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

Environmental Assessment
Spring Creek Mine
Big Horn County, Montana
Mining Plan
for
Federal Coal Lease MTM-069782

May 2020

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

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1.0 Purpose and Need

1.1 Introduction

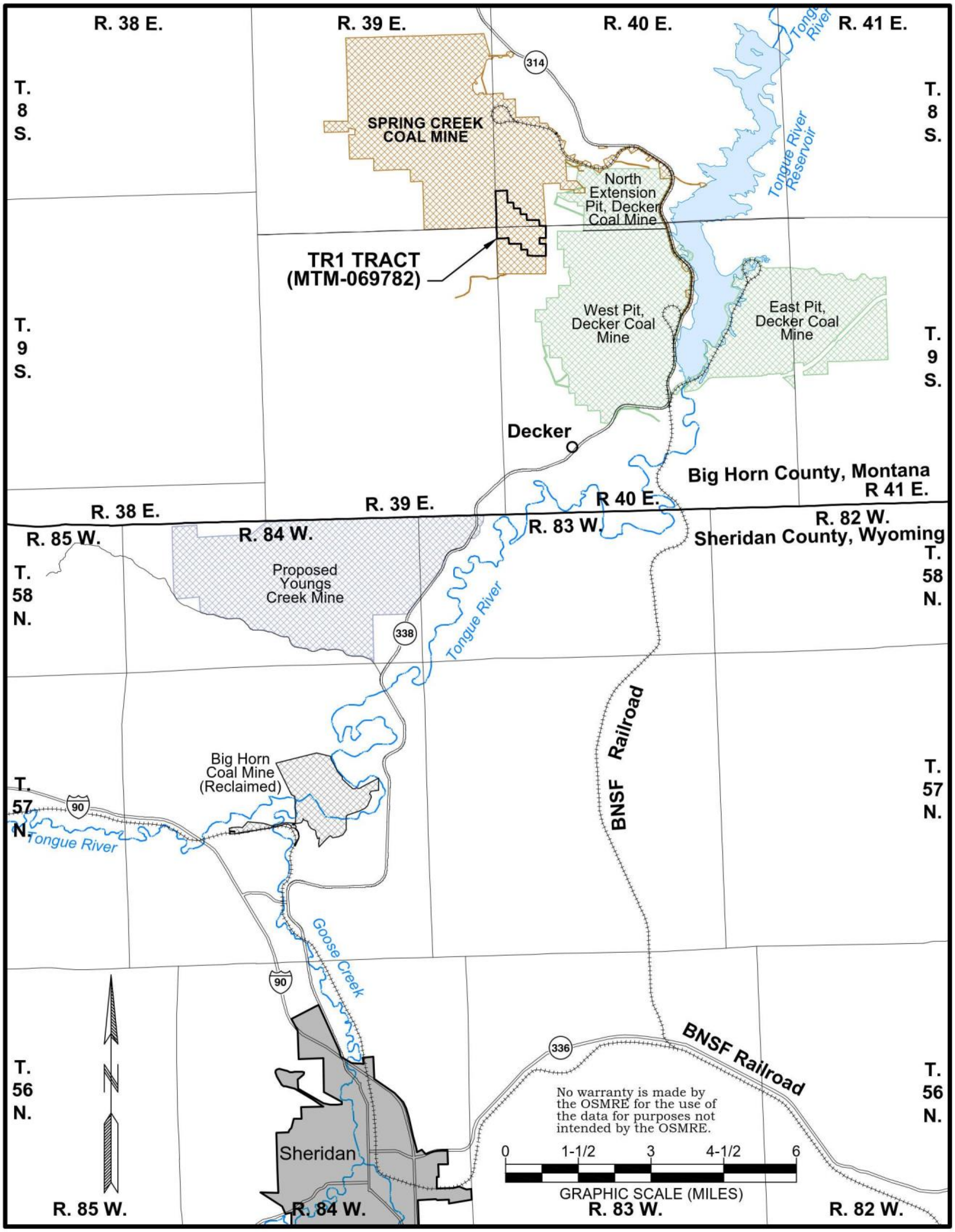
Spring Creek Coal LLC (SCC) is seeking to modify its current federal mining plan to allow recovery of the additional federal coal associated with MTM-069782. This environmental assessment (EA) for the Spring Creek Mine (SCM) federal mining plan modification for a portion of federal coal lease MTM-069782 (TR1 Tract) has been prepared by the U.S. Department of the Interior (DOI)/Office of Surface Mining Reclamation and Enforcement (OSMRE), Western Region. OSMRE will prepare a mining plan decision document (MPDD) in support of its recommendation to the Assistant Secretary, Lands and Minerals Management (ASLM) regarding federal mining plan modifications (OSMRE 1999). The ASLM will decide whether the mining plan modification is approved, disapproved, or approved with conditions. Using criteria outlined in OSMRE's Handbook for Implementing the National Environmental Policy Act (OSMRE 2019), the DOI's Departmental Manual (DM) Part 516 (DOI 2004), the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (40 Code of Federal Regulation [C.F.R.] Subparts 1500-1508), and the DOI's regulations for implementation of the National Environmental Policy Act of 1969 (43 C.F.R. Part 46), OSMRE determined that this EA could incorporate by reference analyses included in the EA for Spring Creek Coal Lease Modification MTM-069782 and Amendment to Land Use Lease MTM-74913 (hereafter 2010 LBM EA [BLM 2010a]). The 2010 LBM EA evaluated impacts related to mining federal coal within the TR1 Tract. This approach is consistent with Secretarial Order 3355, which is intended to streamline the National Environmental Policy Act (NEPA) process.

This EA review has been conducted in accordance with the NEPA and the CEQ regulations for implementing NEPA (40 C.F.R. Parts 1500-1508); the DOI's regulations for implementation of NEPA (43 C.F.R. Part 46); the DOI's Departmental Manual Part 516; and OSMRE's Directive REG-1, Handbook on Procedures for Implementing the National Environmental Policy Act (OSMRE 2019). Information gathered from federal, state, and local agencies, SCC publicly available literature, the 2020 Spring Creek Mine Cumulative Hydrologic Impacts Assessment, (hereafter 2020 CHIA [Montana Department of Environmental Quality/Water Quality Division 2020]), and in-house OSMRE sources, such as the SCM Permit Application Package (PAP) for TR1 Major R, was used in the preparation of this EA.

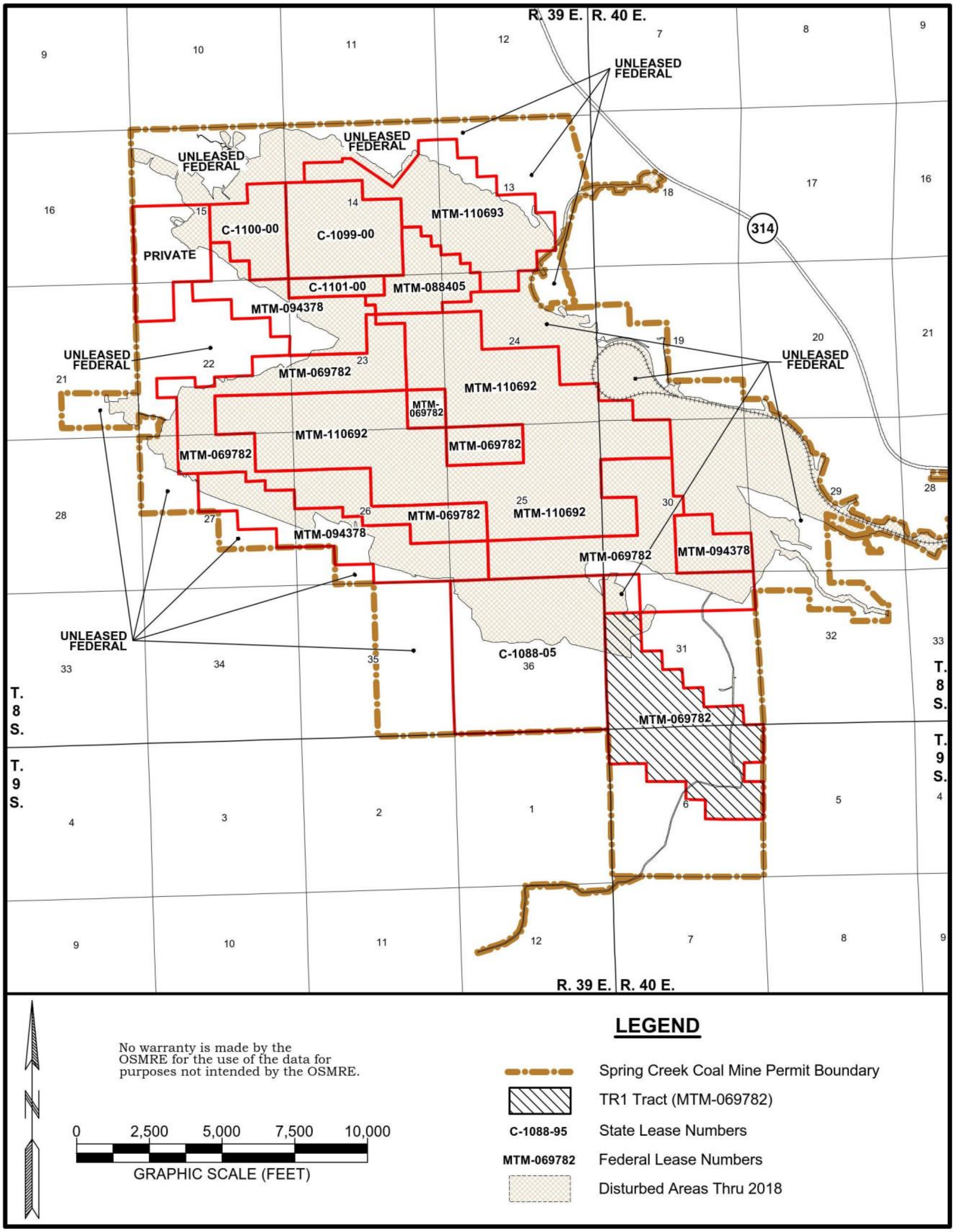
1.2 Background

1.2.1 Site History

SCC, a wholly-owned subsidiary of Cloud Peak Energy Resources (CPE), operates the SCM, which is located in Big Horn County, Montana, approximately 32 miles north of Sheridan, Wyoming (**map 1-1**). Coal has been mined on a commercial scale at the SCM since 1979. Ownership of the surface and mineral estate within the permit boundary was thoroughly discussed in section 3.11 of the 2010 LBM EA and surface and mineral estate ownership has not changed since 2010. The SCM has recovered coal under eight distinct coal leases, as shown on **map 1-2**.



