratte	Division Chief	BLM WO320
Jamie Connell	State Director	BLM - Montana State Office
Duane Spencer		BLM Buffalo Field Office
Rhen Etzelmiller		BLM Casper Field Office
		BLM Library
Coal Coordinator		BLM Montana State Office
Todd Yeager		BLM Miles City Office
Coal Coordinator		BLM Wyoming State Office

Name	Title	
File Copy		BLM-Wyoming High Plains District Office
Stephanie Connolly	District Manager	BLM-Wyoming High Plains District Office
Don Sutherland		Bureau of Indian Affairs
		Campbell County Conservation District
		Campbell County School District 1
		Campbell County Board of Commissioners
Executive Director		Campbell County Econ Dev Corp
Louise Carter-King	Mayor	City of Gillette
		Congresswoman Cynthia M. Lummis
		Converse County Commission
Dr. Dan Espelan		Converse County School District #1
Kirk M. Hughes		Converse County School District #2
Paul W. Musselman		Converse County, Special Projects
Superintendent		Devils Tower National Monument
		Economic Analysis Division
Tom Langston		Gillette Dept of Comm Dev
Steve Bullock		Governor of Montana
Matt Mead		Governor of Wyoming
Eric Barlow		H03 Campbell/Converse
Dan Kirkbride		H04 Platte/Converse
Richard Cannady		H06 Converse
Scott Clem		H31 Campbell
Norine Kasperik		H32 Campbell
Michael Madden		H40 Johnson/Sheridan
Bill Pownall		H52 Campbell
Roy Edwards		H53 Campbell
Environmental Division		HQ-USAF/CEVP
Greg Julian		Mineral Management Service
Environmental Protection Specialist		National Park Service - Air Quality

Name	Title	
		NPS
		NPS - Air Quality
		NPS Air Resources Division
		NPS 2310
Bridget Hill		Office of State Lands and Investments
Mark Gordon		Office of the State Treasurer
Matt McKeown		Rocky Mtn Region Solicitor
Ogden Driskill		S01 Crook/Campbell/Weston
Dave Kinskey		S22 Sheridan/Johnson
Jeff Wasserburger		S23 Campbell/Converse
Michael Von Flatern		S24 Campbell
Jason Crowder		State Land Commissioner - State of Wyoming
Ralph Kingan	Mayor	Town of Wright
		US Army Corps of Engineers
		US Department of Energy
		US EPA
Conservation		US Fish & Wildlife Service
Ecological Services		US Fish & Wildlife Service
		US Geological Survey Water Resources Division
		US Senator John Barrasso
DeAnna Kay		US Senator Mike Enzi
Jason M. Ryan	Business Analytics Director	US Western Surface Operations
BLM Cooperator Lead		USDA-FS Douglas Ranger District
Wendi Chatman		UW Libraries
Mark Rogaczewski		WDEQ Land Quality Division
David Waterstreet		WDEQ Water Quality Division
Tim Stark		WY Dept of Transportation
Dave Spencer		WY Business Council/NE Region
		WY Dept of Employment Research & Planning

Name	Title	
Kelly Bott		WY DEQ Air Quality Division
Milward Simpson		WY Parks & Cultural Res Dept
Pat Tyrrell		WY State Engineer's Office
Sarah Needles		WY State Historic Pres Office
Section		Wyoming Dept of Agriculture
Scott Talbott		Wyoming Game and Fish Department
Kyle Wendtland		Wyoming LQD - DEQ
Al Minier	Chairman	Wyoming Public Service Comm
Harry LaBonde		Wyoming Water Dev Comm
Thomas A. Drean	Director	Wyoming State Geological Survey
Businesses and Individuals		
		Alpha Wyoming Land Company, LLC
Managing Editor		Associated Press
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
		Caballo Rojo, LLC
Jason Adrians		Casper Star Tribune
Amy M. Atwood		Center for Biological Diversity
John Trummel		Cloud Peak Energy
		Cordero Rojo Mine
		Defenders of Wildlife
Matt Adelman	Publisher	Douglas Budget
		Environmental Policy and Culture Program
		Fdn for N American Wild Sheep
Energy Reporter		Gillette News-Record

Name	Title	
Scott Child		Interwest Mining Company
Joe Mehl		Kiewit Mining Group Inc
Jim McLealand & Eric Bjordahl		M&K Oil Company Inc
Hal Quinn		National Mining Association
		National Wildlife Federation
		Natural Resources Defense Council
		Peabody Caballo Mining, LLC
Shannon Anderson		Powder River Basin Resource Council
Phil Dinsmoor		Powder River Coal Company
James Piccone		Resolute Wyoming
Peter Morgan		Sierra Club
Lecia	Craft	Thunder Basin Coal Company
Roger Miller	President	Trout Unlimited
Lance Fritz	President, CEO	Union Pacific Railroad
Taylor Jones		WildEarth Guardians
Mike Evers		WWC Engineering
Bill Schilling		Wyoming Business Alliance
Jonathan Downing		Wyoming Mining Association
Gary Wilmont		Wyoming Outdoor Council
Niels Hansen		Wyoming Stock Growers Assoc
Steve Kilpatrick		Wyoming Wildlife Federation
Amy Wallop-Hendrickson	Executive Director	Wyoming Wool Growers Assoc
Mike McCraken	Publisher	Wyoming-Tribune Eagle
Katie Parker		Yates Petroleum Corp et al
Norma L. Duvall Trust		
Kyle R. Larson		
Beverly J. Lawson Trust		
James F. Rourke, et al.		
Randy C. Greer		

Duvall Public Outreach (Scoping) Comments Summary

Comment Date	Comment Topic									
	Water Quality	**Air Quality**	**Wildlife**	**Level of NEPA/ NEPA Process**	**Reclamation/ Self Bonding**	**Climate Change/ Global Warming**	**Economy**	**Pro Mining**	**Notes**	**# of Comments**
8/23/2016								1		1
9/2/2016				1			1	1		1
9/5/2016	1	1		1	1	1				1
9/6/2016	1	1	1	1		1				1
	2	**2**	**1**	**3**	**1**	**2**	**1**	**2**		**4**

* Comments received over extended period

Public Outreach (Scoping) Comments Categorized by Key Resource Category

Comment Topic	**Count**	**Percent**
Pro Mining	2	14%
Level of NEPA/NEPA Process	3	21%
Economy	1	7%
Air Quality	2	14%
Wildlife	1	7%
Climate Change/ Global Warming	2	14%
Reclamation/ Self Bonding	1	7%
Water Quality	2	14%
Total	**14**	**100%**

Duvall EA Review Public Comments Summary								
Comment Topic								
Level of NEPA/ NEPA Process	**Climate Change**	**Permitting**	**Economy**	**Pro Mining**	**Against Coal Mining**	**Notes**	**# of Comments**	**# Commenters**
						WGFD has no concerns pertaining to this mining plan modification	0	1
			1	1		Campbell County Board of Commissioners requests OSM approval of the proposed action	2	1
						SEO noted that there is an updated CHIA (2017) for the area. Commenter has no concerns.	0	1
1	1	1			1	WildEarth Guardians stated that an EIS needs to be prepared and that previous comments from this commenter were not appropriately analyzed	4	1
1	1				1	Sierra Club letter contains multiple comments about GHG/climate change analysis/modeling and insists that an EIS is required	3	1
2	**2**	**1**	**1**	**1**	**2**		9	5

Duvall EA Substantive Public Review Comments and OSMRE Response

COMMENTER: WYOMING GAME AND FISH DEPARTMENT

Comment: The staff of the Wyoming Game and Fish Department (Department) has reviewed the proposed Environmental Assessment for the Cordero Rojo Mine Duvall Tract federal mining plan modification located in Campbell County. We have no terrestrial wildlife habitat or aquatic concerns pertaining to this mining plan modification.

Response: Noted

Revision: No changes made.

COMMENTER: CAMPBELL COUNTY BOARD OF COMMISSIONERS

Comment: Mr. Sholar, we respectfully request the Office of Surface Mining Reclamation and Enforcement approve the Proposed Action as outlined in the EA, Sign the FONSI and allow Cordero Rojo Mine to proceed with the Mining Plan Modification for Federal Coal Lease WYW174407.

Response: Noted

Revision: No changes made.

COMMENTER: WYOMING STATE ENGINEER'S OFFICE

Comment: Overall, findings from the 2017 CHIA indicate that there is no expected material damage to the hydrologic system outside of the permit area. These findings are consistent with the analysis provided in the EA and as such, there are no concerns on behalf of the WSEO. This comment is for informational purposed only.

Response: Noted

Revision: No changes made.

COMMENTER: WILDEARTH GUARDIANS

Comment 1: It appears that an EIS is required for numerous reasons, among them that the draft EA fails to demonstrate that the impacts will not be significant under the National Environmental Policy Act (NEPA).

To begin with, it appears that OSM is attempting to tier its Environmental Assessment (EA) the 2007 Maysdorf coal lease final EIS and the 2009 South Gillette Area Coal Lease Applications Final

EIS, and in doing so avoid preparing its own EIS or supplemental EIS. This is not supported by interior Department NEPA regulations at 43 C.F.R § 46.140. These regulations state that: An environmental assessment may be prepared, and a finding of no significant impact reached, for a proposed action with significant effects, weather direct, indirect, or cumulative, if the environmental assessment is tiered to a broader environmental impact statement which fully analyzed those significant effects.

43 C.F.R § 46.140(c). Here, the EISs that will be tiered to, namely the 2007 Maysdorf coal lease EIS and 2009 South Gillette Area Coal Lease Applications EIS, did not fully analyze the significant impacts of mining the lease. it did not address the impacts of mining to current National Ambient Air Quality Standards (NAAQS), it did not address the fact that current OSM regulations fail to appropriately limit blasting emissions in order to protect public health and safety, it did not address new sage grouse management requirements, it not [sic] address new information regarding climate impacts and the need to fully quantify the greenhouse gas emissions that would result from mining and consuming the coal produced from the lease, it did not address the social cost of carbon related to the mining of the lease, among other impacts.

Response 1: The determination of significance is based on the context and intensity as defined by CEQ regulations 40 CFR 1508.27. The context and intensity of the direct, indirect, and cumulative impacts to all resources are described in the EA in Chapter 4, and the rationale for the conclusions reached is provided. For the reasons described in the FONSI, OSMRE has determined that there would be no significant impacts resulting from the Proposed Action. Therefore, an EIS is not required under for the Proposed Action.

The EA analyzes the direct and indirect effects on climate change from greenhouse gas emissions and, as discussed in section 4.4 of this EA, concludes the effects would be moderate and short-term. The EA addresses impacts to NAAQS in Section 4.4 and determined the effects to be moderate and short term. The EA conforms to current OSM regulations on blasting emissions. The EA discloses potential impacts to greater sage-grouse in Sections 3.3.3 and 4.10.3 concluding impacts would be moderate and short-term. The EA provides OSMRE's rationale for not conducting a social cost of carbon analysis in Section 4.4.5.1.

Revision: Section 4.4.5.1 has been revised to clarify why a social cost of carbon analysis was not utilized for this NEPA evaluation.

Comment 2: …it does concern us that the agency has not appropriately analyzed and assessed a number of potentially significant impacts that were identified by WildEarth Guardians in previous comments. Importantly, the EA fails to analyze air quality impacts, particularly impacts to the 1-hour nitrogen dioxide NAAQS and 2015 8-hour ozone NAAQS, fails to analyze and assess the impacts of similar and cumulative actions, particularly in terms of climate impacts, and fails to appropriately analyze and assess carbon costs in terms of the social cost of carbon.

Furthermore, OSM inappropriately rejected analyzing in detail alternatives that were recommended by WildEarth Guardians in previous comments, including an alternative that provides for alternative mining levels, and alternative that requires the use of equipment that

produces less or no emissions, such as natural gas-fired vehicles and machinery and electric machinery powered by solar panels or other renewable energy sources, and an alternative or alternatives that mitigate greenhouse gas emissions associated with the proposed mining.
Overall, it simply appears that WildEarth Guardians previously submitted comments on OSM's proposed mining plan were mostly ignored. We request the agency consider and respond to our comments and explain to the American Public why it believes that approval of the proposed is wholly justified.