Map 1-1. General Location of the TR1 Tract



Map 1-2. Configuration of the TR1 Tract and Coal Leases within the Spring Creek Mine Permit Boundary

As a result of an internal BLM administrative action, portions of federal coal leases MTM-069782 and MTM-094378 were separated out to create two new federal coal leases; MTM-110692 and MTM-110693. Rather than adding additional coal reserves or area to the leases or the federal mining plan, this administrative action simply changed the federal coal lease identifying labels for reserves already included within the mining plan. Because this administrative action was approved following the application for the federal mining plan modification, the application materials and Resource Recovery and Protection Plan (R2P2) referenced by this EA do not reflect the revised lease identifications. However, the revised lease configuration is presented on **map 1-2**.

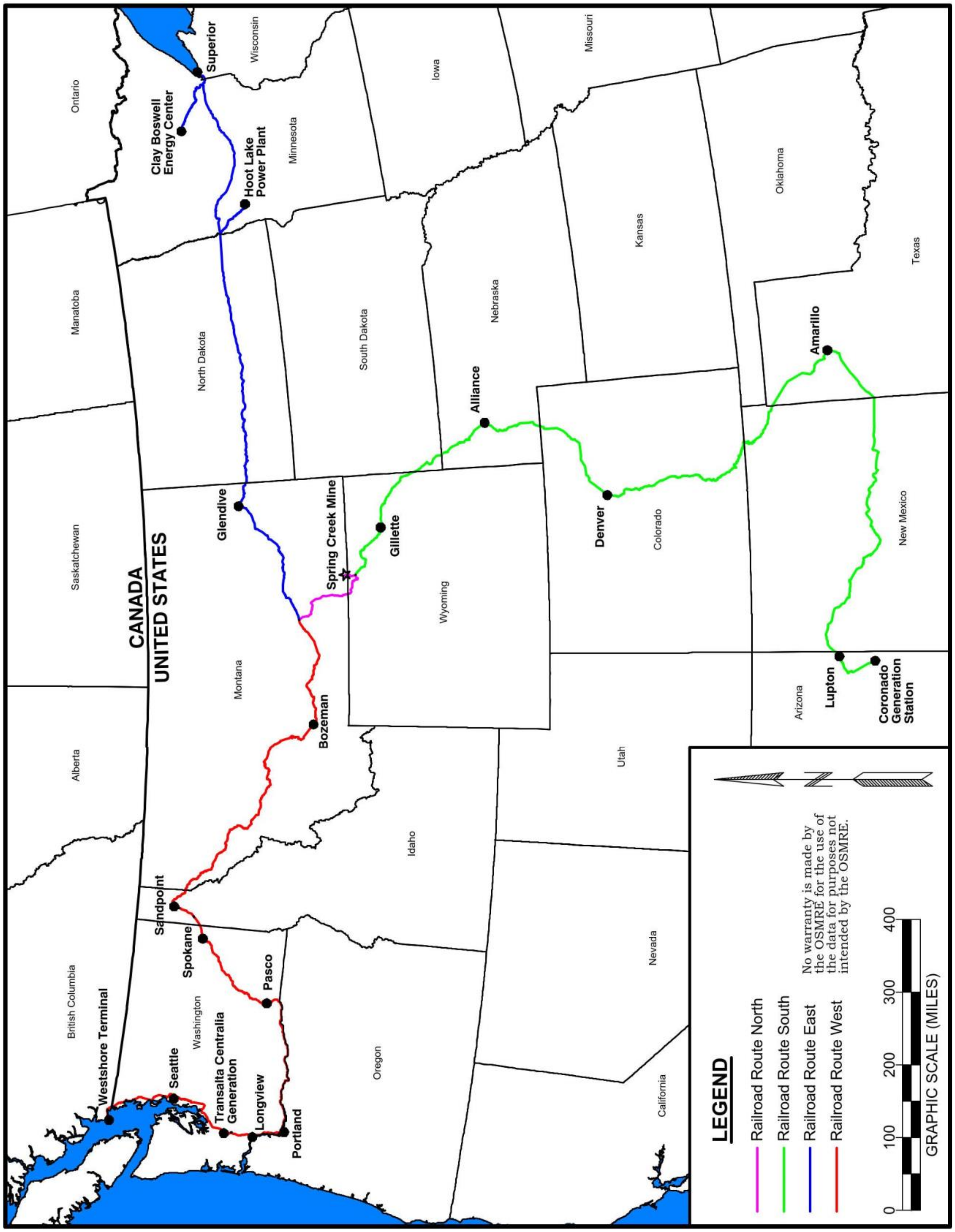
The SCM is located in the Montana Powder River Basin (PRB) region, a coal basin that spans from northeast Wyoming to southeast Montana. The PRB produces 80 percent of the coal mined from federal government owned coal leases in the U.S. The region has also been heavily developed for oil and gas recovery, most recently for coal bed natural gas (CBNG) recovery. The entire TR1 Tract is currently leased for surface coal mining.

Coal is mined at the SCM using conventional surface-mining methods and shipped from an onsite railroad loading facility to electric utilities and industrial customers in the northwest, midwest, and southwest United States, and exported to Asian utility customers via the Westshore Terminal in British Columbia, Canada (SCC 2019). In 2018, approximately 67 percent of coal from the SCM was shipped to U.S. markets and approximately 33 percent were foreign shipments. The coal was transported by rail from the SCM to 13 power plants at a per-trip average of 1,210 rail miles (weighted average based on distance and tons shipped). Coal was also transported by rail to one port for one-way overseas transport (4,300 nautical miles). The primary routes for rail transport are shown on **map 1-3**.

The R2P2 for the SCM is sequenced to concurrently operate four mining pits. The BLM Montana State Office approved modifications to the R2P2 for the SCM on June 19, 2017. This sequencing is necessary to ensure proper blending of the coal to meet coal contract stipulations. It is also necessary to lessen the risk of interrupted coal delivery in case an emergency (i.e., pit flooding) disrupts operations in one of the pits. The mine also has specific bench lengths and bench orientations. These specific pit lengths, orientations, and other mine design factors are done to optimize the coal haul distances. This mine plan design has been approved by the BLM in the R2P2 and is needed to ensure maximum recovery of the coal resource. As explained in the R2P2, interruptions to the mine plan sequence will disrupt these strategic decisions, resulting in illogical sequences, more overburden rehandle, longer haul distance, delayed reclamation, and lower coal recovery.

1.2.2 Project Background

In anticipation of needed additional coal reserves, SCC filed an application in 2007 with BLM to lease a tract of federal coal under leasing by modification regulations (also known as LBM regulations) at 43 C.F.R. § 3432.0-3 and the provisions of the Energy Policy Act of 2005 (Government Publishing Office [GPO] 1982 and U.S. Congress 2005, respectively). The tract was applied for as a maintenance tract for the SCM to maintain operation at the mine's current average annual level of production and was assigned case file number MTM-069782. BLM prepared the 2010 LBM EA to satisfy NEPA requirements for the LBM. The 2010 LBM EA analyzed the potential impacts associated with coal recovery and reclamation of the 498.1 acres of additional federal coal associated with MTM-069782, which would allow the SCM to continue producing coal at the current rate instead of ceasing production as recoverable coal reserves were nearly exhausted. OSMRE and the Montana Department of Environmental Quality (MDEQ) were cooperating agencies on the 2010 LBM EA. Federal coal lease MTM-069782 as leased is shown on **map 1-2**.



Map 1-3. BNSF Rail Road Routes Used to Transport SCM Coal

BLM's Miles City Field Office issued a decision record (DR) on April 12, 2010, recommending modification of federal coal lease MTM-069782 to add approximately 498.1 acres of federal coal associated with the Proposed Action (BLM 2010a) and the lease of 50.8 Mt of mineable federal coal was effective July 1, 2010. It should be noted that, for the purposes of this evaluation, the original estimated amount of mineable coal within the tract has been revised upward to 56.4 Mt mineable (53.6 Mt recoverable) based on the approved R2P2. In addition, the anticipated annual production rate evaluated in the 2010 LBM EA of 18 Mt, which was based on estimated production at that time, has been reduced to the 14.2 Mt evaluated in this EA. These changes are a result of reevaluation of coal quantities and market conditions. From 2014 through 2018, the annual coal recovery at the SCM ranged from 16.4 Mt in 2014 to 10.3 Mt in 2016, averaging 14.2 Mtpy over that time period (SCC 2019). While the evaluated annual rate of 14.2 Mtpy is a reasonable analytical estimate given current coal demand and the recent annual production at the mine, SCC has the option of producing coal up to its annual limit under their current Montana Air Quality Permit (MAQP) #1120-12, which allows a maximum coal production of 30.0 Mtpy (MDEQ-Permitting and Compliance Division [PCD] 2014).

1.2.3 Statutory and Regulatory Background

For existing approved federal mining plans that are proposed to be modified, OSMRE prepares a MPDD, utilizing an appropriate NEPA analysis document. The ASLM reviews the MPDD and decides whether or not to approve the federal mining plan modification, and if approved, whether any conditions may be needed, pursuant to 30 C.F.R. Part 746. OSMRE's recommendation regarding the evaluation of the federal mining plan modification will be based, at a minimum, on

1. the PAP,
2. the R2P2,
3. information prepared in compliance with NEPA, including this EA,
4. documentation demonstrating compliance with the applicable requirements of federal laws, regulations, and executive orders 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 MTM-069782, the R2P2, and the Mineral Leasing Act of 1920 (MLA),
7. findings and recommendations of MDEQ with respect to the mine permit revision application and the Montana State SMCRA regulatory program,
8. the findings and recommendations of OSMRE with respect to the additional requirements of 30 C.F.R. Chapter VII, Subchapter D (30 C.F.R. Parts 740 to 746),
9. OSMRE's obligations under MLA and DOI regulations to ensure that SCC achieves maximum economic recovery of the federal coal reserves in MTM-069782 (30 U.S.C. § 201(a)(3)(C); 30 C.F.R. § 746.13(e); 43 C.F.R. § 3482.1(c)(7)), and
10. SCC's obligations under the MLA, DOI regulations, and the terms of MTM-069782 to diligently develop the leased federal coal reserves and maintain continued operation (30 U.S.C. § 207(b)(1); 43 C.F.R. § 3480(a)(8),(12) and 43 C.F.R. § 3483.1(a)(1)-(2)).

OSMRE's recommendation is also guided by the following existing documents:

1. BLM's 2010 leasing decision, which conveyed property and contract rights to SCC through the issuance of MTM-069782; and

2. MDEQ's binding mining permit TR1 MR for SMP C1979012 and MAQP #1120-12, both of which established substantive operational standards for the development of the coal that is subject to the federal mine plan.

1.3 Purpose and Need

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

1.3.1 Purpose

The purpose of the action is established by the MLA and the SMCRA, which requires the evaluation by OSMRE of SCM's proposed mining plan modification before allowing surface mining and reclamation operations to develop the TR1 Tract associated with federal coal lease MTM-069782. OSMRE is the agency responsible for making a recommendation, supported by meeting all the requirements of the statutes and regulations listed in Section 1.4.1,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 SCC the opportunity to exercise its valid existing rights granted by the BLM under federal coal lease MTM-069782 to access and recover these federal coal reserves located in the TR1 Tract. ASLM approval of the federal mining plan modification is necessary to recover the reserves.

1.4 Regulatory Framework and Necessary Authorizations

1.4.1 Statutes and Regulations

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. Energy Policy Act of 2005,
5. Federal Coal Leasing Act Amendment, 1976 (FCLAA),
6. Federal Land Policy Management Act of 1976 (FLPMA),
7. SMCRA,
8. Multiple-Use Sustained Yield Act of 1960,
9. Endangered Species Act of 1973 (ESA),
10. Clean Air Act, as amended (CAA),
11. Clean Water Act (CWA),
12. Safe Drinking Water Act, as amended (SDWA),
13. National Historic Preservation Act, as amended (NHPA),
14. American Indian Religious Freedom Act of 1978 (AIRFA), and
15. Migratory Bird Treaty Act of 1918, as amended (MBTA).

In addition, this EA follows guidance in OSMRE's Handbook for Implementing the National Environmental Policy Act (OSMRE 2019) and DOI 516 DM (DOI 2004). A MPDD will be prepared and submitted to the ASLM for the considered federal mining plan modification.

1.5 Outreach and Issues

Following a review of the 2010 LBM EA and the 2016 federal MPDD for SCM Federal lease MTM-94378 (OSMRE 2016a), OSMRE determined that further analyses were appropriate, based on newly available information and changes to the environmental consequences assessment of the Proposed Action that have occurred since 2010. Internal discussions within OSMRE identified a preliminary set of issues to be considered during the NEPA analysis. Substantive issues identified during the public scoping period (October 15 through November 14, 2015) were also considered during the document preparation. The public scoping comment letters are summarized in **appendix A** and the 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 (2),
4. level of NEPA/ NEPA process (2),
5. climate change/global warming (2),
6. adequacy of permitting (1),
7. against mining (2) [the 4,213 form letters that were against mining were counted as one comment].

1.6 Crosswalk of Resource Areas

Table 1-1 identifies the location of resource discussions presented in the 2010 LBM EA 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 than those resources and effects not brought forward for analysis had been sufficiently documented in the 2010 LBM EA DR and that new information would not affect the decision-making process. Information presented in the 2010 LBM EA that adequately described the affected environment for resources is incorporated by reference into this EA in their entirety and are not reiterated.

1.7 Public Involvement

On October 15, 2015, OSMRE posted an announcement of the EA on its *Initiatives* webpage (OSMRE 2016b). The announcement initiated a comment period that extended from October 15 through November 14, 2015. OSMRE also published a notice of intent (NOI) to prepare this EA in both the Sheridan Press and Big Horn County News on October 15 and 29, 2015. Public outreach and Tribal consultation letters were also sent out to interested parties, stakeholders and tribes that could be affected by the project. OSMRE received written and e-mailed comments from 4,214 individuals. A form letter in favor of the SCM accounted for 4,213 comments. Public comments were reviewed and new substantive concerns were considered during the issues identification process. Lists of agencies, tribes, and individuals included on mailing lists and the public scoping comment letters received are included in **appendix A**. OSMRE has determined that the 2015 public involvement was sufficient to identify issues of concern for the TR1 Tract. The substantive issues identified during public scoping were considered during preparation of this EA.

Table 1-1. Crosswalk of Resources Analyzed in the 2010 LBM EA[1] and in the 2020 TR1 EA

Resource	2010 LBM EA Affected Environment	2010 LBM EA Environmental Consequences	2020 TR1 EA Issues Revisited	2020 TR1 EA Affected Environment	2020 TR1 EA Environmental Consequences
General Setting	3.1	4.1.1	Summary only	3.1	4.1
Topography and Physiography	3.2	4.1.1	Summary only	3.2	4.2
Geology, Minerals, and Paleontology	3.3 3.3.1 3.3.2	4.1.2	Summary only	3.3	4.3
Air Quality	3.4 3.4.1 3.4.2 3.4.3	4.1.3	Update AQ discussions to include new AQ information from annual reports and AQ permit updates. Add GHG discussions	3.4	4.4
Water Resources	3.5 3.5.1 3.5.2	4.1.4	Update surface and groundwater and water rights discussions.	3.5	4.5
Alluvial Valley Floors	3.6	4.1.5	Summary only	3.6	4.6
Aquatic Resources (Wetlands)	3.7	4.1.6	Summary only	3.7	4.7
Soils	3.8	4.1.7	Summary only	3.8	4.8
Vegetation	3.9	4.1.8	Summary only	3.9	4.9
Wildlife (Including Threatened and Endangered and Special Status Species)	3.10.1 3.10.2 3.10.3 3.10.4 3.10.5 3.10.6 3.10.7 Appendices A, B, & C	4.1.9	Update raptor nest locations from annual reports; Update Greater sage-grouse discussions; Update T&E and special status species discussions	3.10	4.10
Land Use and Recreation	3.11	4.1.10	Summary only	3.11	4.11
Cultural Resources	3.12 3.12.1	4.1.11	Update to discuss any new CR inventories, especially related to BLM stipulations	3.12	4.12
Visual Resources	3.13	4.1.12	Summary only	3.13	4.13
Noise	3.14	4.1.13	Updates related to rail and vessel traffic	3.14	4.14
Transportation	3.15	4.1.14	Updates related to rail and vessel traffic	3.15	4.15
Hazardous and Solid Waste	3.16	4.1.15	Summary only	3.16	4.16
Socioeconomics	3.17 3.17.1 3.17.2 3.17.3 3.17.4 3.17.5 3.17.6	4.1.16	Update Economics Discussions to Reflect Current Conditions	3.17	4.17
Greenhouse Gas Emissions	3.18	4.1.17	GHG discussions Moved to sections 3.4.1.5, 4.4.5, and 4.4.6	--	--
Short Term Uses and Long-Term Productivity	--	--	New to 2020 TR1 EA	3.18	4.18
Unavoidable Adverse Effects	--	--	New to 2020 TR1 EA	3.19	4.19

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 C.F.R. § 46.420). This chapter describes the Proposed Action and the No Action Alternative considered and analyzed in detail in this EA. In addition, it identifies alternatives considered but eliminated from detailed analysis.

2.1 Description of the Alternatives

Because the 2010 LBM EA is incorporated by reference in this EA, the Proposed Action and No Action Alternative analyzed in this EA reflect the alternatives considered in the 2010 LBM EA. **Section 2.1.3** includes alternatives considered but eliminated from detailed analysis. In addition, this EA also reflects updated resource-specific information collected since the publication of the 2010 LBM EA. A description of the Proposed Action and the action alternatives analyzed by this EA are included in this section and summarized in **table 2-1**.

Table 2-1. Summary Comparison of Coal Production, Surface Disturbance, Mine Life, and Employees for the No Action Alternative and Proposed Action, as of December 31, 2018

Item	No Action Alternative	Federal Mining Plan Approval of the Proposed Action
Remaining Mineable Federal Coal[1]	79.7 Mt	136.1 Mt (56.4 Mt added)
Remaining Recoverable Federal Coal[1]	75.7 Mt	129.3 Mt (53.6 Mt added)
MDEQ Permit Area (From SMP C1979012)	9,220.0 acres	9,220.0 acres (no change)
Currently Approved Federal Mine Plan Area	3,772.7 acres	4,270.8 acres (498.1 acres added)
MDEQ Acres to Be Disturbed (From SMP C1979012)	6,134.0 acres	6,862.4 acres (728.4 acres added)
Average Annual Coal Production	14.2 Mt	14.2 Mt (no change)
LOM Year (From SMP C1979012)	2027	2031 (4 years added)
Average Number of Employees	281	281 (no change)

[1] Approved in the 2016 MPDD

2.1.1 Proposed Action

The Proposed Action would modify the federal mining plan and authorize SCC to conduct coal mining on an additional 498.1 acres of federal coal to recover approximately an estimated 53.6 Mt of the 56.4 Mt of mineable coal. SCC projects that mining in the tract would begin in 2020 and, using an annual production rate of 14.2 Mt, mining this coal would extend the mine's life by about 4 years, to 2031. The SCM's current MAQP #1120-12 allows a maximum coal production of 30.0 Mtpy (MDEQ-PCD 2014). Approximately 728.4 acres of disturbance would be added from the federal mining plan revision.

The TR1 Tract would be mined as an integral part of the SCM under the Proposed Action. Because the TR1 Tract would be an extension of the existing SCM, the facilities and infrastructure would be the same as those identified in SMP C1979012 and in modifications to the BLM R2P2, which were approved June 19, 2017.

2.1.2 No Action Alternative

Under the No Action Alternative, the proposed mining plan modification would not be approved by the ASLM, and SCM would continue to operate under the currently approved federal mining plan. Under this alternative, OSMRE would not recommend approval or approval with conditions of the federal mining plan modification, and the ASLM would issue a decision based on the No Action Alternative.