Response 2: The Duvall EA presents historic emission data for both the 1-hour NO_2 and 8-hour O_3 NAAQS in Section 3.1.4.2, and impacts analysis in Section 4.4.2. The EA analyzes the direct and indirect effects on climate change from greenhouse gas emissions and, as discussed in Section 4.4 of this EA, concludes the effects would be moderate and short-term. The EA provides OSMRE's rationale for not conducting a social cost of carbon analysis in Section 4.4.5.1.

OSM considered the alternatives suggested by WildEarth Guardians (low or no pollutant emitting equipment and air quality mitigation measures) in the Duvall EA in Section 2.1.3. The suggested alternatives were eliminated from detailed analysis because OSMRE determined they did not meet the agency's purpose and need.

Section 1.3 of the EA provides OSMRE's rationale for the purpose and need for the Proposed Action.

Revision: Section 4.4.5.1 has been revised to clarify why social cost of carbon was not utilized for this NEPA evaluation.

COMMENTER: SIERRA CLUB

Comment 1: OSM must analyze and disclose the reasonably foreseeable direct, indirect, and cumulative climate impacts of the proposed mining, and evaluate the "significance" of these impacts. 40 C.F.R. §§ 1508.7, 1502.16.

OSM cannot attempt to meet this obligation merely by comparing project level carbon dioxide emissions to national greenhouse gas emissions. Here, OSM quantified the 34.3 million tons of greenhouse gas emissions (in CO_2-e) that would result from mining, shipping, and burning Cordero Rojo coal each year. Draft EA at 4-17, T.4-7. OSM then concluded that "[b]cause emissions would . . . represent only 0.59 percent of the projected 2020 U.S. CO_2 emissions, impacts would be potentially detectable but slight." Draft EA at 4-16.

This limited approach fails to provide the public and decision-makers with meaningful information on climate change and fails to follow clear instruction from the Council on Environmental Quality (CEQ), which promulgates NEPA regulations and guidance. In August 2016, the CEQ issued guidance to assist federal agencies in analyzing climate impacts of their actions under the National Environmental Policy Act (NEPA).2 Although the CEQ Climate Guidance has been "withdrawn for further consideration," 82 Fed. Reg. 16,576 (April 5, 2017), the underlying requirement to consider climate change impacts under NEPA has not changed.

OSM's approach to evaluating the significance of the climate impacts of its decision is precisely the kind of limited analysis that CEQ specifically directed agencies not to do:

Therefore, a statement that emissions from a proposed Federal action represent only a small fraction of global emissions is essentially a statement about the nature of the climate change challenge, and is not an appropriate basis for deciding whether or to what extent to consider climate change impacts under NEPA. Moreover, these comparisons are also not an appropriate method for characterizing the potential impacts associated with a proposed action and its alternatives and mitigations because this approach does not reveal anything beyond the nature of the climate change challenge itself: the fact that diverse individual sources of emissions each make a relatively small addition to global atmospheric GHG concentrations that collectively have a large impact.

CEQ Climate Guidance at 11 (emphasis added). OSM cannot comply with NEPA merely by comparing the carbon dioxide emissions from its proposal with national levels of greenhouse gas emissions. OSM has the means to provide the public and decision-makers with meaningful information, and OSM must do so before it approves the proposed mine expansion. As explained below, OSM has the tools that would allow it to evaluate both the amount and impact of greenhouse gas emissions that will flow from its decision to authorize the mining of an additional 55.8 million tons of federally owned coal.

Response 1: OSMRE has determined that the analysis of potential impacts resulting from direct and indirect greenhouse gas emissions is adequate. The 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 4.4.4.1 of the EA. The EA concludes that the potential effects of greenhouse gas emissions on climate change would be moderate and short-term.

Comment 2: OSM's EA entirely fails to address the key climate question: whether there is a measurable difference in greenhouse gas emissions between approving and rejecting this 55.8 million ton mine expansion. OSM must answer this question in order to make an informed decision here. Without such an answer, neither OSM nor the public can adequately distinguish between the climate impacts of the Action and No Action alternatives. OSM's current approach quietly dodges responsibility for any contribution to the climate problem. But NEPA requires federal agencies to study and disclose the effects of their decisions; it does not permit them to leave key questions silently unanswered. Quantifying emissions from the fifth largest coal mine in the U.S. is not enough. Because OSM could answer this fundamental question about the effects of its decision, but has not done so, NEPA demands more. By not even attempting to answer the key environmental question, OSM has failed to take the hard look that NEPA requires.

There is no doubt that agencies must provide a clear basis for choice among alternatives, and in particular between the climate impacts of Action and No Action alternatives. 42 U.S.C. §§ 4332(2)(C), 4332(2)(E), and 40 CFR §§ 1502.14(f), 1508.9(b). In the context of climate change, OSM must at least analyze and disclose the difference in greenhouse gas emission levels between alternatives. Among other clear directives, CEQ reaffirmed the bedrock principles that an agency

must present its climate analysis "in clear terms and with sufficient information to make a reasoned choice between no action and other alternatives" and that it is the agency's obligation to "ensure the professional and scientific integrity" of its analysis. CEQ Climate Guidance at 10 (citing 40 CFR § 1500.1, 1502.24).

Here OSM admits that in 2014, 98 percent of coal from Wyoming was used to generate electricity by burning it in coal-fired power plants. Draft EA at 4-18. OSM quantifies carbon dioxide emissions that will result from mining, shipping, and burning the Cordero Rojo mine coal[3]. Yet OSM never addresses whether approving or rejecting the 55.8 million tons of coal at stake here would change those downstream greenhouse emissions from coal-fired power plants. Instead, OSM dodges the issue by dating that: that should be signed to the coal producer. In addition, there is no certainty that GHG emissions at power plants would actually be reduced if the federal coal associated with the Proposed Action was not mined, given that the power plants supplied by CMC have alternative sources for coal, and the CRM also has non-federal coal reserved that could be mined (see Draft EA at 4-19).

OSM's dodge is legally untenable. As explained below, this supposed uncertainty is the result of OSM's refusal to study the issue. OSM is well aware that it has the tool to study the marked effects of its decisions since it has participated as a cooperating agency in at least one of such study, discussed later in these comments.

Moreover, OSM here expressly adopts the 2009 South Gillette Final EIS prepared by BLM that purported to analyze the climate impacts of four coal mines in Wyoming, including the Cordero Rojo coal covered in this proposed mine plan amendment. Draft EA at 1-1.

The problem for OSM, and the public, is that the South Gillette FEIS - which OSM expressly adopts here - contains a deeply flawed view of how energy markets work and how changes in supply change those markets. In the South Gillette FEIS, BLM, and OSM as a cooperating agency, incorrectly assert that the decision to approve or reject the proposals, (which included the Cordero Rojo Mine expanded by this proposal), would have *no impact* on the amount of coal mined, coal burned, or carbon dioxide emitted.

According to the BLM analysis that OSM expressly adopts in this EA:

It is not likely that selection of the No Action Alternative would result in a decrease in U.S. CO_2 emissions attributable to coal-burning power plants in the longer term because there are multiple other sources of coal that, while not having the cost, environmental, or safety advantage, could supply the demand for coal beyond the time that [the mines] complete recovery . . . .BLM, South Gillette Area Coal LBA Tracts, Final Environmental Impact Statement, at 4-120 to 4-121 (2009). Not only did OSM explicitly adopt the 2009 FEIS analysis in this EA, it was a cooperating agency in that 2009 FEIS. Id. at inside cover page. Cordero Rojo Draft EA at 1-1.

Response 2: Section 4.4.4 of the EA discloses 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 2.8 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 2.8 years. While annual CO2e emissions would remain the same as the Proposed Action for approximately 11.6 years, the LOM CO_2e emissions would decrease by approximately 22 percent as a result of the No Action Alternative, based on 2.8-fewer years of combustion of CRM coal.

OSMRE is tiering to the Maysdorf 2007 EIS and the SGAC 2009 EIS pursuant to CEQ regulations 40 CFR 1502.20 as described in Section 1.1 of the EA..

Revision: No changes made.

Comment 3: The assumption – that if OSM were to reject the proposal in favor of the No Action alternative, other coal mines would simply ramp up production to completely replace all 55.8 million tons of Cordero Rojo coal in the market – defies the most basic understanding of market economics, lacks any support, and fails to meet the standard of professional analysis that NEPA demands. Simply put: supply and demand matter. Nor does OSM state that the mine has sufficient non-federal reserves that are accessible without the proposed modification to replace the additional 20 million tons per year added by this proposal or the 55.8 million tons over the life of the project. OSM does not get to ignore basic economic principles or remain ignorant of their effects simply because it would prefer not to own the climate effects of its decision to approve more than 55.8 million tons of coal mining and the resulting coal combustion. Under NEPA, agencies have a duty to "insure the professional integrity" of the analyses in an EIS, 40 C.F.R. § 1502.24, and must present "high-quality" information and "[a]curate scientific analysis." 40 C.F.R. § 1500.1(b). OSM's adoption of the flawed "perfect substitution" assumption is illogical and unsupported, and its refusal to correct this error by adequately studying the market effects using available tools violates NEPA.

In the U.S. energy market – where coal, natural gas, wind, solar, and nuclear all compete for market share, where utilities can choose among these competing options on an on-going basis, and where utilities and grid operators can quickly alter the rates at which these commodities are utilized – price, supply, and demand interact in predictable ways. Although BLM and OSM assert that other coal mines "could supply the demand" if it were to reject the Cordero Rojo proposal, that statement fundamentally misunderstands how supply and demand works.

Economic demand is not a fixed threshold that suppliers of a commodity will necessarily rise to meet; it is instead a relationship among economic parameters that ultimately lead to certain levels of consumption.[4] As you restrict the supply of a good, price increases, and this in turn affects demand. As explained by Judge Posner, these "straightforward, intuitive premises" dictate that "[i]f quantity falls, price will rise . . . [i]f price rises, quantity falls because consumers buy less of the good."[5] In the energy context, that means that if OSM, BLM, or other federal agencies restrict the supply of coal, coal prices will increase. This increase in coal price will cause some utilities to switch from coal to a cheaper alternative. Because switching from coal to anything else – natural gas, wind, solar, geothermal or nuclear energy, etc. – results in decreased carbon dioxide emissions, this fuel switching results in quantifiable decreases in greenhouse gas emissions.

Response 3: Section 2.1.2 of the EA discusses the No Action Alternative against which the Proposed Action is compared. Under the No Action Alternative, ASLM would not approve the 2016 federal mining plan modification request described above under the Proposed Action. Under this alternative, the CRM would mine its remaining 232.6 Mt of recoverable federal coal reserves within the existing CRM leases in approximately 11.6 years at an average production rate of approximately 20 million tons per year (Mtpy).

The No Action Alternative included in this EA compares the potential environmental and economic consequences of not mining the Duvall tract, under the assumption that the additional coal within federal coal lease WYW174407 tract would not be mined in the foreseeable future if the No Action Alternative is selected. Under the No Action Alternative scenario, CMC would be limited to recovering the remaining federal coal reserves associated with federal coal leases WYW8385, WYW23929, WYW154432, and WYW174407 and coal within state and private leases. All of the federal coal included in the No Action Alternative would continue to be shipped to 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 the Duvall tract.

Revision: No changes made

Comment 4: As noted, OSM neither identifies nor answers the key environmental question posed by its consideration of the Cordero Rojo proposal. But NEPA does not allow OSM to simply stick its head in the sand and remain willfully ignorant of the environmental effects of its decision. NEPA affirmatively requires "reasonable forecasting," and requires agencies to provide information that is "essential to a reasoned choice among alternatives," where the cost of obtaining the information is not exorbitant. 40 C.F.R. § 1502.22(a).

Here OSM chose not to provide any information on relevant market factors that might help explain why OSM believes in this perfect substitution theory. For example, OSM provided no information comparing Cordero Rojo coal prices to the prices and availability of other sources of coal. OSM provided no information on shipping prices, existing reserves, sulfur or heat content of other sources of coal. OSM provided no mention of the relationship between supply, price and demand in the coal market, which are crucial pieces when evaluating the market effect of a decision to approve hundreds of millions of tons of federal coal mining, and must be evaluated by OSM here.

Notably, OSM's analysis here directly contradicts the approach that CEQ recommended agencies take in looking at climate impacts. CEQ's Climate Guidance, which articulated then (and still) controlling obligations under NEPA statute and regulations, specifically instructed agencies to compare the greenhouse gas emissions levels between alternatives in agencies' NEPA reviews:

When considering GHG emissions and their significance, agencies should use appropriate tools and methodologies for quantifying GHG emissions and comparing GHG quantities across alternative scenarios.

…[A]n agency should compare the anticipated levels of GHG emissions from each alternative – including the no-action alternative – and mitigation actions to provide information to the public and enable the decision maker to make an informed choice.

CEQ Climate Guidance at 10, 15 (emphasis added).

Moreover, CEQ directs federal agencies to use the tools available to conduct the necessary study in order to distinguish between the climate impacts of various project alternatives:

When data inputs are reasonably available to support calculations, agencies should conduct GHG analysis and disclose quantitative estimates of GHG emissions in their NEPA reviews. These tools can provide estimates of GHG emissions, including emissions from fossil fuel combustion and estimates of GHG emissions and carbon sequestration for many of the sources and sinks potentially affected by proposed resource management actions.
CEQ Climate Guidance at 12.

In correcting its error here, OSM cannot simply assert that emissions differences between Action and No Action alternatives would be uncertain. That sort of dodge is belied by the fact that these market and climate effects do not need to be uncertain, as evidenced by DOI's statement that it will develop and use models to answer this question going forward. This question is only uncertain because federal agencies have often refused to do the necessary study. In fact, there are multiple energy-economy models that could supply OSM with the projected levels of emissions in comparing the Action and No Action alternatives for 55.8 million tons of coal at issue here. These tools are already widely used by private parties and federal agencies to evaluate market effects of agency proposals in the coal mining and energy sectors.

For example, OSM's sister federal agency, the Department of Energy, has a computer model created by the EIA that has been in use since 1994, and it could be utilized by OSM here to undertake precisely the kind of analysis that would be useful to decision-makers. EIA's National Energy Modeling System (NEMS) is an energy-economy model that projects future energy prices, supply, and demand and can be used to isolate variables such as changes in coal supply and variations in delivered coal price.[6]

Similarly, ICF International's Integrated Planning Model has been used to evaluate these types of market responses to numerous federal proposals in recent years. Recent examples include, but are not limited to the following projects: EPA, Clean Power Plan; State Department, Keystone XL Pipeline; Surface Transportation Board, Tongue River Railroad; U.S. Forest Service, Colorado Roadless Rule; Washington Department of Ecology, Millennium Bulk Export Terminal.

Response 4: Section 4.4.4 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 2.8 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 2.8 years. While annual CO2e emissions would remain the same as the Proposed Action for approximately 11.6 years, the LOM CO_2e

emissions would decrease by approximately 22 percent as a result of the No Action Alternative, based on 2.8-fewer years of combustion of CRM coal.

Revision: No changes made

Comment 5: Courts have long recognized the connection between market impacts and environmental effects, and have set aside agency decisions for violating NEPA's "hard look" mandate where the agency misunderstood basic economic principles or a third-party's economic report. Both the Eighth Circuit, *Mid States Coal. for Progress v. Surface Transp. Bd.*, 345 F.3d 520, 550 (8th Cir. 2003), and more recently the District of Colorado, *High Country Conservation Advocates v. U.S. Forest Serv.*, 52 F.Supp. 3d 1174, 1197-98 (D.Colo. 2014) have rejected similar unsupported, "illogical" assumptions of perfect substitution in essentially identical contexts. As the Eight [sic] Circuit explained:

[T]he proposition that the demand for coal will be unaffected by an increase in availability and a decrease in price . . . is illogical at best. The increased availability of inexpensive coal will at the very least make coal a more attractive option to future entrants into the utilities market when compared with other potential fuel sources, such as nuclear power, solar power, or natural gas. . . . [The railroad] will most certainly affect the nation's long-term demand for coal.

Mid-States Coal. for Progress v. STB, 345 F.3d at 549. The Eighth Circuit then concluded that even if the "extent" of the increase in coal use was not reasonably foreseeable, the "nature" of the effect was, and that in this circumstance, "the agency may not simply ignore the effect." Id. (citing 40 C.F.R. §1502.22).

The Forest Service's error in High Country is even more on point. The Forest Service in High Country, like BLM and OSM here, argued that "if the coal does not come out of the ground in the North Fork consumers will simply pay to have the same amount of coal pulled out of the ground from somewhere else—overall [greenhouse gas] emissions from combustion will be identical under either scenario." 52 F.Supp. 3d 1174, 1197-98 The court in High Country held that the Forest Service's FEIS was deficient, concluding that the increased supply made possible by the Forest Service's decision would "impact the demand for coal relative to other fuel sources" and that "[t]his reasonably foreseeable effect must be analyzed." Id. at 1198.
Other courts have similarly invalidated agency decisions that fail to take into account the connection between economic information and environmental impacts. For example, the Ninth Circuit invalidated a timber sale because Forest Service misinterpreted economic reports supporting the sale, explaining that, "[i]naccurate economic information may defeat the purpose of an EIS by 'impairing the agency's consideration of the adverse environmental effects' and by 'skewing the public's evaluation' of the proposed agency action." *NRDC v. U.S. Forest Serv.*, 421 F.3d 797, 811 (9th Cir. 2005) (quoting *Hughes River Watershed Conservancy v. Glickman*, 81 F.3d 437, 446-48 (4th Cir. 1996)). See also *Nat'l Wildlife Fed'n v. Nat'l Marine Fisheries Serv.*, 235 F.Supp.2d 1143, 1157 (D. Wash. 2002) ("An EIS that relies upon misleading economic information may violate NEPA if the errors subvert NEPA's purpose of providing decision makers and the public an accurate assessment upon which to evaluate the proposed project.").

Response 5: Section 4.4.4 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 2.8 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 2.8 years. While annual CO2e emissions would remain the same as the Proposed Action for approximately 11.6 years, the LOM CO_2e emissions would decrease by approximately 22 percent as a result of the No Action Alternative, based on 2.8-fewer years of combustion of CRM coal.

Revision: No changes made

Comment 6: In addition to federal courts, the Secretary of Interior has recognized that opening up more federal lands for fossil fuel production could not only affect the amount of coal produced, but also the amount of wind and solar generation in our energy grid. That is why, in ordering a comprehensive study of the climate impacts of the federal coal program—since cancelled for political purposes—then-Secretary Jewell directed the Department of Interior to evaluate "how the administration, availability, and pricing of Federal coal affect regional and national economies (including job impacts), and energy markets in general, including the pricing and viability of other coal resources... and other energy sources."[7] The Secretary further directed the Department to study, "[t]he impact of possible program alternatives on the projected fuel mix and cost of electricity in the United States".[8]

More recently, in releasing a scoping report on the now-cancelled PEIS process, the Department of Interior – which OSM is a part of – acknowledged that the climate impacts of various alternatives for the federal coal leasing program are "largely contingent on the degree to which the substitute fuel sources are less carbon intensive (e.g., natural gas-fired generation or renewable generation) as opposed to similarly carbon intensive (e.g., non-Federal coal)."[9] The Department acknowledged that this issue has not yet been studied and evaluated by either the Department or BLM, explaining that "BLM will develop and use economic models to assess these substitution dynamics and the impact they have on the costs and benefits of any changes."[10] Since the Department of the interior has acknowledged this is a key issue in determining the climate impact of leasing federally-owned coal, clearly stated its intention to study the market effects, and then abruptly cancelled the study for purely political reasons, OSM must use the available tools to study the market effects of its decision to approve the proposed mine plan modification.

Response 6: OSMRE is aware of the programmatic federal coal lease EIS, and since the analysis identified by the commenter was not completed, OSMRE is unable to review any findings in relation to our EA. Section 4.4.5.1of the EA provides OSMRE's rationale for not conducting a social cost of carbon analysis.

Revision: Section 4.4.5.1 has been revised to clarify why social cost of carbon was not utilized for this NEPA evaluation.

Comment 7: Critically, every time these robust modeling tools discussed above have been used, they have documented market impacts. Most on point, the U.S. Forest Service recently documented impacts to wind and solar generation of a proposal that would open up approximately 170 million tons of coal on otherwise protected public lands in Colorado. OSM should be well aware of this analysis, as OSM was a cooperating agency in that NEPA review.

In its analysis, using ICF's Integrated Planning Model (IPM) version 5.13, which most closely matches our current regulatory setting where the Clean Power Plan has not been implemented, the Forest Service concluded: "the mix of energy sources used to generate electricity changes, in response to increases in North Fork Coal Mining Area coal production," resulting in quantifiable decreases in renewable generation (measures in megawatt hour) as a result of the proposal.[11] The Forest Service explained that "[t]hese shifts in the mixtures of energy used to generate electricity, as well as the production of different types of energy will change carbon dioxide emissions.[12] The Forest Service concluded that the proposal would result in an additional 130 million tons of greenhouse gas emissions over the life of the proposal, when compared to the No Action alternative based on IPM version 5.13.13

Understanding the market and climate impacts of a decision to approve or reject massive coal mine expansions like the one at issue here is essential to making an informed decision. In order to comply with NEPA, OSM must either use available tools to provide that essential information or explain why it could not do so. OSM has done neither. Under the applicable regulations, the agency "shall" explain in its EIS (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. 40 C.F.R. § 1502.22(b).

In order to fully understand the climate impacts of its proposal, OSM must use one of the available climate energy models to evaluate market changes. Without using available tools to compare the greenhouse gas emission levels between Action and No Action, OSM cannot make an informed decision or take the hard look NEPA requires.

Response 7: Section 4.4.4 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 2.8 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 2.8 years. While annual CO2e emissions would remain the same as the Proposed Action for approximately 11.6 years, the LOM CO_2e emissions would decrease by approximately 22 percent as a result of the No Action Alternative, based on 2.8-fewer years of combustion of CRM coal.

Section 4.4.5.1of the EA provides OSMRE's rationale for not conducting a social cost of carbon analysis.

Revision: Section 4.4.5.1 has been revised to clarify why a social cost of carbon analysis was not conducted for this NEPA evaluation.

Comment 8: In the EA, OSM asserts—incorrectly—that it simply does not have the means to assess the climate impact of the greenhouse emissions it quantifies.

Although the effects of GHG 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 possible to associate any particular action with the creation or mitigation of any specific climate-related environmental effects.

EA at 4-18. Not only is this statement patently untrue, it is boilerplate stock language used by OSM in other NEPA reviews. See, e.g. OSM Spring Creek Draft Environmental Assessment at 4-15 (2016); OSM, Belle Ayr Draft Environmental assessment at 4-24 (2017) (repeating quoted language verbatim).
OSM's assertion that it does not have tools to assess climate impacts from its decision is incorrect. The social cost of carbon – a tool created by federal agencies and generally accepted in the scientific community – could be used here, as it would allow OSM to quantify and disclose the harm caused by that the project's carbon dioxide emissions. The social cost of carbon provides a metric for estimating the economic damage, in dollars, of each incremental ton of carbon dioxide emitted into the atmosphere.[14]

NEPA specifically requires federal agencies to analyze and disclose the environmental effects of their actions, including "aesthetic, historic, cultural, economic, social, or health" impacts. 40 C.F.R. § 1508.8. Where "information relevant to reasonably foreseeable significant adverse impacts cannot be obtained because the overall costs of obtaining it are exorbitant or the means to obtain it are not known," NEPA regulations direct agencies to evaluate a project's impacts "based upon theoretical approaches or research methods generally accepted in the scientific community." 40 C.F.R. § 1502.22(b)(4). The social cost of carbon is based on generally accepted research methods and years of peer-reviewed scientific and economic studies. It is a simple tool that is easy for federal agencies to use and easy for the public to understand. Putting a dollar figure on each ton of CO_2 emitted as a result of a federal project places climate impacts in a context that both decision makers and the public can readily comprehend. The social cost of carbon is backed by years of peer reviewed scientific and economic research, it is designed to be updated to reflect the most up-to-date information, and it has already been used by federal agencies in both rulemaking decisions and project-level reviews under NEPA.