If the No Action Alternative is selected, SCM would bypass the coal in the project area, resulting in 53.6 Mt of federal coal not being recovered and 728.4 acres of previously undisturbed ground not being disturbed. Under this alternative, the SCM would mine its remaining 75.7 Mt of recoverable federal coal reserves within the existing mine leases in approximately 5.3 years at an average production rate of approximately 14.2 Mtpy.

2.1.3 Alternatives Considered but Eliminated from Detailed Analysis

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 SCC 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 MDEQ 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 MDEQ-approved surface mining permit. An Underground Mining Alternative would, thus, be inconsistent with the Purpose and Need for this action.

Also, as implied in the BLM Finding of No Significant Impact and Decision Record for Environmental Assessment for Spring Creek Coal Lease Modification (BLM 2010a), lease MTM-069782 is a surface reserve lease only. Therefore, the lease was purchased and held by the SCC with the clear understanding by all parties concerned that the lease would be mined by surface mining methods.

This alternative is also economically infeasible at current permitted production rates, and the economics of initiating an underground longwall mining operation in the SCM 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 SCM, 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 MDEQ of an application for a permit revision would be required to authorize underground mining. The process for SCC to design and engineer a new underground mine and for MDEQ to process a new permit application would take a number of years. 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 SCM 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 498.1 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 SCM; 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 SCM and by requiring oil and gas operators in the region to reduce their emissions. These proposals are not alternatives 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 C.F.R. § 1508.8 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 non-coal operators is beyond OSMRE's authority and its implementation would be highly remote and speculative.

2.1.3.4 Reduce Coal Mining Rates and Numbers of Trains

Under this alternative, SCM would reduce their coal mining production rates, resulting in the need for fewer coal trains. The alternative would increase the duration of mining and train traffic. It would also delay reclamation, potentially increasing impacts associated with mining in the area.

In addition, SCC is not proposing to increase the number of coal shipments. Production rates would remain the same in both the No Action and the Proposed Action.

2.1.3.5 Investments in Clean Energy

OSMRE received a public comment requesting that consideration of an alternative to replace coal mining with "investments in clean energy." This alternative was not carried forward for further analysis because it does not meet the purpose of the project (**section 1.3.1**), which is to review and make a decision on SCM's proposed mining plan modification before allowing surface mining and reclamation operations to develop the TR1 Tract associated with federal coal lease MTM-069782.

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

The 2010 LBM EA presented a thorough description of the existing conditions at the SCM to support the analysis presented therein. The following summary of updated existing condition, including ongoing permitted mining operations, are the most notable changes since the 2010 LBM EA was prepared. This update is provided to support the evaluation of potential impacts contained in **chapter 4** of this EA.

Mining and reclamation activities have continued as approved by SMP C1979012 since the 2010 LBM EA was prepared and the modification to federal coal lease MTM-069782 was issued. The federal mining plan approval associated with the modification to coal lease MTM-069782 would allow mining of an additional 498.1 acres containing approximately 56.4 Mt of mineable federal coal. Operations at the SCM are conducted in accordance with applicable laws and regulations including SMCRA, MDEQ rules and regulations, and the MDEQ-approved PAP. The PAP, including approved revisions, provides the most complete descriptions of mining, environmental protection measures, and reclamation activities within the project area for the LOM and, as such, is used and referenced for the purpose of this EA.

SCC currently employs 281 people at the SCM. From 2014 through 2018, SCC recovered approximately 70.9 Mt of coal from all permitted operations, at an average rate of 14.2 Mtpy (SCC 2019). Approximately 45 percent of the remaining federal coal within the approved SCM permit boundary is within MTM-069782 (SCC 2019). Approximately 75.7 Mt of federal was available for recovery after January 1, 2019, excluding the 53.6 Mt of recoverable federal coal identified in the Proposed Action. SCC continues to use conventional surface-coal mining techniques described in **section 2.1.1**.

2.2.1 Current Bonding and Bond Release Status

SMCRA provides that, as a prerequisite for obtaining or modifying a coal mining permit, permittees must post a reclamation bond to ensure that the regulatory authority will have sufficient funds to reclaim the site if the permittee fails to complete obligations set forth in the approved reclamation plan (OSMRE 2015). SCC updates the SCM reclamation bond annually through a process that requires MDEQ review and approval. The most recent bond was approved by MDEQ in May 2019 in the amount of $108,850,000 (SCC 2019). The mine's reclamation bond is currently valid and will continue to be updated and approved by MDEQ on an annual basis.

There are four phases of bond release that Montana mine operators may request for the release of a performance bond or monetary deposit regarding areas disturbed by coal removal. As outlined in Administrative Rule of Montana (ARM) 17.24.1116 (Bonding: Criteria and Schedule for Release of Bond [Montana Secretary of State 2015]), the four bond release phases for lands disturbed by coal mining are:

Phase I – when the permittee completes the backfilling, regrading, and drainage control of a bonded area,

Phase II – when the permittee has completed soil replacement and spoil and soil tillage, and vegetation is established in accordance with the approved reclamation plan,

Phase III – when the revegetation criteria applicable to and consistent with the approved postmining land use is met, and

Phase IV – the remaining portion of the bond may be released after the permittee has successfully completed all surface coal mining and reclamation activities and all disturbed lands within any designated drainage basin have been reclaimed in accordance with the Phase I, II, and III requirements.

The acres of reclamation at the SCM from 2014 through 2018, by bond release phase, are shown in **table 2-2**.

Table 2-2. Total Mine Disturbance/Reclamation/Bond Release Acres

Year	Total Disturbance	Facility Disturbance	Active Mining Area	Available for Seeding	Soiled & Seeded	Phase I	Phase II	Phase III	Phase IV
2014	4,371.1	996.8	2,171.5	1,202.8	1,173.5	982.0	622.2	0.0	0.0
Ratio of total	--	23%	50%	28%	27%	22%	14%	0%	0%
2015	4,626.8	1,074.3	2,296.6	1,255.9	1,213.3	1,042.0	780.2	407.0	0.0
Ratio of total	--	23%	50%	27%	26%	23%	17%	9%	0%
2016	4,753.0	1,057.0	2,383.0	1,313.0	1,257.0	1,207.0	935.0	407.0	0.0
Ratio of total	--	22%	50%	28%	26%	25%	20%	9%	0%
2017	4,879.0	1,086.0	2,455.0	1,338.0	1,319.0	1,283.8	1,017.0	407.0	0.0
Ratio of total		22.3%	50.3%	27.4%	27.0%	26.3%	20.8%	8.3%	0%
2018	4,947.3	995.8[2]	2,543.3	1,408.3	1,340.3	1,310.8	1,017.0	407.0	0.0
Ratio of total	--	20.1%	51.4%	28.5%	27.1%	26.5%	20.6%	8.2%	0%

Source: 2014 through 2018 Annual Mining Reports for the SCM for SMP C1979012. Total disturbance includes the Facility Disturbance, Active Mining Area, and the area Available for Seeding

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 MDEQ.

The standard for determining if mines are meeting their contemporaneous reclamation obligations is determined by compliance with permit commitments. This evaluation is conducted annually by OSMRE and, according to the 2018 Annual Evaluation Report for the Regulatory Program, all Montana coal mines evaluated in the report were found to be in compliance within the 2015 evaluation year (OSMRE 2018).

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**. The determination of adequacy of the description of baseline conditions in the 2010 LBM EA was made if conditions have not substantively changed, no new data are available, the resource conditions have only been minimally affected as a result of current mining operations, and/or further presentation of information would not affect the decision-making process. Baseline information presented in the 2010 LBM EA that has not substantively changed is incorporated by reference. Updated information pertaining to the baseline data is presented in this chapter when applicable.

3.1 General Setting

The general setting of the TR1 Tract is described in section 3.1 of the 2010 LBM EA. The tract is located in the PRB, which has a semi-arid, high plains environment with relatively large seasonal and diurnal variations in temperature and seasonal variation in precipitation.

3.2 Topography and Physiography

Topography and physiography of the TR1 Tract are described in section 3.2 of the 2010 LBM EA. The SCM is physiographically part of the unglaciated Missouri Plateau section of the Great Plains Province (Fenneman 1931). This part of the Great Plains Province is characterized by broad plateaus that are dissected by incised stream valleys. In the western portion, the plateaus merge with the PRB and other broad regional downfolds. These basins are separated by major mountainous uplifts. The SCM is located near the northwest limb of the structural basin lying in the Tongue River Valley.

3.3 Geology, Minerals, and Paleontology

General geology and coal resources are described in section 3.3.1 of the 2010 LBM EA. The SCM area contains the following stratigraphic units or layers (in descending order from the surface): Quaternary (most recent) deposits, the Eocene-age Wasatch Formation, and the Paleocene-age Fort Union Formation. The targeted coal seam lies within the Anderson-Dietz (A/D) coal seam, which is the uppermost unit of the Tongue River Member of the Fort Union Formation. Within the tract, the A/D coal seam thickness ranges between 70 and 85 feet. The A/D sub-bituminous coal seam is of high quality having low sulfur content and high British thermal units (Btu) values for the Great Plains.

The discussions included in section 3.3.2 of the 2010 LBM EA provide details regarding the description of the minerals and paleontological resources. These details have not changed. No significant or unique paleontological resource localities have been documented on federal lands in the tract.

3.4 Air Quality and Climate Change

Air Quality regulations applicable to surface coal mining may include the National Ambient Air Quality Standards (NAAQS), Montana Ambient Air Quality Standards (MAAQS), and Prevention of Significant Deterioration (PSD). These regulatory programs are described in section 3.4.1 of the 2010 LBM EA. Additional air quality regulations applicable to surface coal mining include the

New Source Performance Standards (Section 111 of the CAA), and the Federal Operating Permit Program (Title V of the CAA).

Air quality information specific to the SCM is included in SCC's MAQP #1120-12 (MDEQ-PCD 2014). Section 3.4 of the 2010 LBM EA includes detailed discussions of air quality issues relating to the leasing and mining of coal related to the TR1 Tract. The analysis presented herein serves to summarize attainment/nonattainment areas discussions; update discussions with recent air quality monitoring findings; summarize revised air quality modeling results; and update discussions on carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM_{10} and $PM_{2.5}$), lead (Pb), hydrogen sulfide (H_2S), and hazardous air pollutants (HAPs) (specifically mercury [Hg]).