Although President Trump recently disbanded the IWG and rescinded its Technical Support Document – he did so on political, not scientific grounds.[15] The President's Executive Order directed federal agencies to refer to OMB Circular A-4 when evaluating greenhouse gas emission impacts from federal regulations. Circular A-4 instructs agencies to account for both the costs and benefits and to account for global impacts when evaluating impacts "likely to have effects" outside the U.S.[16] The social cost of carbon allows OSM to evaluate those impacts here. There is nothing about the science behind the social cost of carbon that makes it more applicable in the regulatory setting than to project-level NEPA processes, and thus its specific application in the regulatory context does not detract from its utility here. Similarly, OSM could simply use one of

the DICE, PAGE, or FUND models that the social cost of carbon is based on, as nothing in federal policy undermines the validity or application of those models.

Moreover, federal agencies' obligation to analyze the costs associated with greenhouse gas emissions through NEPA was directly affirmed by the court in *High Country Conservation Advocates v. U.S. Forest Service*, 52 F. Supp. 3d 1174 (D.Colo. 2014). In its decision, the court identified the social cost of carbon protocol as a tool to "quantify a project's contribution to costs associated with global climate change." Id. at 1190. After rejecting the agency's excuses for not using the tool, the court concluded: "[t]he critical importance of [climate change] . . . tells me that a 'hard look' has to include a 'hard look' at whether this tool, however imprecise it might be, would contribute to a more informed assessment of the impacts than if it were simply ignored." Id. at 1193. The same is true here.

Nor can the agency tout the benefits of coal development without similarly disclosing the costs. See 40 C.F.R. § 1502.23. Here, as is often the case, federal agencies reviewing coal leasing proposals tout the economic benefits of the project—such as job creation or local taxes—while failing to discuss the costs. EA at Appendix E-14. OSM quantified "future revenues added by the [Cordero Rojo] Tract," including federal royalties, three different types of tax revenues, bonus bid payments, contributions to abandoned mine land funds. Id. Yet, as noted, OSM refused to make any attempt to quantify costs associated with its proposal. Although NEPA does not require agencies to prepare cost-benefit analyses, this type of misleading and one-sided analysis is expressly forbidden. See *Hughes River Watershed Conservancy v. Glickman*, 81 F.3d 437, 446-47 (4th Cir. 1996) ("it is essential that the EIS not be based on misleading economic assumptions"); *Sierra Club v. Sigler*, 695 F.2d 957, 979 (5th Cir. 1983) (agency choosing to "trumpet" an action's benefits has a duty to disclose its costs).

Finally, if OSM truly believes that other mines would simply ramp up production to fully replace Cordero Rojo coal in the market, then OSM cannot simultaneously refuse to apply that same logic to its evaluation of the economic benefits of its decision. Essentially, OSM discounts the climate harms as 'likely to happen anyway' but treats the benefits as outright additions. OSM does not acknowledge that, under its theory, for example, the taxes and royalties it touts as benefits of its decision would largely accrue anyway since production would just occur elsewhere. Nor does OSM acknowledge that mine employment would remain the same, if, as it asserts may happen, Cordero Rojo simply supplies the same amount of coal from non-federal reserves at the mine. OSM wants to take responsibility for the benefits while disavowing responsibility for the harms. This misleading and internally-inconsistent analysis must be discarded.

None of OSM's excuses for not using the social cost of carbon have any merit. First, OSM asserts that it cannot use the social cost of carbon because there is no consensus of what percentage of power plant greenhouse gas emissions to assign to coal producers. Draft EA at 4-19. Fundamentally, this statement does not address the central purpose of the social cost of carbon: to better inform agencies and the public of the impact of the proposed action. As the court in High Country stated, key issue for purposed of NEPA is "whether this tool, however imprecise it might be, would contribute to a more informed assessment of the impacts than if it were simply ignored." High Country, 52 F. Supp. 3d at 1193. The notion that OSM may not want to assign all off [sic] the social costs of emissions from power plants to the mine operator - and thus to OSM's

decision to approve a mine plan modification - does not mean that the portion to assign to the mine operator and to OSM is zero. Moreover, as explained next, OSM does not need to assign a portion of power plan emissions to coal producers in order to use the social cost of carbon. Instead, OSM could determine how its decision (compared to the No Action alternative) would affect coal combustion levels, and use that number as the necessary inputs for calculating the social cost of carbon.[17]

Second, as noted above, OSM declined to use the social cost of carbon because there is "no certainty" that power plant emissions would be reduced by OSM selecting the No Action alternative here. Draft EA at 4-19. That lack of certainty, as explained above, is the result of OSM's refusal to study this issue. OSM cannot reasonably claim "uncertainty" as an excuse for not using a tool like the social cost of carbon because OSM could end any uncertainty by using one of several available models to first answer the market effect question on the quantity of CO_2 emissions caused by OSM's approval of the mine plan modification, and then use those changes in the marketplace (i.e., changes in coal production and CO_2 emissions) to analyze the impact of those emissions on the environment.

Finally, OSM asserts that to "provide any meaningful insight, the projected social cost of carbon would need to be viewed in the context with other costs and benefits associated with the Proposed Action. Draft EA at 4-19. OSM never states that it couldn't provide those other costs and benefits. Indeed, it quantifies many of the purported economic benefits of the mine expansion, including taxes, employment, royalties, and bonus bid payments. Draft EA at Appendix E-14. Nor does OSM offer up anything to explain why offering partial benefits provided "meaningful insight" but providing partial costs would not. This excuse is simply another dodge so that OSM does not have to own up to the true climate costs of its decision to approve the mine plan modification that Cloud Peak wants.

Response 8: Section 4.4.5.1of the EA provides OSMRE's rationale for not conducting a social cost of carbon analysis.

Revision: Section 4.4.5.1 has been revised to clarify why a social cost of carbon analysis was not conducteded for this NEPA evaluation.

Comment 9: OSM must consider the urgent need to cut carbon emissions to combat climate change in accordance with our international commitments and scientific consensus regarding the urgent need to dramatically reduce greenhouse gas emissions in the very near term. One of the measuring standards available to the agency for analyzing the magnitude and severity of OSM-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 sever and irreparable harm to the biosphere and humanity. Utilizing carbon budgets would offer OSM a methodology for analyzing how the proposed mine expansion and the continued coal combustion from the Cordero Rojo [sic] may affect the country's ability to meet its national and international greenhouse gas emission reduction targets.

As the Department of Interior recently explained, a "central objective to the BLM's reform effort for the Federal coal program is consideration of the effect of the program on, and alternatives for alignment with, US climate goals." Department of Interior, Federal Coal Program Programmatic EIS Scoping Report at 6-13. The fact that President Trump ordered the Department of Interior to abandon that review on political grounds does not relieve OSM and other federal agencies of the obligation to take a hard look at the climate impacts of their decisions, including by examining how agency decisions align with U.S. climate objectives. Here OSM has made no attempt to align its decision with still-binding U.S. climate reduction goals, nor has OSM assessed the severity of its emissions by discussing the diminishing U.S. carbon budget.

NEPA regulations mandate that federal agencies, "shall discuss any inconsistency of a proposed action with any approved State or local plan and laws (whether or not federally sanctioned)," 40 C.F.R. § 1506.2(d), and require agencies to address "possible conflicts between the proposed action and the objectives of Federal, regional, State, and local (and in the case of a reservation, Indian tribe) land use plans, policies and controls for the area concerned." 40 C.F.R. § 1502.16(c).

In order to take the hard look at this issue as NEPA requires, OSM must acknowledge and address the extent to which the proposed action conflicts with our national emissions reduction goals and international climate commitments, including internationally-agreed upon carbon budgets.

Response 9: Section 4.4.4 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. OSMRE has determined that the existing analysis is adequate to inform the decisionmaker of potential impacts of the Proposed Action.

Revision: No changes made

Comment 10: In its short, five-page section on climate impacts, EA at 4-16 to 4-20, OSM fails to appreciate the urgency of climate change. OSM characterizes climate impacts associated with the Cordero Rojo Mine as "minor" and "detectable but slight." EA at 4-16. However, climate experts disagree with OSM: we cannot continue to simply wave off contributions to climate change simply because they represent a small part of a big problem. A coalition of prominent climate experts, policymakers, and corporate leaders warns in the top scientific journal Nature that keeping the global temperature rise below 2 °C, as set out in the Paris Climate Agreement, will be impossible without major changes in the next three years.[18,19] The Paris Climate Agreement remains legally binding to the United States and is an international commitment that will require urgent action before 2020 to honor. As explained in these recent studies, this timeline will make it possible to attain the United Nations Sustainable Development goals set out in 2015.[20] Pushing back the year of peak emissions just five years to 2025 will make it infeasible to transform the global economy in time to forestall the devastating impacts of climate change.[21]

Using climate models, scientists have estimated the quantity of allowable global emissions to remain within a global temperature increase of 2 °C or lower compared to pre-industrial temperatures.[22] This is our remaining global carbon budget, which has been estimated at around 1000 gigatons of CO_2 ($GtCO_2$),[23] or at most, 1050 $GtCO_2$ this century.[24] A lower bound for the

carbon budget has been estimated at only 150 $GtCO_2$, also over the next century.[25] By 2013, cumulative carbon emissions had amounted to 1970 $GtCO_2$.[26] In other words, when looking at cumulative carbon emissions since pre-industrial levels, we have less than one-third of aggregate carbon emissions remaining before we will see a 2 °C temperature rise, and this is the most conservative estimate, giving us only a 67% chance of reaching the goal according to the largest carbon budget estimate available.[27] In its EA, OSM failed to even mention the concept of a global carbon budget, nor the urgency of keeping global emissions within a strict carbon budget that is consistent with our international commitments.

The 1 °C of global warming humans have caused since the late 19th century has already led to appreciable and alarming impacts on the environment:

Global temperature and sea levels keep rising, reaching record highs once again in 2016. Global sea ice cover reached a record low, and mountain glaciers and the huge ice sheets in Greenland and Antarctica are on a trajectory of accelerating mass loss. More and more people are suffering from increasing and often unprecedented extreme weather events, both in terms of casualties and financial losses.[28]

Controlling global warming to a 2 °C increase is difficult enough, but in reality, keeping warming at or below 1.5 °C is ideal, since greater increases in temperature are associated with a higher chance of "crossing critical tipping points where major and largely irreversible changes…are triggered."[29] Achieving just the 2 °C target requires immediate action and leaves no room for continued coal leasing on federal lands.

Experts have made projections of where the world must be in 2020 to keep global temperature rise below 2 °C. Within the energy sector, all coal plants will need to be in the process of retirement, and no new coal plants can be approved.[30] Leasing a federal coal mine with climate impacts reaching to 2027 and beyond is inconsistent with where the United States must be by 2020 in order to meet our climate commitments. Our current global rate of carbon emissions is highly unsustainable. At our current rate of emissions of 39 $GtCO_2$ emitted each year, we could reach the lower bound for the world's estimated carbon budget in just four years, and the mid-point estimate would be reached within fifteen years.[31] Even the current intended Nationally Determined Contributions ("(I)NDCs") pursuant to the Paris Climate Agreement are insufficient to meet the 2 °C goal.[32,33]

Deliberate climate leadership is needed, and now. Scientific simulations have shown that to fulfill the Paris Climate Agreement, "the effort required to close the gap between current conditional (I)NDCs and the 2 °C goal [falls] solely to the G8 and China."[34] Moreover, experts indicate moving away from coal by 2020 is not only necessary but achievable, as demand for coal will have peaked by 2020.[35]

Most governments and investors increasingly realize that there is no room for new coal-fired power plants in the emissions budget implied by the Paris Agreement temperature limits: emissions from existing power plants alone would exceed the cost-optimal carbon budget by 114%. Most governments are also beginning to recognize that reliance on coal (and gas) exposes their economy to price volatility on the global coal markets and decreases their energy security.