Since the tract is near the border of Montana and Wyoming, the attainment status of nearby areas in both states is considered. The TR1 Tract is in an area that is designated an attainment area for all pollutants (EPA 2018a). However, the town of Sheridan, Wyoming, located about 32 miles south of the project area, is in maintenance status for PM_{10} (in the process of re-designating to attainment by continuing to show compliance with the NAAQS after having initially been in nonattainment). The town of Lame Deer, Montana, located about 40 miles north, is a non-attainment area for PM_{10}. The town of Laurel, Montana, located about 90 miles northwest of the project area is a non-attainment area for SO_2. The city of Billings, Montana, located about 90 miles northwest of the project area, is in maintenance status for CO_2 and SO_2. None of these cities/towns are in line with prevailing winds (see **map 3-1** for prevailing wind directions).

3.4.1 Existing SCM Air Quality Summary

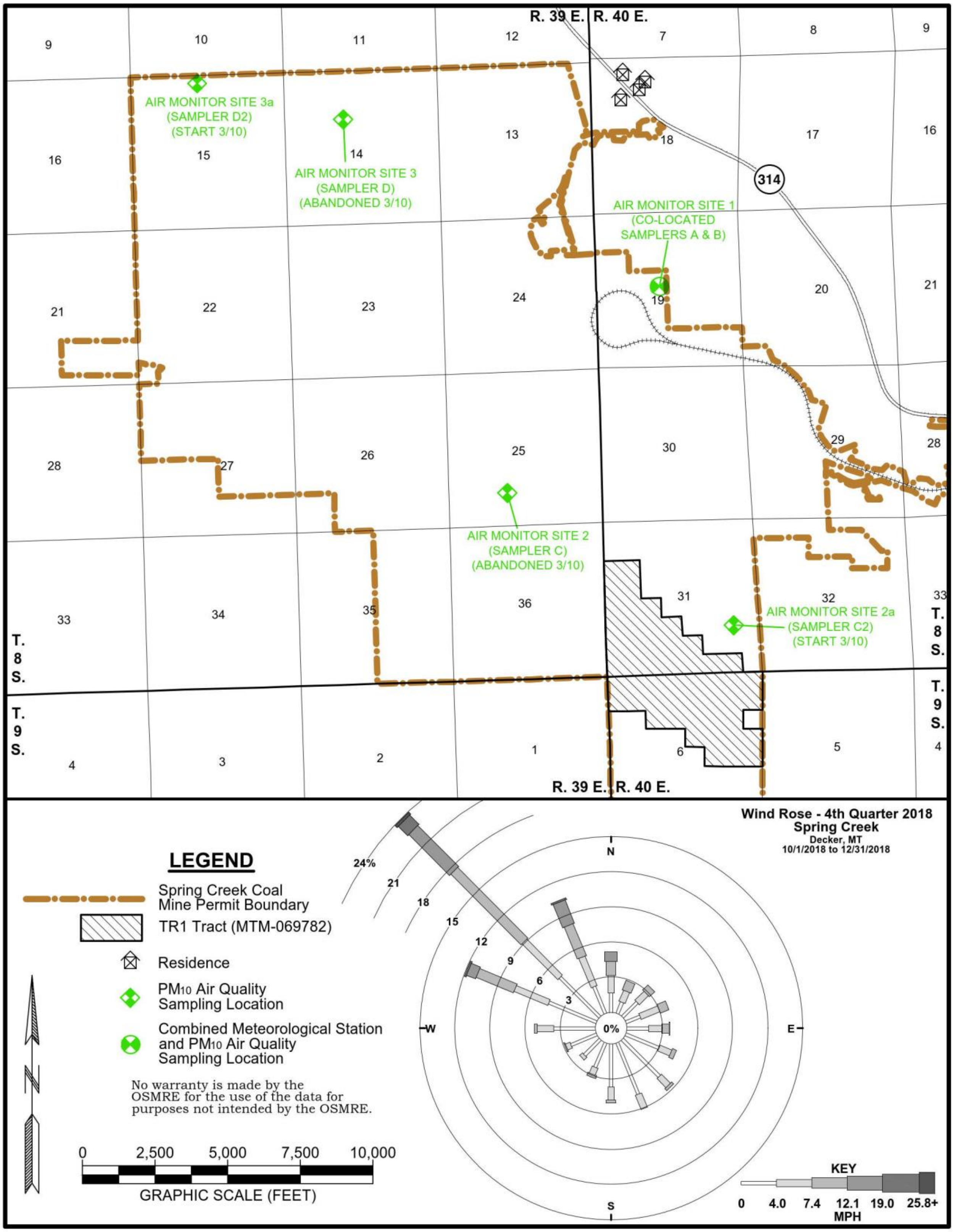
Baseline air quality data for the surface facilities area for the SCM are found in the section 3.4 of the 2010 LBM EA. The following discussions include updated (2014-2018) air quality monitoring results.

3.4.1.1 Air Quality-Particulate Matter

Based on SCC's history of relatively low ambient monitoring readings and MDEQ's confidence in current permit conditions, MDEQ removed the requirement for SCC to sample for PM_{10} in September 2009. SCC has voluntarily chosen to continue the PM_{10} sampling program. These data are used internally and not submitted to MDEQ, per MDEQ's request. $PM_{2.5}$ monitoring at the SCM is not required by MDEQ and is not conducted at this time.

Current, voluntary air monitoring consists of four samplers at three sites that monitor concentrations of PM_{10} and a meteorological site (**map 3-1**). Air quality monitoring sites C and D were relocated in 2010 to sites C2 and D2, respectively, to account for the progression of mining operations.

Tables 3-1 and 3-2 list the annual mean and high PM_{10} concentrations for the SCM. The average annual mean PM_{10} concentration from 2014-2018 ranged between 10.3 and 33.2 $\mu g/m^3$(about 21 percent to 66 percent of the annual MAAQS of 50 $\mu g/m^3$). The annual high 24-hour PM_{10} values ranged between 24.6 and 110.8 $\mu g/m^3$, or about 16 to 74 percent of the MDEQ-Air Resources Management Bureau (ARMB) 24-hour standard of 150 $\mu g/m^3$.



Map 3-1. Wind Rose and Air Quality and Meteorological Stations at the Spring Creek Coal Mine

Table 3-1. PM_{10} Concentration Values (Annual Mean STP µg/m^3) for the SCM

Site Name[1]	2014	2015	2016	2017	2018
A PM_{10}	26.9	26.6	14.1	24.2	25.1
B PM_{10}	26.9	27.3	13.6	24.2	26.2
C2 PM_{10}	21.7	33.2	16.3	27.3	23.5
D2 PM_{10}	18.0	16.6	10.3	16.5	15.7

1 See **map 3-1** for site locations
Source: SCM Ambient Air Quality Monitoring Network 2018 2018 4th Quarter and Annual Report 2018 (IML 2018)

Table 3-2. PM_{10} Concentration Values (Annual High [24 Hour] STP µg/m^3) for the SCM

Site Name[1]	2014	2015	2016	2017	2018
A PM_{10}	65.1	75.2	31.9	60.3	60.8
B PM_{10}	68.9	79.5	33.2	54.0	78.4
C2 PM_{10}	39.0	94.2	43.3	110.8	68.0
D2 PM_{10}	100.8	51.5	24.6	50.0	44.2

1 See **map 3-1** for site locations
Source: SCM Ambient Air Quality Monitoring Network 4th Quarter and Annual Report (IML 2018)

Since $PM_{2.5}$ monitoring is not required by MDEQ, data were not gathered onsite. Therefore, data from one $PM_{2.5}$ monitor located in Sheridan Wyoming were used to estimate $PM_{2.5}$ emissions at SCM (**table 3-3**). Regional monitoring demonstrated that ambient concentrations of $PM_{2.5}$, as determined by the 98th Percentile 24-hour standard and annual average values, generally were within established 24-hour (35 µg/m^3) and annual (12 µg/m^3) standards. One exceedance was noted at the site in 2017.

Table 3-3. Measured $PM_{2.5}$ Concentrations[1] in Sheridan, Wyoming

Site ID	Year	24 hour (µg/m^3)	Annual (µg/m^3)
Meadowlark Elementary (560331003)	2014	14	4.4
		18	5.4
	2015	33[2]	5.9[2]
		18	5.2
	2016	16	4.9
		18	4.5
	2017	22	6.6*
		40	6.4*
	2018	17	5.0
		13	5.1

1 The 24-hour standard is met when the 98th percentile 24-hour concentration, as determined by Appendix N of 40 C.F.R. Part 50 is less than or equal to 35 micrograms per cubic meter. The annual standard is met when the arithmetic mean concentration, as determined by Appendix N of 40 C.F.R. Part 50 is less than or equal to 12 µg/m^3. **Bold** test indicates an exceedance.
2 Included an exceptional event
* The mean does not satisfy minimum data completeness criteria
Source: EPA 2019a

To further evaluate potential $PM_{2.5}$ emissions at the SCM, PM_{10} monitoring data from the SCM were used to estimate $PM_{2.5}$ ambient concentrations by applying a 0.2 factor, as determined by Pace (2005). The estimated annual mean and maximum 24-hour $PM_{2.5}$ values are presented in **tables 3-4 and 3-5**, respectively. The estimated $PM_{2.5}$ concentrations were below the prescribed 24-hour NAAQS (35 µg/m^3) and the annual NAAQS (12 µg/m^3). These estimates are supported by the regional $PM_{2.5}$ data presented in **table 3-3**.