These considerations, combined with increasing cost competitiveness of renewables, means that investment in new fossil fuel generation capacity is slackening off.[36]

Furthermore, the United States bears a disproportionately large share of the blame for anthropogenic climate change. The United States' historical emissions debt (the difference between how much we should have been emitting based on population size and actual emissions) is extremely large. In fact, since 1960, "[t]he United States is a clear leader among debtor countries, with historical CO_2 emissions that have consistently exceeded the world per-capita average" and carries the largest share of both carbon (CO_2) and climate (also including methane, nitrous oxide, and sulfur dioxide) debt.[37]

In terms of countries that bear the greatest responsibility for anthropogenic climate change, the United States easily tops the list. In the period from 1990–2010, the United States alone was responsible for 32% of global climate debt.[38] The country with the next greatest impact during the same period was Russia, which was responsible for only 10% of emissions, much lower by comparison.[39] In total, our carbon debt by the year 2013 surmounted 100 $GtCO_2$, compared to just 3.1 $GtCO_2$ owed by France.[40] In any future global discussions about who bears the responsibility for climate change, such as the costs of mitigation, the United States could be expected to pay a significant amount relative to other debtor nations,[41] potentially to climate creditor nations such as India.[42]

In the extreme case of the United States, [fully accounting for both past and future inequalities] would entail both: (1) at least a 90% reduction in emissions by 2050, relative to 2005; and (2) an additional accounting for the more than 150 Gt CO_2 carbon debt that will have accrued against the United States by that time. And neither of these conditions are trivial. The US EPA's own estimates of the social cost of carbon range vary widely, from $11 to almost $100 per tonne of CO_2 emitted, based on various assumptions of the future cost and discount rate of climate damages associated with emissions. Even at the very lowest end of this cost range, the United States' current cumulative carbon debt of 100 Gt CO_2 is valued at more than a trillion dollars.[43] Several other published studies have estimated the United States' portion of the global carbon budget based on various principles, each of which offers OSM a viable option for better evaluating the impact of the emissions from its decision to authorize the Cordero Rojo project. These studies allocate the remaining global carbon budget across countries based on factors including equity and economics. Estimates of the U.S. carbon budget reported by the four studies discussed below range from 34 $GtCO_2$ to 158 $GtCO_2$, depending on the temperature target used by the study (1.5°C versus 2°C), the likelihood of meeting the temperature target (50% or 66% probability), the equity principles used to allocate the global budget among nations, and whether a cost-optimal model was employed.

Using a non-precautionary 50% probability of limiting global warming to 2°C, Raupach et al. (2014) estimated the U.S. carbon budget at 158 $GtCO_2$ based on a "blended" approach of sharing principles for allocating the global carbon budget across nations.[44] The "blended" approach is midway between a non-equity "inertia" approach in which sharing is based on current emissions, and an "equity" approach in which sharing is based on population and provides for equal per-capita emissions across countries.

Using a more precautionary 66% probability of keeping warming below 2°C, Peters et al. (2015) estimated the U.S. carbon budget at 34 $GtCO_2$ under an equity approach and 123 $GtCO_2$ under an inertia approach.[45]

Similarly using a 66% probability of keeping warming below 2°C, Gignac et al. (2015) estimated the U.S. carbon budget at 78 to 97 $GtCO_2$, based on a contraction and convergence framework, in which all countries adjust their emissions over time to achieve equal per-capita emissions.[46]

Although the contraction and convergence framework corrects present emissions inequities among countries over a specified time frame, it does not account for inequities stemming from historical emissions differences. When accounting for historical responsibility, Gignac et al. (2015) estimated that the United States has an additional cumulative carbon debt through 2013 of 100 $GtCO_2$.

Du Pont et al. (2017) averaged across five IPCC-AR5 sharing principles (capability, equal per capita, greenhouse development rights, equal cumulative per capita, and constant emissions ratio) to estimate the U.S. carbon budget through 2100.47 Using a 66% probability of keeping warming below 2°C, du Pont et al. (2017) estimated the U.S. carbon budget at 104 $GtCO_2eq$ (equal to ~ 69 $GtCO_2$) based on a cost-optimal model. Du Pont et al. (2017) further estimated the U.S. carbon budget at 57 $GtCO_2eq$ (equal to ~ 38 $GtCO_2$) for a 50% chance of returning global average temperature rise to 1.5°C by 2100, which is the only target among the four studies just discussed that is consistent with the "well below 2°C" temperature target of the Paris Agreement.

Under any scenario, the remaining U.S. carbon budget consistent with limiting global average temperature rise to 1.5°C or 2°C is quite small and is rapidly being consumed. Keeping in mind considerations of both equity and future costs, the United States must place cutting CO_2 emissions as a pressing national priority to sustain its leadership role in the international landscape, which leaves no place for continued coal mine leasing on federal lands. OSM must take the threat of climate change seriously in light of the overwhelming research and evidence presented by climate experts. At a minimum, OSM must address this recent scholarship on the concept of carbon budgeting, which was not addressed by BLM in the 2009 South Gillette EIS or OSM's 2017 Draft EA, and evaluate how the direct and indirect greenhouse gas emissions associated with the Cordero Rojo project affect the remaining available carbon budget.

Response 10: Section 4.4.4 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. OSMRE has determined that the existing analysis is adequate to inform the decisionmaker of potential impacts of the Proposed Action.
Revision: No changes made

Comment 11: NEPA also requires a detailed analysis of "cumulative" effects, "the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions." 40 C.F.R. §§ 1508.7, 1508.25(c).

Here OSM improperly refused to even consider cumulative climate impacts. The sum total of its cumulative climate section reads as follows:

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.

Draft EA at 4-19.

This blatant dodge plainly violates NEPA. For example, OSM does not even acknowledge the cumulative impact of Cordero Rojo coal added to other coal mining in the Powder River Basin. Nor does OSM address other nearby mine plan modifications that OSM is currently considering, like the 220 million ton mine plan modification at the Belle Ayr Mine that was part of the same 2009 South Gillette FEIS that OSM tiers to here.

The impact of greenhouse gas emissions on climate change is precisely the kind of cumulative impacts analysis that NEPA requires agencies to conduct. *Ctr. for Biological Diversity v. Nat'l Highway Traffic Safety Admin.*, 538 F.3d 1172, 1217 (9th Cir. 2008). [T]he fact that climate change is largely a global phenomenon that includes actions that are outside of [the agency's] control . . . does not release the agency from the duty of assessing the effects of its actions on global warming within the context of other actions that also affect global warming. Id.

Analysis of cumulative impacts protects against "the tyranny of small decisions," *Kern v. Bureau of Land Mgmt.*, 284 F.3d 1062, 1078 (9th Cir. 2002), by confronting the possibility that agency action may contribute to cumulatively significant effects even where the impacts appear insignificant in isolation. 40 C.F.R. §§ 1508.7, 1508.27(b)(2). See *Grand Canyon Trust v. Fed. Aviation Admin.*, 290 F.3d 339, 342 (D.C. Cir. 2002) (evaluating the environmental consequences of a proposed action, the agency "must give a realistic evaluation of the total impacts and cannot isolate a proposed project, viewing it in a vacuum.").

Here OSM cannot simply punt because it thinks predicting impacts might be "difficult[]." EA at 4-23 [sic]. OSM may not want to add up the cumulative greenhouse gas emissions that result from its past, pending, and foreseeable future approvals for coal mining on public lands, but NEPA does not allow it.

Response 11: Section 4.4.5.2 of the EA includes a detailed discussion for the reasoning behind not including cumulative effects for GHG evaluations. Section 4.4.4 presents emissions related to the Proposed Action in the context of total U.S. emissions. OSMRE, where appropriate and not overly speculative, included reasonable forecasting as in the case with the Air Quality and Climate Change discussion in Chapter 4 allowing the decision maker to evaluate potential impacts associated with the Proposed Action using representative or predicted emissions.

No changes required

Revision: No changes made

Comment 12: NEPA requires OSM prepare a full Environmental Impact Statement (EIS) for the proposed mine expansion instead of the more limited EA and unsigned Finding of No Significant Impact (FONSI) it has prepared thus far. This proposal is massive – the 20 million tons of coal per year Cordero Rojo would generate would make it the fifth largest coal mine in the U.S. See supra note 1 and accompanying text. OSM's proposed course is legally insufficient. The agency must prepare an Environmental Impact Statement (EIS) to fulfill its duties under NEPA.

NEPA requires federal agencies to prepare an EIS rather than a more limited EA for any "major federal action[] significantly affecting the quality of the human environment." 42 U.S.C. § 4332(2)(C). Agencies must prepare an EIS if there are "substantial questions whether a project may have significant effect," *Blue Mountains Biodiversity Project v. Blackwood*, 161 F.3d 1208, 1212 (9th Cir. 1998), and an agency "cannot avoid preparing an EIS by making conclusory assertions that an activity will have only an insignificant impact on the environment." *Ocean Advocates v. U.S. Army Corps of Eng'rs*, 402 F.3d 846, 864 (9th Cir. 2004).

Here the direct, indirect, and cumulative impacts of coal mining and combustion associated with the proposed expansion will undoubtedly have a significant effect on the environment. The proposed expansion will assuredly result in the release of carbon dioxide into our atmosphere. When combined with other mine expansions, including those currently under evaluation by OSM, the proposal will undoubtedly result in hundreds of millions of tons of greenhouse gas emissions – making them significant by any measure.

A proposal may require an EIS if its effects are "likely to be highly controversial." 40 C.F.R. § 1508.27(b)(4). Increasing methane and carbon dioxide emissions by expanding coal mining into federal lands is particularly controversial at this time, as doing so may interfere with efforts to meet our international climate commitments and could make it impossible to keep global warming limits within manageable thresholds.

Response 12: The determination of significance is based on the context and intensity as defined by CEQ regulations 40 CFR 1508.27. The significance of the direct, indirect, and cumulative impacts to all resources is analyzed in the EA in Chapter 4, and the rationale for the conclusions reached is provided. For the reasons described in the FONSI, OSMRE has determined that there are no significant impacts. Therefore, an EIS is not required. As stated in the FONSI on pages 4 and 5, As a factor for determining within the meaning of 40 CFR 1508.27(b)(4) (whether or not to prepare a detailed EIS) "controversy" is not equated with "the existence of opposition to a use." *Northwest Environmental Defense Center v. Bonneville Power Administration*, 117 F.3d 1520, 1536 (9th Cir. 1997). The term 'highly controversial' refers to instances in which "a substantial dispute exists as to the size, nature, or effect of the major federal action rather than the mere existence of opposition to a use" *Hells Canyon Preservation Council v. Jacoby*, 9 F.Supp.2d 1216, 1242 (D. Or. 1998). The EA has analyzed the direct and indirect effects on and from climate change and, as discussed in section 4.4 of this EA, determined the effects to be moderate and short-term.

Revision: No changes made

APPENDIX C

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

Selection of Worst-Case Years – Redhorse Corporation

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

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

Off-site impacts are primarily affected by the magnitude of emissions from the mine, and the proximity of the emission sources to the ambient air boundary. The first worst-case modeling scenario was selected based on the mine year that had the maximum projected particulate matter emissions. From Table 5-1, in Redhorse 2016, the mine year with the highest projected PM_{10} emissions from Cordero Rojo Mine is mine year 2023. This mine year also has pit operations that are in close proximity to the western and eastern borders of the lands necessary to conduct mining. Therefore, mine year 2023 was selected as the first mine year for the modeling analysis.

Based on guidance from WDEQ personnel at a pre-application meeting held on May 16, 2016, one of the worst-case years selected should be based on the maximum projected cumulative PM_{10} emissions from all Middle Group mines and at least one of the one of the worst-case years should be within 5 years of the application submittal. An examination of projected emissions shown in the PM_{10} table on **page C-2** shows that mine year 2017 represents the highest cumulative PM_{10} emissions from the Middle Group mines and is also within 5 years. Therefore, mine year 2017 was selected as the second worst-case modeling scenario.