Table 3-4. Estimated Annual Mean STP $PM_{2.5}$ Concentrations ($\mu g/m^3$)

Site Name[1]	2014	2015	2016	2017	2018
A	5.4	5.3	2.8	4.8	5.0
B	5.4	5.5	2.7	4.8	5.2
C2	4.3	6.6	3.3	5.5	4.7
D2	3.6	3.3	2.1	3.3	3.1

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

Table 3-5. Estimated Annual High 24-Hour STP $PM_{2.5}$ Concentrations ($\mu g/m^3$)

Site Name[1]	2014	2015	2016	2017	2018
A	13.0	15.0	6.4	12.1	12.2
B	13.8	15.9	6.6	10.8	15.7
C2	7.8	18.8	8.7	22.2	13.6
D2	20.2	10.3	4.9	10.0	8.8

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

3.4.1.2 Emissions of Nitrogen Dioxide (NO_2), Ozone (O_3), Sulfur Dioxide (SO_2), Mercury (Hg), Lead (Pb), and Carbon Monoxide (CO)

NO_2 concentrations (98th percentile, 1 hour) are currently being monitored in Rosebud County at one air quality system (AQS) monitoring site near Birney (**table 3-6**). NO_2 concentrations were also monitored through 2017 at three other AQS monitoring sites near the town of Lame Deer (**table 3-6**). These monitoring sites are the closest to the SCM, between 28 and 44 miles (**map 3-2**). All monitored NO_2 values were below the MDEQ-ARMB and NAAQS 1-hour standard (100 ppb) and annual standard (53 ppb).

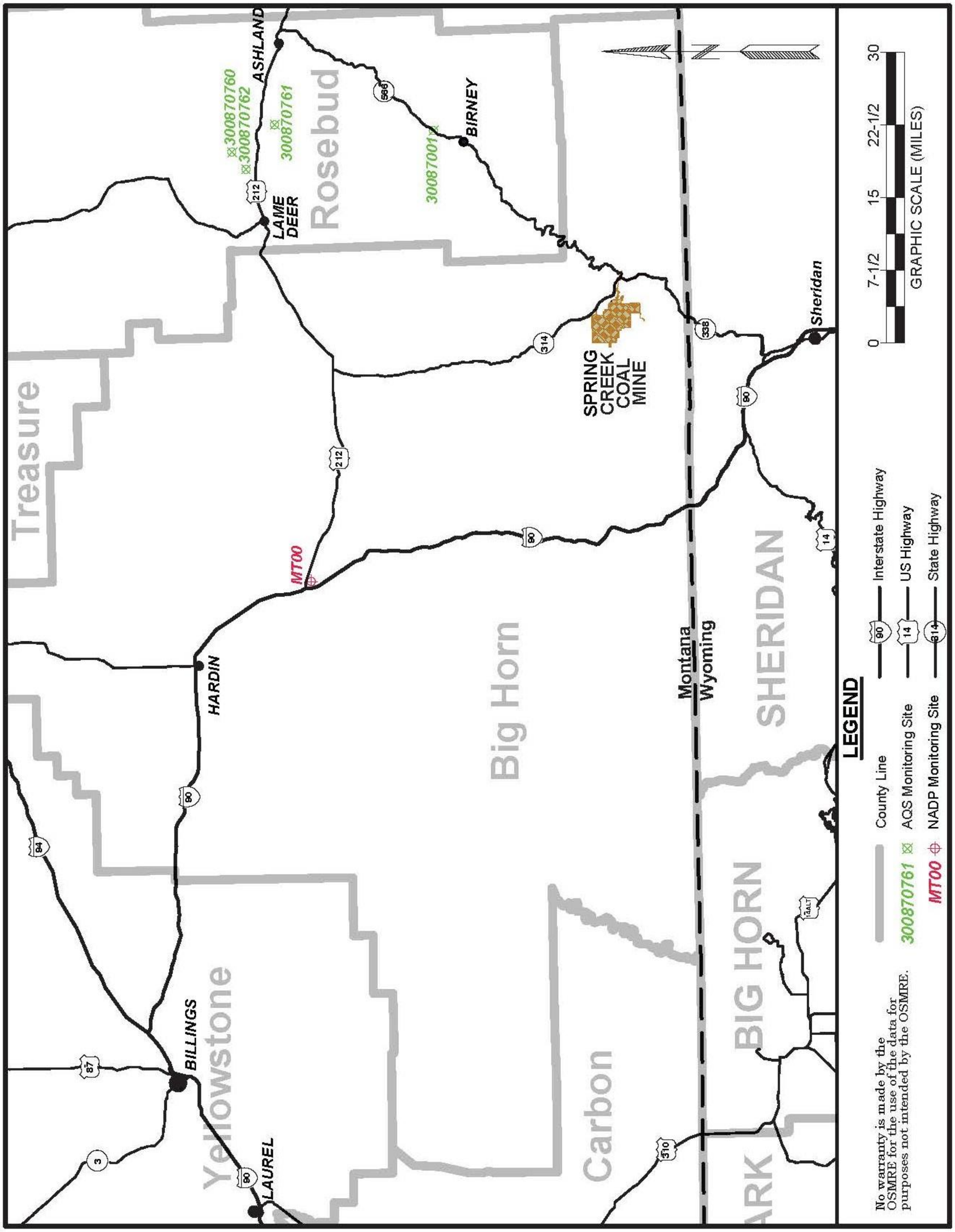
Table 3-6. Measured NO_2 Concentrations in Rosebud County, Montana

AQS Site ID[1]	Sampler ID		2014	2015	2016	2017	2018
300870001	3 Miles North of Birney	1 hour	8	5	6	13	7
		Annual	0.68	0.43	0.48	2.89	1.48
300870760	Morningstar	1 hour	54	18	11	12	--
		Annual	2.96	1.93	1.78	0.57	--
300870761	Garfield Peak	1 hour	10	75	49	17	--
		Annual	1.19	1.11*	1.51	0.48	--
300870762	Badger Peak	1 hour	10	10	13	9	--
		Annual	1.71	0.91	1.47	0.54	--

[1] See **map 3-2** for site locations

-- Indicates the monitoring site data were not available, as of 8/23/19.

Source: EPA 2019a



Map 3-2. Regional Air Quality Monitoring Sites

O_3 monitoring is not required at the SCM but 2014 through 2018 concentrations are available from AQS Site 300870001, which is the closest Montana monitoring site located approximately 28 miles northeast of the tract (**map 3-2**). As shown in **table 3-7**, the 8-hour O_3 values were below the NAAQS 8-hour standard of 0.070 ppm and the 1-hour O_3 values were below the MDEQ-ARMB 1-hour standard of 0.10 ppm.

Table 3-7. Measured O_3 Concentrations at AQS Monitoring Site[1] 300870001

Parameter Measure	2014	2015	2016	2017	2018
MDEQ-ARMB 1 hour (ppm)	0.066	0.065	0.067	0.070	0.069
MDEQ-ARMB 1 hour (μg/m^3)	139	137	142	148	146
NAAQS 8 hour (ppm)	0.055	0.056	0.057	0.059	0.059
NAAQS 8 hour (μg/m^3)	116	118	120	125	125
Days maximum exceeded*	0	0	0	0	0

1 See **map 3-2** for site location

* The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 parts per million (254 μg/m^3) is equal to or less than 1, as determined by Appendix H of 40 C.F.R. Part 50.

Source: EPA 2019a

SO_2 monitoring data were available from three sites in Rosebud County. No sites in Big Horn County monitor for SO_2. As presented in **table 3-8**, SO_2 data collected at the three sites were below the 1-hour MAAQS (0.50 ppm) 99th percentile concentrations. Data collected in 2015 from the Garfield Peak site show that SO_2 1-hour concentrations exceeded the NAAQS (0.075 ppm) standard. High SO_2 values were recorded in 2015 during a 3-day period, between June 3 and June 5. Excluding this 3-day period, the 1-hour values averaged 0.001 ppm (EPA 2019a). The 24-hour 1st maximum SO_2 data collected at the three sites were also below the MAAQS (0.100 ppm) concentrations (there is no NAAQS 24-hour standard). Therefore, it is likely that ambient air quality within the vicinity of the proposed action is currently in compliance with the SO_2 MAAQS and NAAQS.

Table 3-8. Measured SO_2 Concentrations in Rosebud County, Montana

AQS Site ID	Sampler ID		2014	2015	2016	2017	2018
300870760	Morningstar	1 hour	0.008	0.009	0.008	0.009	--
		24 hour	0.005	0.002	0.003	0.003	--
300870761	Garfield Peak	1 hour	0.008	0.215*	0.007	0.008	--
		24 hour	0.004	0.020	0.005	0.006	--
300870762	Badger Peak	1 hour	0.007	0.011	0.006	0.006	--
		24 hour	0.003	0.013	0.002	0.002	--

* The high 99th percentile 1-hour value was recorded during a 3-day period from June 3 through June 5, where maximums 1-hour concentrations ranged between 0.269 ppm and 0.191 ppm.

-- No data for Rosebud County.

Source: EPA 2019a

Annual Hg (a HAP), Pb (a criteria pollutant), and CO (an indirect greenhouse gas [GHG]) monitoring values are not collected specifically for the SCM. For a general discussion on Hg emissions, Hg air emissions (stack plus fugitive) for 2013 through 2017 (2018 data are not available) from three coal-fired power plants and one coal mine in Big Horn and Rosebud counties were evaluated (**table 3-9**).

Table 3-9. Measured Annual Hg Stack (Air) Emissions from Power Stations in Big Horn and Rosebud Counties (Pounds)

AQS Site ID	2013	2014	2015	2016	2017
Colstrip Energy LP Rosebud Power Plant 110041886144					
Total emissions	1.57	2.65	1.4	1.4	0.9
Stack (air) emissions	1.57	2.65	1.4	1.4	0.9
Percent Emitted to air	100.0	100.0	100.0	100.0	100.0
Colstrip Steam Electric Station 110041982520					
Total emissions	1,278.0	1,244.0	1,175.4	1,316.7	1,433.4
Stack (air) emissions	110.0	110.0	120.0	130.0	140.0
Percent emitted to air	8.6	8.8	10.2	9.9	9.8
Hardin Generating Station 110038363623					
Total emissions	22.9	16.0	0.1	24.4	18.0
Stack (air) emissions	5.7	4.3	0.1	5.7	3.7
Percent Emitted to air	24.9	26.9	100.0	23.4	20.6
Decker Coal Company					
Total emissions	0.15	0.11	0.007	0.006	0.006
Stack (air) emissions	0.002	0.002	0.002	0.002	0.002
Percent Emitted to air	1.3	1.8	28.6	33.3	33.3
Total emissions from Four Sources					
Total emissions	1,302.6	1,262.8	1,176.9	1,342.5	1,452.3
Stack (air) emissions	117.3	117.0	121.5	137.1	144.6
Percent Emitted to air	9.0%	9.3%	10.3%	10.2%	10.0%

Source: EPA 2019b

Annual Pb monitoring values are not collected at the SCM. **Table 3-10** shows the Pb emissions from power stations in Big Horn and Rosebud counties for 2013 through 2017 (2018 data are not available). A direct comparison between the monitored values at the power plants/mines and NAAQS and MAAQS is not possible since the monitored values were presented in pounds, rather than the NAAQS and MAAQS units (µg/m^3).