Mine year 2017 was also used for the NO_2 modeling analysis. These mine years represent high Cordero Rojo Mine and cumulative projected NO_X emissions. Mine year 2017 is 99 percent of the maximum cumulative NO_X emission year and mine year 2023 is 97 percent of the maximum Cordero Rojo Mine NO_X emission year (see NO_X table on **page C-2**).

Redhorse Corporation Cordero Rojo Mine and Regional Mines Annual PM_{10} Emission Summary (tpy)

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

[1] The Belle Ayr Mine plan includes mining through 2031
[2] The Caballo Mine plan includes mining through 2023
[3] The Coal Creek Mine plan includes mining through 2020

Redhorse Corporation Cordero Rojo Mine and Regional Mines Annual NO_X Emission Summary (tpy)

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

[1] The Belle Ayr Mine plan includes mining through 2031
[2] The Caballo Mine plan includes mining through 2023
[3] The Coal Creek Mine plan includes mining through 2020

APPENDIX D

CRM SPECIAL STATUS SPECIES SUMMARY TABLES
FOR FEDERAL LEASE MODIFICATION APPROVAL - WYW174407

CRM Species of Concern

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

Group	Common Name	Scientific Name	Observed in Study Area[1]	Bird of Conservation Concern[2]	USFWS[2]	WY_BLM[2]	USFS[2]	WGFD[2]	STATE RANK[2]	GLOBAL RANK[2]
Birds	Chestnut-collared Longspur	*Calcarius ornatus*	Yes	No			Region 2 Sensitive	NSS4 (Bc); Tier 2	S1	G5
Birds	Greater Sage-Grouse	*Centrocercus urophasianus*	Yes	Yes	Candidate Warranted but Precluded (C)	Sensitive	Region 2 Sensitive; Region 4 Sensitive	NSS2 (Ba); Tier 1	S4	G3G4
Birds	Mountain Plover	*Charadrius montanus*	No	Yes	Not Warranted for Listing (NW)	Sensitive	Region 2 Sensitive	NSSU (U); Tier 1	S2B;S3B	G3
	Black Tern									
Birds	Bobolink	*Dolichonyx oryzivorus*	No	No				NSS4 (Bc); Tier 2	S2	G5
Birds	Willow Flycatcher	*Empidonax traillii*	No	Yes						
Birds	Merlin	*Falco columbarius*	No	No				NSSU (U); Tier 3	S3B;S4N	G5
Birds	Prairie Falcon	*Falco mexicanus*	Yes	Yes						
Birds	Peregrine Falcon	*Falco peregrinus*	Yes	Yes	Delisted; formally monitored (DM)	Sensitive	Region 2 Sensitive; Region 4 Sensitive	NSS3 (Bb); Tier 2	S2	G4
Birds	Whooping Crane	*Grus americana*	No	No	Listed Endangered (LE); and Endangered - Nonessential Experimental Population (LEXN)				S1N	G1
Birds	Sandhill Crane	*Grus canadensis*	No	No				NSS4 (Bc); Tier 3	S3B;S5N	G5
Birds	Bald Eagle	*Haliaeetus leucocephalus*	Yes	Yes	Delisted; formally monitored (DM)	Sensitive	Region 2 Sensitive; Region 4 Sensitive	NSS2 (Ba); Tier 1	S3B;S5N	G5
Birds	Black-necked Stilt	*Himantopus mexicanus*	No	No					S3B	G5
Birds	Dark-eyed Junco	*Junco hyemalis*	No	No					S5B;S5N	G5
Birds	White-winged Junco	*Junco hyemalis aikeni*	No	No					S3	G5T4

Group	Common Name	Scientific Name	Observed in Study Area[1]	Bird of Conservation Concern[2]	USFWS[2]	WY_BLM[2]	USFS[2]	WGFD[2]	STATE RANK[2]	GLOBAL RANK[2]
Birds	Loggerhead Shrike	*Lanius ludovicianus*	Yes	Yes		Sensitive	Region 2 Sensitive		S3	G4
Birds	Herring Gull	*Larus argentatus*	No	No					SNA	G5
Birds	California Gull	*Larus californicus*	No	No					S2B	G5
Birds	Ring-billed Gull	*Larus delawarensis*	No	No					S2	G5
Birds	Eastern Screech-Owl	*Megascops asio*	No	No					S3	G5
Birds	Red-headed Woodpecker	*Melanerpes lentiginosus*	Yes	Yes						
Birds	Lewis's Woodpecker	*Melanerpes lewis*	No	No			Region 2 Sensitive	NSSU (U); Tier 2	S2	G4
Birds	Long-billed Curlew	*Numenius americanus*	Yes	Yes		Sensitive	Region 2 Sensitive	NSS3 (Bb); Tier 2	S3B	G5
Birds	Sage Thrasher	*Oreoscoptes montanus*	Yes	Yes		Sensitive		NSS4 (Bc); Tier 2	S5	G5
Birds	Osprey	*Pandion haliaetus*	No	No					S3B	G5
Birds	American White Pelican	*Pelecanus erythrorhynchos*	No	No					S1B	G4
Birds	Red-necked Phalarope	*Phalaropus lobatus*	No	No					S3N	G4G5
Birds	Rose-breasted Grosbeak	*Pheucticus ludovicianus*	No	No					S1	G5
Birds	White-faced Ibis	*Plegadis chihi*	Yes	No		Sensitive		NSS3 (Bb); Tier 2	S1B	G5
Birds	Virginia Rail	*Rallus limicola*	No	No				NSS3 (Bb); Tier 2	S3B	G5
Birds	American Avocet	*Recurvirostra americana*	No	No					S3B	G5
Birds	Golden-crowned Kinglet	*Regulus satrapa*	No	No					S3B;S4N	G5
Birds	McCown's Longspur	*Rhynchophanes mccownii*	Yes	Yes			Region 2 Sensitive	NSS4 (Bc); Tier 2	S2	G4
Birds	Dickcissel	*Spiza americana*	No	No				NSS4 (Bc); Tier 2	S1	G5
Birds	Brewer's Sparrow	*Spizella breweri*	Yes	Yes		Sensitive	Region 2 Sensitive	NSS4 (Bc); Tier 2	S5	G5

Group	Common Name	Scientific Name	Observed in Study Area[1]	Bird of Conservation Concern[2]	USFWS[2]	WY_BLM[2]	USFS[2]	WGFD[2]	STATE RANK[2]	GLOBAL RANK[2]
Birds	Clay-colored Sparrow	*Spizella pallida*	Yes	No					S3B	G5
Birds	Common Tern	*Sterna hirundo*	No	No					S1	G5
Birds	Barn Owl	*Tyto alba*	No	No					S2	G5
Mammals	Plains Bison	*Bos bison*	No		Not Warranted for Listing (NW)				S1	G4TU
Mammals	Gray Wolf	*Canis lupus*	Yes		Proposed for Delisting (PD)		Region 2 Sensitive; Region 4 Sensitive		S1	G4G5
Mammals	Black-tailed Prairie Dog	*Cynomys ludovicianus*	No		Not Warranted for Listing (NW)	Sensitive	Region 2 Sensitive		S2	G4
Mammals	Thirteen-lined Ground Squirrel	*Ictidomys tridecemlineatus*	Yes						S5	G5
Mammals	Northern River Otter	*Lontra canadensis*	No				Region 2 Sensitive	NSSU (U); Tier 2	S3	G5
Mammals	Black-footed Ferret	*Mustela nigripes*	No		Listed Endangered (LE); and Endangered - Nonessential Experimental Population (LEXN)			NSS1 (Aa); Tier 1	S1	G1
Mammals	Least Weasel	*Mustela nivalis*								
Mammals	Western Small-footed Myotis	*Myotis ciliolabrum*	No					NSS4 (Cb); Tier 2	S3B	G5
Mammals	Little Brown Myotis	*Myotis lucifugus*	No		Petition Under Review (UR)			NSS4 (Cb); Tier 2	S5	G3
Mammals	Olive-backed Pocket Mouse	*Perognathus fasciatus*	No					NSS4 (Cb); Tier 2	S4	G5
Mammals	White-footed Deermouse	*Peromyscus leucopus*	No						S3	G5
Mammals	Dwarf Shrew	*Sorex nanus*	No					NSS3 (Bb); Tier 2	S4	G4
Mammals	Plains Spotted Skunk	*Spilogale putorius interrupta*	No		Petition Under Review (UR)				S3	G4T4

Group	Common Name	Scientific Name	Observed in Study Area[1]	Bird of Conservation Concern[2]	USFWS[2]	WY_BLM[2]	USFS[2]	WGFD[2]	STATE RANK[2]	GLOBAL RANK[2]
Mammals	Eastern Cottontail	*Sylvilagus floridanus*	Yes						S3	G5
Mammals	Grizzly Bear	*Ursus arctos*	No		Listed Threatened (LT)				S1	G4T4
Mammals	Swift Fox	*Vulpes velox*	No		Not Warranted for Listing (NW)	Sensitive	Region 2 Sensitive	NSS4 (Cb); Tier 2	S2	G3
Mammals	Bear Lodge Meadow Jumping Mouse	*Zapus hudsonius campestris*	Yes						S1	G5T3
Reptiles	Eastern Spiny Softshell	*Apalone spinifera*	No					NSS4 (Bc); Tier 3	S4	G5T5
Reptiles	Eastern Yellow-bellied Racer	*Coluber constrictor flaviventris*	No						S4	G5T5
Reptiles	Pale Milksnake	*Lampropeltis triangulum multistriata*	No					NSS3 (Bb); Tier 2	S3	G5TNR
Reptiles	Bullsnake	*Pituophis catenifer sayi*	No						S4	G5T5
Reptiles	Plains Gartersnake	*Thamnophis radix*	No					NSSU (U); Tier 2	S5	G5
Plants	Barr's milkvetch	*Astragalus barrii*	Yes				Region 2 Sensitive		S3	G3
Plants	Woolly twinpod	*Physaria lanata*	No				Region 2 Sensitive	NSSU (U); Tier 2	S2	G5T2

[1] Study area is CRM permit boundary and 0.5-mile buffer

[2] Blank cells indicate the information is not applicable

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

MBCC – Migratory Birds of Conservation Concern

USFS:

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

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

WGFD:

NSS1-NSS4:

The NSS rank of the species is subtracted from 5 and multiplied by 6: [(5-NSS)x6]. This would result in scores of NSS1 = 24, NSS2 = 18, NSS3 = 12, NSS4 = 6.

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

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

Urgency of conservation action.

Ability to implement effective conservation actions.

The species' ecological or management role as a keystone, indicator, or umbrella species.