Table 3-10. Measured Annual Pb Air Emissions (in Pounds) from Power Stations in Big Horn and Rosebud Counties (Pounds)

AQS Site ID	2013	2014	2015	2016	2017
Colstrip Energy LP Rosebud Power Plant 110041886144					
Total emissions	357.1	249.4	743.2	145.2	518.7
Stack (air) emissions	117.4	111.8	112.6	114.9	67.8
Percent emitted to air	32.9%	44.8%	15.2%	79.1%	13.1%
Colstrip Steam Electric Station 110041982520					
Total emissions	78,379.0	86,936.5	93,358.0	97,979.0	91,612.0
Stack (air) emissions	680.0	750.0	800.0	730.0	730.0
Percent emitted to air	0.9%	0.9%	0.9%	0.7%	0.8%
Hardin Generating Station 110038363623					
Total emissions	2,643.8	3,058.6	2,338.2	1,550.0	1,281.5
Stack (air) emissions	191.6	206.5	151.9	103.0	39.5
Percent emitted to air	7.2%	6.8%	6.5%	6.6%	3.1%
Decker Coal Company					
Total emissions	17.4	20	20	2.65	3.3
Stack (air) emissions	0.0	0.0	0.0	0.05	0.05
Percent emitted to air	0.0%	0.0%	0.0%	1.9%	1.5%
Total emissions from Four Sources					
Total emissions	81,397.3	90,264.5	96,459.4	99,676.9	93,415.5
Stack (air) emissions	989.0	1068.3	1064.5	948.0	837.4
Percent emitted to air	1.2%	1.2%	1.1%	1.0%	0.9%

Source: EPA 2019b

3.4.1.3 Air Quality Related Values (AQRVs)

AQRVs as related to the TR1 Tract were discussed in sections 3.4.5 and 3.4.6 of the 2010 LBM EA. Updated information regarding AQRVs is included below. AQRVs are evaluated by the land management agency responsible for a Class I area, according to the agency's level of acceptable change (LAC). These AQRVs include potential air pollutant effects on visibility and the acidification of lakes and streams. The AQRVs, and the associated LAC, are applied to PSD Class I and sensitive Class II areas and are the land management agency's policy and are not legally enforceable as a standard. MDEQ MAAQS do include a standard for visibility. Class I areas are afforded specific AQRV protection under the CAA. The Class I designation allows very little deterioration of air quality. The AQRVs associated with this action include visibility and acidification of lakes. The nearest Class I area is located approximately 19 miles north of the tract at the Northern Cheyenne Indian Reservation.

3.4.1.3.1 Visibility

In accordance with ARM 17.8.818, the state of Montana does not require mines to evaluate visibility impacts on Class I areas (MDEQ-PCD 2014). Because MDEQ has determined that the SCM is not a major stationary source and because the SCM is not required by MDEQ to monitor visibility, a direct comparison to MAAQS standards is not possible. The current visibility discussions have been inferred from the currently permitted mining activities related to the existing coal leases at the SCM. Visibility can be defined as the distance one can see and the ability to perceive color, contrast, and detail. Fine particulates ($PM_{2.5}$) 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 annual averages for the 20 percent best and worst visibility days at Northern Cheyenne Indian Reservation monitoring site (the nearest PSD Class I area, see **map 3-2**) for 2003 through 2018 (Interagency Monitoring of Protected Environments [IMPROVE] 2019). Increasing dv values represent proportionately larger perceived visibility impairment (BLM 2003). The long-term trend in visibility at the Northern Cheyenne Indian Reservation appears to be relatively stable, if not improving slightly.

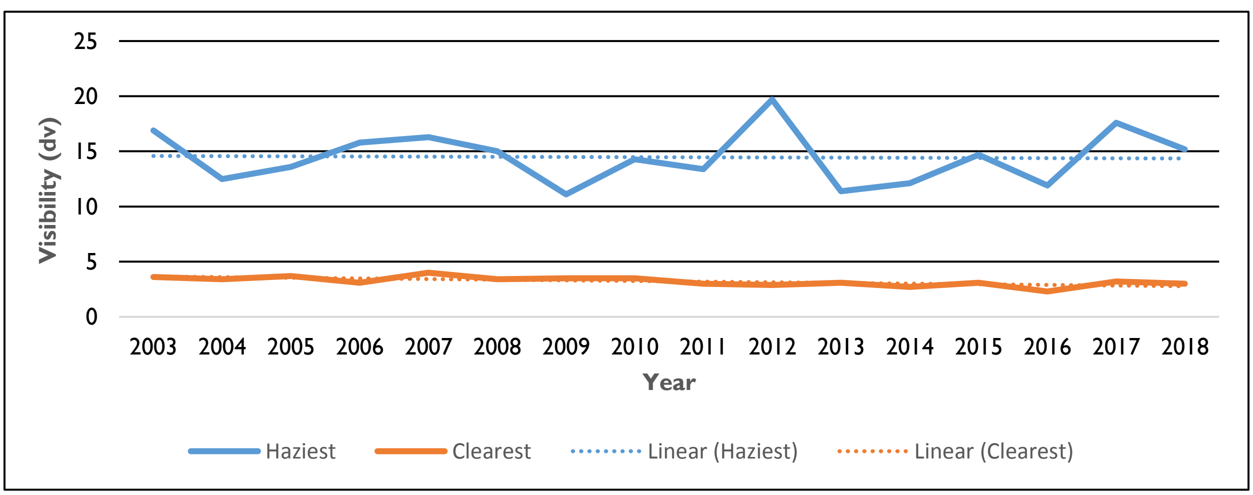


Figure 3-1. Visibility in the Northern Cheyenne Indian Reservation Area – Site MT00

3.4.1.3.2 AQRVs Related to Coal Combustion

Emissions that affect air quality also result from combustion of fossil fuels. **Table 3-11** presents the estimated $PM_{10,}$ $PM_{2.5}$, SO2, NO_X, Hg, and CO emissions estimates for combustion of coal mined at the SCM.

Table 3-11. Estimated Annual $PM_{10,}$ $PM_{2.5}$, SO2, NO_X, Hg, and CO Contributions from Coal Combustion

Source	2014	2015	2016	2017	2018
Tons of Coal	17.3	17.0	10.3	12.7	13.6
PM_{10} (tons)	3,872.9	3,797.5	2,293.4	2,846.4	3,033.1
$PM_{2.5}$ (tons)	1,181.2	1,158.2	699.5	868.1	925.1
SO_2 Emissions (tons)	71,421.0	70,030.0	42,293.5	52,490.2	55,934.1
NO_X Emissions (tons)	27,597.2	27,059.7	16,342.3	20,282.3	21,613.0
Hg Emissions (tons)	0.28	0.27	0.16	0.20	0.22
CO Emissions (tons)	26.5	26.0	15.7	19.5	20.8

Source: WWC Engineering (WWC) completed the calculations, which are provided in **appendix B**

3.4.1.3.3 Acidification of Lakes

Acid deposition causes acidification of lakes and streams, which can have direct impacts on aquatic habitats and contribute to the damage of trees at high elevation and many sensitive forest soils. Acid rain is measured as acidity and alkalinity using a pH for which 7.0 is neutral. The lower a substances pH, the more acidic it is. Normal rain has a pH of about 5.6 (EPA 2019c). The National Atmospheric Deposition Program (NADP) monitors precipitation chemistry at various sites around the U.S. The nearest site to the tract is Site MT00 (**map 3-2**). **Table 3-12** provides the measured hydrogen ion concentrations for the years 2014 through 2018. The trend in pH at monitoring site MT00 appears to be relatively stable.

Table 3-12. Measured Hydrogen Ion (H+ as pH) Concentrations at Monitoring Site MT00

Parameter	2014	2015	2016	2017	2018
pH	5.4	5.6	5.5	5.5	5.7

Source: NADP 2019

3.4.1.4 Climate Change

Climate in the SCM area is generally characterized as semi-arid, or a region where the potential evapotranspiration exceeds the precipitation, but not by an extreme margin (Peel, et al. 2007). The nearest location for recorded long-term climate data is the Sheridan Field Station, Wyoming (Station ID 488160), which provided information for the period of record of 1920 to 2019. The station is approximately 18 miles south of the SCM. The average annual temperature during the period of record was 44.5 degrees Fahrenheit (°F), while the average annual maximum and minimum temperatures ranged from 59.1 to 29.9 °F, respectively. For the period of record, average annual total precipitation and total snowfall were reported to be 15.1 inches and 43.7 inches, respectively. The heaviest precipitation generally occurred between April and June with most snowfall generally occurred in March (Western Regional Climate Center 2020). According to wind data provided in the SCM 2018 ambient air monitoring network report, prevailing winds in 2018 were from the northwest, with maximum winds greater than 30 miles per hour (SCC 2018a).

Global warming refers to the ongoing rise in global average temperature near the Earth's surface. It is caused mostly by increasing concentrations of GHGs (primarily CO_2, methane, nitrous oxide [N_2O], and fluorinated gases) in the atmosphere, and it is changing global climate patterns. Climate change refers to any significant change in the measures of climate (e.g., temperature, precipitation, and wind patterns) lasting for an extended period of time (EPA 2017a).

The Global Change Research Act of 1990 mandates that the U.S. Global Change Research Program (USGCRP) deliver a report to Congress and the president every 4 years that analyzes the effects of global climate change on the natural environment and other systems, as well as provides current trends in global climate change. The recently released second volume of the Fourth National Climate Assessment focuses on the human welfare, societal, and environmental elements of climate change and variability for 10 regions of the United States (USGCRP 2018). The global climate is changing rapidly compared to the pace of natural climate variations that have occurred throughout Earth's history. Evidence for these changes consistently points to human activities, especially emission of GHGs, as the dominant cause. Global average temperature has increased by approximately 1.8°F from 1901 to 2016. Without significant emission reductions, annual average global temperatures could increase by 9°F or more by the end of this century (compared to preindustrial temperatures) (Hayhoe et al. 2018).