Rank:
G = Global rank assigned by NatureServe: range-wide probability of extinction for a species
S = Subnational (state/jurisdiction) rank assigned by WYNDD biologists for Wyoming
T = Trinomial rank: refers to the range-wide probability of extinction for a subspecies or variety
These letters are each followed by a numeric, 1-5 score:
1 = critically imperiled
2 = imperiled
3 = vulnerable
4 = apparently secure
5 = secure
Source: WYNDD (2017) and USFWS (2017) for Birds of Conservation Concern

APPENDIX E

GREENHOUSE GAS EMISSIONS CALCULATIONS

PM_{10}, $PM_{2.5}$, SO_2, NO_X, Hg, CO, and CO_2 CONTRIBUTIONS FROM COAL COMBUSTION CALCULATIONS

REVENUE CALCULATIONS
(Completed by WWC Engineering)

GHG Calculations Assumptions

Direct Emissions Variables

Source	CO_2e/Mt Coal Mined
FUEL subtotal	3,266.9
ELECTRICITY subtotal	2,670.1
PROCESS subtotal	1,147.7

Source: SGAC Calculations (BLM 2009)

Indirect Emissions Assumptions

Train: 130 Cars/Train, 1/2 aluminum rotary, 1/2 aluminum bottom dump (From CRM)
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_2e Conversion Rate	Kg CO_2e/Gal Diesel	Kg CO_2e/Mile/Ton
CO_2	10.21	1	10.21	0.023417431
CH_4	0.0000112	25	0.00028	0.000001
N_2O	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/1 Ton[1]	Miles	Kg CO_2e/Mile/Ton[2]	Tons	Kg CO_2e /Mile	Kg CO_2e/Trip	Metric Tons CO_2e/Trip
Loaded	436	1,060	0.0234	19,260.0 (Calculated)	451.3 (Calculated)	478,406.6 (Calculated)	4,784.1 (Calculated)
Empty	436	1,060	0.0234	3,790.0	88.8	94,141.3.0	941.4

[1] FactCheck 2008
[2] EPA 2014

CRM Production, 2009-2016

	2009	2010	2011	2012	2013	2014	2015	2016	Average
Production (Tons)	39,380,964	38,499,809	39,455,590	39,204,737	36,670,450	34,809,102	22,871,977	18,332,046	33,653,084

Source: WDWS (2009 through 2016)

Estimated 2009 Cordero Rojo Mine Equivalent CO_2e (in metric tons)

Source	**Coal (Mt)**	**Ave. Known Ratio (tons CO_2e/Mt coal)**	**Tons CO_2e**
Direct			
Fuel	39.4	3266.9	128,654
Electricity		2670.1	105,151
Mining Process		1147.7	45,198
Total Direct			**279,002**
Indirect			
Rail Transport			
2009 Coal Production	39,400,000		
2009 Coal Shipped by Rail	39,400,000		
Tons Coal/Train	15,470		
Empty Train Tons	3,790		
Loaded Train Tons	19,260		
# Loaded Trains/year	2,547		
# Empty Trains/year	2,547		
Average Rail Miles to Power Plant	1,060		
Kg CO_2e/Mi/Loaded Train	451.33		
Kg CO_2e/Mi/Empty Train	88.81		
Kg CO_2e/year Empty	239,765,108.5		
Kg CO_2e/year Loaded	1,218,436,936.4		
Kg CO_2e/year Total	1,458,202,044.8		
Total Transportation (CO_2e)	1,457,498		
Combustion (CO_2e)	65,963,115		
Total Indirect CO_2e	**67,420,612**		
Total Direct + Indirect CO_2e	**67,699,615**		

100% Coal shipped to U.S. power plants

Estimated 2010 Cordero Rojo Mine Equivalent CO_2e (in metric tons)

Source	**Coal (Mt)**	**Ave. Known Ratio (tons/Mt coal)**	**Tons**
Direct			
Fuel	38.5	3266.9	125,775
Electricity		2670.1	68,798
Mining Process		1147.7	29,572
Total Direct			**272,760**
Indirect			
Rail Transport			
2010 Coal Production	38,499,809		
2010 Coal Shipped by Rail	38,499,809		
Tons Coal/Train	15,470		
Empty Train Tons	3,790		
Loaded Train Tons	19,260		
# Loaded Trains/year	2,489		
# Empty Trains/year	2,489		
Average Rail Miles to Power Plant	1,060		
Kg CO_2e/Mi/Loaded Train	451.33		
Kg CO_2e/Mi/Empty Train	88.81		
Kg CO_2e/year Empty	234,287,078.2		
Kg CO_2e/year Loaded	1,190,598,713.9		
Kg CO_2e/year Total	1,424,885,792.1		
Total Transportation (CO_2e)	1,424,886		
Combustion (CO_2e)	64,487,180		
Total Indirect CO_2e	**65,912,066**		
Total Direct + Indirect CO_2e	**66,184,825**		

100% Coal shipped to U.S. power plants

Estimated 2011 Cordero Rojo Mine Equivalent CO_2e (in metric tons)

Source	**Coal (Mt)**	**Ave. Known Ratio (tons/Mt coal)**	**Tons**
Direct			
Fuel	39.5	3266.9	128,897
Electricity		2670.1	105,350
Mining Process		1147.7	45,283
Total Direct			**279,531**
Indirect			
Rail Transport			
2011 Coal Production	39,455,590		
2011 Coal Shipped by Rail	39,455,590		
Tons Coal/Train	15,470		
Empty Train Tons	3,790		
Loaded Train Tons	19,260		
# Loaded Trains/year	2,550		
# Empty Trains/year	2,550		
Average Rail Miles to Power Plant	1,060		
Kg CO_2e/Mi/Loaded Train	451.33		
Kg CO_2e/Mi/Empty Train	88.81		
Kg CO_2e/year Empty	240,103,396.3		
Kg CO_2e/year Loaded	1,220,156,045.7		
Kg CO_2e/year Total	1,460,259,442.1		
Total Rail Transportation (CO_2e)	1,460,259		
Combustion (CO_2e)	66,088,113		
Total Indirect CO_2e	**67,548,373**		
Total Direct + Indirect CO_2e	**67,827,904**		

100% Coal shipped to U.S. power plants

Estimated 2012 Cordero Rojo Mine Equivalent CO_2e (in metric tons)

Source	**Coal (Mt)**	**Ave. Known Ratio (tons/Mt coal)**	**Tons**
Direct			
Fuel	39.2	3266.9	128,078
Electricity		2670.1	104,681
Mining Process		1147.7	44,995
Total Direct			**277,754**
Indirect			
Rail Transport			
2012 Coal Production	39,204,737		
2012 Coal Shipped by Rail	39,204,737		
Tons Coal/Train	15,470		
Empty Train Tons	3,790		
Loaded Train Tons	19,260		
# Loaded Trains/year	2,534		
# Empty Trains/year	2,534		
Average Rail Miles to Power Plant	1,060		
Kg CO_2e/Mi/Loaded Train	451.33		
Kg CO_2e/Mi/Empty Train	88.81		
Kg CO_2e/year Empty	238,576,853.3		
Kg CO_2e/year Loaded	1,212,398,468.1		
Kg CO_2e/year Total	1,450,975,321.3		
Total Rail Transportation (CO_2e)	1,450,975		
Combustion (CO_2e)	65,667,934		
Total Indirect CO_2e	**67,118,910**		
Total Direct + Indirect CO_2e	**67,396,664**		

100% Coal shipped to U.S. power plants

Estimated 2013 Cordero Rojo Mine Equivalent CO_2e (in metric tons)

Source	**Coal (Mt)**	**Ave. Known Ratio (tons/Mt coal)**	**Tons**
Direct			
Fuel	36.7	3266.9	119,799
Electricity		2670.1	97,914
Mining Process		1147.7	42,087
Total Direct			**259,799**
Indirect			
Rail Transport			
2013 Coal Production	36,670,450		
2013 Coal Shipped by Rail	36,670,450		
Tons Coal/Train	15,470		
Empty Train Tons	3,790		
Loaded Train Tons	19,260		
# Loaded Trains/year	2,370		
# Empty Trains/year	2,370		
Average Rail Miles to Power Plant	1,060		
Kg CO_2e/Mi/Loaded Train	451.33		
Kg CO_2e/Mi/Empty Train	88.81		
Kg CO_2e/year Empty	223,154,680.7		
Kg CO_2e/year Loaded	1,134,026,161.3		
Kg CO_2e/year Total	1,357,180,842.0		
Total Transportation (CO_2e)	1,357,181		
Combustion (CO_2e)	61,423,004		
Total Indirect CO_2e	**62,780,185**		
Total Direct + Indirect CO_2e	**63,039,984**		

100% Coal shipped to U.S. power plants

Estimated 2014 Cordero Rojo Mine Equivalent CO_2e (in metric tons)

Source	**Coal (Mt)**	**Ave. Known Ratio (tons/Mt coal)**	**Tons**
Direct			
Fuel	34.8	3266.9	113,718
Electricity		2670.1	92,944
Mining Process		1147.7	39,950
Total Direct			**246,612**
Indirect			
Rail Transport			
2014 Coal Production	34,809,102		
2014 Coal Shipped by Rail	34,809,102		
Tons Coal/Train	15,470		
Empty Train Tons	3,790		
Loaded Train Tons	19,260		
# Loaded Trains/year	2,250		
# Empty Trains/year	2,250		
Average Rail Miles to Power Plant	1,060		
Kg CO_2e/Mi/Loaded Train	451.33		
Kg CO_2e/Mi/Empty Train	88.81		
Kg CO_2e/year Empty	211,827,617.2		
Kg CO_2e/year Loaded	1,076,464,355.3		
Kg CO_2e/year Total	1,288,291,972.5		
Total Transportation (CO_2e)	1,288,292		
Combustion (CO_2e)	58,305,246		
Total Indirect CO_2e	**59,593,538**		
Total Direct + Indirect CO_2e	**59,840,150**		

100% Coal shipped to U.S. power plants

Estimated 2015 Cordero Rojo Mine Equivalent CO_2e (in metric tons)

Source	**Coal (Mt)**	**Ave. Known Ratio (tons/Mt coal)**	**Tons**
Direct			
Fuel	22.9	3266.9	74,720
Electricity		2670.1	61,070
Mining Process		1147.7	26,250
Total Direct			**162,041**
Indirect			
Rail Transport			
2015 Coal Production	22,871,977		
2015 Coal Shipped by Rail	22,871,977		
Tons Coal/Train	15,470		
Empty Train Tons	3,790		
Loaded Train Tons	19,260		
# Loaded Trains/year	1,478		
# Empty Trains/year	1,478		
Average Rail Miles to Power Plant	1,060		
Kg CO_2e/Mi/Loaded Train	451.33		
Kg CO_2e/Mi/Empty Train	88.81		
Kg CO_2e/year Empty	139,185,331.1		
Kg CO_2e/year Loaded	707,311,207.7		
Kg CO_2e/year Total	846,496,538.9		
Total Transportation (CO_2e)	846,497		
Combustion (CO_2e)	38,310,561		
Total Indirect CO_2e	**39,157,058**		
Total Direct + Indirect CO_2e	**39,319,099**		

100% Coal shipped to U.S. power plants

Estimated 2016 Cordero Rojo Mine Equivalent CO_2e (in metric tons)

Source	**Coal (Mt)**	**Ave. Known Ratio (tons/Mt coal)**	**Tons**
Direct			
Fuel	18.3	3266.9	59,889
Electricity		2670.1	48,948
Mining Process		1147.7	21,040
Total Direct			**129,877**
Indirect			
Rail Transport			
2016 Coal Production	18,332,046		
2016 Coal Shipped by Rail	18,332,046		
Tons Coal/Train	15,470		
Empty Train Tons	3,790		
Loaded Train Tons	19,260		
# Loaded Trains/year	1,185		
# Empty Trains/year	1,185		
Average Rail Miles to Power Plant	1,060		
Kg CO_2e/Mi/Loaded Train	451.33		
Kg CO_2e/Mi/Empty Train	88.81		
Kg CO_2e/year Empty	111,557,994.9		
Kg CO_2e/year Loaded	566,914,770.7		
Kg CO_2e/year Total	678,472,765.6		
Total Transportation (CO_2e)	678,473		
Combustion (CO_2e)	30,706,177		
Total Indirect CO_2e	**31,384,650**		
Total Direct + Indirect CO_2e	**31,514,527**		

100% Coal shipped to U.S. power plants

Summary of Estimated CRM 2009-16 CO_2e Emissions

CO_2e Source	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**Ave.**	**% Of Total Emissions**
Direct Emissions										
Fuel	128,654	125,775	128,897	128,078	119,799	113,718	74,720	59,889	109,941	
Electricity	105,151	102,798	105,350	104,681	97,914	92,944	61,070	48,948	89,857	
Mining Process	45,198	44,186	45,283	44,995	42,087	39,950	26,250	21,040	38,624	
Total Direct Emissions	**279,002**	**272,760**	**279,531**	**277,754**	**259,799**	**246,612**	**162,041**	**129,877**	**238,422**	**0.4%**
Indirect Emissions										
Rail Transport	1,457,498	1,424,886	1,460,259	1,450,975	1,357,181	1,288,292	846,497	678,473	1,245,508	2.2%
Power Plant Combustion (CO_2e)	65,963,115	64,487,180	66,088,113	65,667,934	61,423,004	58,305,246	38,310,561	30,706,177	56,368,916	97.4%
Total Indirect Emissions	**67,420,612**	**65,912,066**	**67,548,373**	**67,118,910**	**62,780,185**	**59,593,538**	**39,157,058**	**31,384,650**	**57,614,424**	**99.6%**
Total Emissions	**67,699,615**	**66,184,825**	**67,827,904**	**67,396,664**	**63,039,984**	**59,840,150**	**39,319,099**	**31,514,527**	**57,852,846**	**100%**

Estimated 2017-2027 Cordero Rojo Mine Equivalent CO_2e (in metric tons)

Source	**Coal (Mt)**	**Ave. Known Ratio (tons/Mt coal)**	**Tons**
Direct			
Fuel	20.0	3266.9	65,338
Electricity		2670.1	53,402
Mining Process		1147.7	22,954
Total Direct			**141,694**
Indirect			
Rail Transport			
2017-2027 Coal Production	20,000,000		
2017-2027 Coal Shipped by Rail	20,000,000		
Tons Coal/Train	15,470		
Empty Train Tons	3,790		
Loaded Train Tons	19,260		
# Loaded Trains/year	1,293		
# Empty Trains/year	1,293		
Average Rail Miles to Power Plant	1,060		
Kg CO_2e/Mi/Loaded Train	451.33		
Kg CO_2e/Mi/Empty Train	88.81		
Kg CO_2e/year Empty	121,708,176.9		
Kg CO_2e/year Loaded	618,495,906.8		
Kg CO_2e/year Total	740,204,083.7		
Total Transportation (CO_2e)	740,204		
Combustion (CO_2e)	33,500,000		
Total Indirect	**34,240,204**		
Total Direct + Indirect CO_2e	**34,381,898**		

100% Coal shipped to U.S. power plants

Summary of Estimated CRM 2017-2027 CO_2e Emissions

CO_2e Source	**2017-2027 Ave**	**% Of Total Emissions**
Fuel	65,338	
Electricity	53,402	
Mining Process	22,954	
Total Direct	**141,694**	**0.4%**
Indirect Emissions		
Rail Transport	740,204	2.5%
Power Plant Combustion	33,500,000	97.4%
Total Indirect Emissions	**34,240,204**	**99.6%**
Total Emissions	**34,381,898**	**100%**

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	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017-2027**	**2017-2030**
Tons of Coal Mined (From CRM)	39,380,964	38,499,809	39,455,590	39,204,737	36,670,450	34,809,102	22,871,977	18,332,046	20,000,000	20,000,000
mw-h from coal mined	63,650,190	62,226,007	63,770,805	63,365,360	59,269,273	56,260,836	36,967,243	29,629,498	32,325,359	32,325,359
PM10 Emissions (Tons)	27,363.3	26,751.0	27,415.1	27,240.8	25,479.9	24,186.6	15,892.3	12,737.7	13,896.7	13,896.7
PM 2.5 Emissions (Tons)	8,345.8	8,159.1	8,361.6	8,308.5	7,771.4	7,376.9	4,847.1	3,885.0	4,238.5	4,238.5
SO2 Emissions (Tons)	344,583.4	336,873.3	345,236.4	343,041.4	320,866.4	304,579.6	200,129.8	160,405.4	175,000.0	175,000.0
NOx Emissions (Tons)	141,771.5	138,599.3	142,040.1	141,137.1	132,013.6	125,312.8	82,339.1	65,995.4	72,000.0	72,000.0
Hg Emissions (Tons)	1.6	1.6	1.6	1.6	1.5	1.4	0.9	0.8	0.8	0.8
CO Emissions (Tons)	9,845.2	9,625.0	9,863.9	9,801.2	9,167.6	8,702.3	5,718.0	4,583.0	5,000.0	5,000.0

Estimated 2016 Fiscal Revenue from 2015 Coal Production in Campbell Co. (Million U.S. Dollars)

Revenue Source	Total Collected	Federal Revenue	State Revenue
Federal Mineral Royalties	564.2	282.1	282.1
Abandoned Mine Lands Fund	95.4	67.4	28.0
Severance Tax	241.1		241.1
Bonus Bid Annual Revenues	307.9	153.9	153.9
Ad Valorem Tax	187.6		187.6
Black Lung	182.1	182.1	
Sales and Use Tax	29.8		29.8
Totals	1608.0	685.5	922.5
$/Ton			**$2.48**

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

Revenue Source	Total Collected	Federal Revenue	State Revenue
Federal Mineral Royalties	390.9	195.4	195.4
Abandoned Mine Lands Fund	66.1	33.0	33.0
Severance Tax	162.7		162.7
Bonus Bid Annual Revenues	0.0	0.0	0.0
Ad Valorem Tax	129.9		129.9
Black Lung	129.8	129.8	
Sales and Use Tax	18.9		18.9
Totals	898.2	358.3	540.0
$/Ton			**$2.29**

Future Revenues added by the CRM Duvall Tract only (Million U.S. Dollars)

Revenue Source	Total Collected	Federal Revenue	State Revenue
Federal Mineral Royalties	92.4	46.2	46.2
Abandoned Mine Lands Fund	15.6	7.8	7.8
Severance Tax	36.1		36.1
Bonus Bid Annual Revenues	0.0	0.0	0.0
Ad Valorem Tax	30.7		30.7
Black Lung	32.5	32.5	
Sales and Use Tax	4.5		4.5
Totals	211.8	86.5	125.3
$/Ton			**$2.25**

Total Future Revenues from CRM (existing mine plus Duvall tract) (Million U.S. Dollars)

Revenue Source	Total Collected	Federal Revenue	State Revenue
Federal Mineral Royalties	483.2	241.6	241.6
Abandoned Mine Lands Fund	81.7	40.8	40.8
Severance Tax	198.8		198.8
Bonus Bid Annual Revenues	0.0	0.0	0.0
Ad Valorem Tax	160.7		160.7
Black Lung	162.3	162.3	
Sales and Use Tax	23.3		23.3
Totals	1110.0	444.8	665.2
$/Ton			**$2.28**

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

Revenue Source	Total Collected	Federal Revenue	State Revenue
Federal Mineral Royalties	92.4	46.2	46.2
Abandoned Mine Lands Fund	15.6	7.8	7.8
Severance Tax	36.1		36.1
Bonus Bid Annual Revenues	0.0	0.0	0.0
Ad Valorem Tax	30.7		30.7
Black Lung	32.5	32.5	
Sales and Use Tax	4.5		4.5
Totals	**211.8**	**86.5**	**125.3**

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

Revenue Source	Total Collected	Federal Revenue	State Revenue
Federal Mineral Royalties	600.6	300.3	300.3
Abandoned Mine Lands Fund	101.5	50.8	50.8
Severance Tax	234.7		234.7
Bonus Bid Annual Revenues	0.000	0.0	0.0
Ad Valorem Tax	199.7		199.7
Black Lung	199.4	199.4	
Sales and Use Tax	29.0		29.0
Totals	1364.9	550.5	814.4
$/Ton			**$2.25**

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		
								$238,178,582.40	$178,633,936.80	$119,089,291.20	$59,544,645.60	$0.00		
WYW161248	Belle Ayr North	221,734,800	$210,648,060.00	$0.95				$42,129,612.00	$42,129,612.00	$42,129,612.00	$42,129,612.00	$42,129,612.00		
								$168,518,448.00	$126,388,836.00	$84,259,224.00	$42,129,612.00	$0.00		
WYW172657	Caballo West	130,196,000	$143,417,403.80	$1.10				$28,683,480.76	$28,683,480.76	$28,683,480.76	$28,683,480.76	$28,683,480.76		
								$114,733,923.04	$86,050,442.28	$57,366,961.52	$28,683,480.76	$0.00		
WYW174596	South Hilight	222,676,000	$300,001,011.66	$1.35					$60,000,202.33	$60,000,202.33	$60,000,202.33	$60,000,202.33	$60,000,202.33	
									$240,000,809.33	$180,000,607.00	$120,000,404.66	$60,000,202.33	$0.00	
WYW176095	South Porcupine LBA	401,830,508	$446,031,864.00	$1.11					$89,206,372.80	$89,206,372.80	$89,206,372.80	$89,206,372.80	$89,206,372.80	
									$356,825,491.20	$267,619,118.40	$178,412,745.60	$89,206,372.80	$0.00	
WYW173408	North Porcupine LBA	721,154,828	$793,270,311.00	$1.10					$158,654,062.20	$158,654,062.20	$158,654,062.20	$158,654,062.20	$158,654,062.20	
									$634,616,248.80	$475,962,186.60	$317,308,124.40	$158,654,062.20	$0.00	
Average				**$0.98**	**$86,268,000.00**	**$95,887,684.80**	**$95,887,684.80**	**$236,107,723.16**	**$543,968,360.49**	**$457,700,360.49**	**$438,218,375.69**	**$438,218,375.69**	**$307,860,637.33**	**$0.00**

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

Source: WDOR 2015 and 2016a

Revenue Calculations Variables

Coal Production (tons)[1]			
		Campbell	Wyoming
	2015 Tons Produced	340,675,046	372,577,808
	2022 Tons Produced (Estimated)	362,625,000	375,000,000
		From Campbell Co.	91.44%
	Duvall Tract[2]	(tons minable)	(tons recoverable)
	No Action Alternative	256,521,739	236,000,000
	Added by Proposed Action	60,751,425	55,773,000
	Average 2015 Sales Price ($/ton)		
	2015 8800 Btu Coal	$13.23[2]	$13.25[3]
	2015 Price without BLT[4]	$12.68	$12.70
Federal Royalties			
	WY share of FR = 0.5 x FR		
	Federal Royalties[3]	$564,243,044.94	
	Wyoming Share	$282,121,522.47	
Abandoned Mine Lands Funds[5]			
	Campbell AML Total	$95,389,012.88	
	WY Share[6]	$28,000,000.00	
Severance Taxes[7]			
	Campbell ST Rate/Ton	$0.6472	
	2016 Severance Taxes[8]	$241,132,357.34	
Lease Bonus Bids (2017 Payments)			
	2016	$307,860,637.33	
	2017	$0.00	
	2019+	$0.00	
	Total 2017+ Bonus Bid Payments	$0.00	
	WY share	$0.00	
Campbell Ad Valorem Taxes[7]			
	AVT Rate/ton	$0.55	
	AVT (Total)	$187,575,680.33	
Black Lung			
	2016 BLT Rate/Ton[9]	$0.534	
	2016 BLT Collected[10]	$182,058,833.01	
	Future BLT Rate/Ton[11]	$0.535	
	Future BLT Collected	$194,094,683.91	
2015 Campbell Co. Employment (mining)[12]			
	Buckskin	218	
	Belle Ayr	286	
	Eagle Butte	290	
	Cordero Rojo	521	
	Antelope	632	
	Caballo	133	
	NARM	1428	
	Rawhide	195	
	Black Thunder	1622	
	Coal Creek	153	
	Dry Fork	80	
	Wyodak	68	
	Total	5626	
Federal Income Tax[13]			
	Head of Household income info:		
	10% on first $12,750		
	15% on next (up to $48,600)		
	Rate[10]	13.6%	
	Tax/employee	$6,185.55	
	Fed Tax	$34,799,904.30	
Fiscal Year 2016 Sales and Use Tax[14]			
	Coal Mining	$29,765,322	
	$/ton	$0.08	

1 Source: WDOR 2016a
2 CRM 2016b
3 Calculated - Tons produced x 2014 sales price per ton x 12.5%
4 Black lung tax removed since it is included in the sale price
5 Calculated - AML = $0.28 per ton produced - through 2021, WY share = 0.5 x AML (Max 28,000,000/yr as of September 2013), Price from CREG 2016
6 Calculated - Wyoming's portion of 2015 + AML Funds (Max out at $75,000,000)
7 WDOR 2016, recalculated using Campbell Co. numbers only
8 CREG 2016
9 Calculated - Maximum per ton rate is $0.55 [(.10)(12750) + (.15)(45487-12750)]
10 IRS 2011

11 Calculated - Rate x 2022 Estimated Production
12 WDWS 2015
13 WDOE 2013 (This is the most current doc as of March 2106)
14 WDOR 2016b