Climate model projections for the Northern Great Plains (consisting of Montana, Wyoming, North Dakota, South Dakota, and Nebraska) indicate consistently warmer conditions in 2 to 3 decades and temperatures rising steadily into the middle of the century (Conant et al. 2018). This warming is predicted to occur along with less snowpack and a mix of increases and reductions in average annual water availability. Precipitation and streamflow show only modest changes, but many areas of the Northern Great Plains are already subject to high variability from year to year (both wet and dry years occur). The result of this high variability is low-probability, high-severity events such as extreme floods and droughts (Conant et al. 2018). Overall, climate models predict an increase in the number of heavy precipitation events (events with greater than 1 inch per day) for much of the region, more very hot days (days with maximum temperatures above 90°F), and many fewer cool days (days with minimum temperatures less than 28°F; decreases of 30 days or more per year are predicted by approximately 2050). The increases in very hot days would have potential impacts on agriculture, energy production, human health, stream flows, snowmelt, and fires. The reduction in cool days would have implications for the region's snowpack and, consequently, stream flow and water use (Conant et al. 2018).

The EPA regulates GHG emissions under several initiatives, including the Mandatory Greenhouse Gas Reporting rule, the Final Greenhouse Gas Tailoring rule, geologic sequestration requirements, and EPA and National Highway Traffic Safety Administration standards for new motor vehicles. Under the Mandatory Greenhouse Gas Reporting rule (40 CFR 98), coal mines subject to the rule are required to report emissions in accordance with the requirements of Subpart FF. Subpart FF is applicable only to underground coal mines and would not apply to the Proposed Action. Because no change to the production levels or annual emissions at the Spring Creek Mine would occur under the Proposed Action, no other GHG reporting or permitting requirements would apply.

3.4.1.5 Greenhouse Gases (GHGs)

According to the EPA and the Montana Climate Change Action Plan (CCAP), GHGs include CO_2, methane (CH_4), nitrous oxide (N_2O) and several fluorinated species of gas (EPA 2018b) and CCAC 2007, respectively). 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. 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.

CO_2 is the primary GHG emitted through human activities that contributes to climate change (81 percent of total U.S. GHG emissions in 2016); it is followed by methane (10 percent of total 2016 emissions), N_2O (6 percent of total 2016 emissions), and fluorinated gases (3 percent of total 2016 emissions) (EPA 2018b). The main human activity emitting CO_2 is the combustion of fossil fuels (including the combustion of coal) for electricity, heat, and transportation (EPA 2018c). Methane, which is created during coal formation, is released from coal after it has been uncovered during surface mining operations. In addition, minor amounts of methane are released during coal extraction, storing, loading, and transport. Methane is also released during postmining operations as the coal is processed, transported, and stored for use. In addition, methane is emitted from the production and transport of natural gas and oil, as well as from livestock, other agricultural practices, and the decay of organic waste in municipal solid waste landfills (EPA 2018b). N_2O is emitted from agricultural and industrial activities, as well as during the combustion of fossil fuels and solid waste. Fluorinated gases, which are synthetic, are emitted from a variety of industrial processes (EPA 2018b).

The global warming potential (GWP) of gases was developed to allow comparisons of global warming impacts between different gases. The GWP of a gas depends on how well the gas absorbs energy and how long the gas stays in the atmosphere. It is a measure of the total energy that a gas absorbs over a particular period of time (usually 100 years) compared with CO_2. CO_2 has a GWP of 1. The larger the GWP, the more warming the gas causes. For example, methane's 100-year GWP is estimated to be 28 to 36, meaning that methane will cause 28 to 36 times as much warming as an equivalent mass of CO_2 over a 100-year time period (EPA 2017b). The GWP for N_2O is estimated to be 265 to 298.

The term carbon dioxide equivalent (CO_2e) is used to describe different GHGs in a common unit. For any quantity and type of GHG, CO_2e represents the amount of CO_2 that would have the equivalent global warming impact (Brander 2012). Surface coal mines in the United States reported emissions of 7.2 million metric tons (MT) of methane CO_2e in 2017 (out of a total of 55.7 million MT of CO_2e emissions from all U.S. coal mining and 6,456.7 million MT of CO_2e emissions from all sources across the country) (EPA 2019a). These surface coal mine emissions represent 13 percent of all coal mining CO_2e emissions and 0.1 percent of all CO_2e emissions in the United States for 2017.

The EPA's Mandatory Greenhouse Gas Reporting rule requires industrial facilities and suppliers of fossil fuels or industrial gases that result in greater than 25,000 MT of CO_2e of GHG emissions per year to report their emissions. **Table 3-13** lists the industry sector, number of reporting facilities, and total GHG emissions for the United States and Montana for reporting year 2018 from EPA's Facility Level Information on Greenhouse Gases Tool (FLIGHT) (EPA 2019e). These data are useful to understand which large sources of anthropogenic emissions are contributing to GHG emissions both nationally and at the state level.

Table 3-13. 2018 Greenhouse Gas Emissions from Large Facilities, by Sector

Industry Sector	Number of Reporting Facilities (U.S.)	Number of Reporting Facilities (Montana)	U.S. Reported GHG Emissions (million metric tons CO_2e)	Montana Reported GHG Emissions (million metric tons CO_2e)	Global Anthropogenic GHG Emissions
Power plants	1,389	8	1,815	15.4	–
Petroleum and natural gas systems	2,319	6	316	0.1	–
Refineries	140	4	181	2.0	–
Chemicals	457	4	191	0.8	–
Other	1,316	3	130	0.2	–
Minerals	383	4	116	1.0	–
Waste	1,498	5	109	0.3	–
Metals	304	1	94	0.04	–
Pulp and paper	218	0	36	0	–
Total*	**7,655**	**35**	**2,987**	**19.8**	**49,000†**

* Total reporters shown may be less than the sum of the number of reporters in the selected source categories because some facilities fall within more than one source category.
† Intergovernmental Panel on Climate Change (IPCC) (2014).

Further insight into trends in GHG emissions from large facilities in Montana can be seen in **figure 3-2**. FLIGHT Data from 2010 through 2018 show variation in annual GHG emissions per year, with an overall -21 percent decline in CO_2e emissions in Montana from 2010 through 2018 (EPA 2019d).

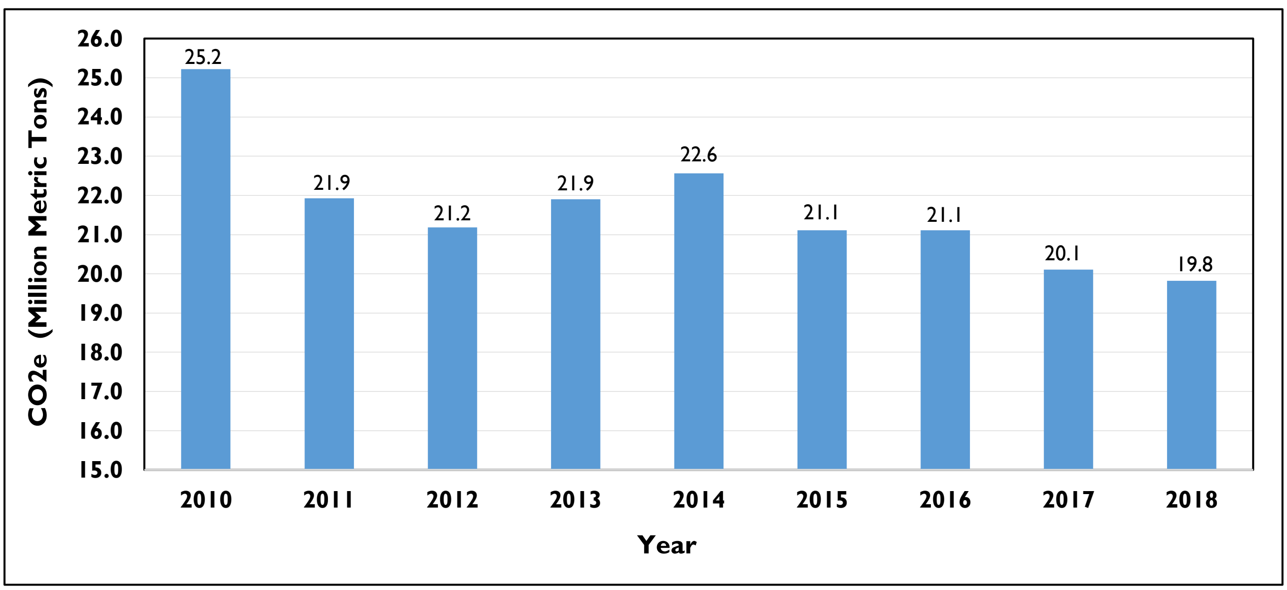


Figure 3-2. Montana annual CO_2e, in million metric tons

The estimated CO_2e emissions from coal mined at the SCM, based on average annual production between 2014 and 2018, are included in **table 3-14**. 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 via rail to final destinations at power plants and loading terminals and from overseas vessel transport are also estimated, which were calculated using a per-trip weighted average of 1,210 rail miles from the SCM to final destinations and 4,300 nautical miles for overseas transport. Discussions of shipping destinations are included in **section 1.2.1**.

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 3-14**, an average of 30.1 million metric tons of CO_2e were produced annually between 2014 and 2018 (see **appendix B** for calculations).

Table 3-14. Estimated Equivalent CO_2 (CO_2e) Emissions from Coal Mined at the SCM

Source	2014-2018 Average Annual Emissions
Tons of Coal Recovered	14.21
Fuel	27,910
Electricity Consumed in Mining Process	45,322
Mining Process[1]	8,208
Total Direct Emissions	*81,440*
Haulage[2]	931,448
From Coal Combustion	29,040,144
Total Indirect Emissions	*29,971,592*
Total Estimated CO_2e Production	**30,053,032**

1. Blasting and methane emission
2. Includes rail and vessel transport

Source: WWC (2019), calculations are provided in **appendix B**

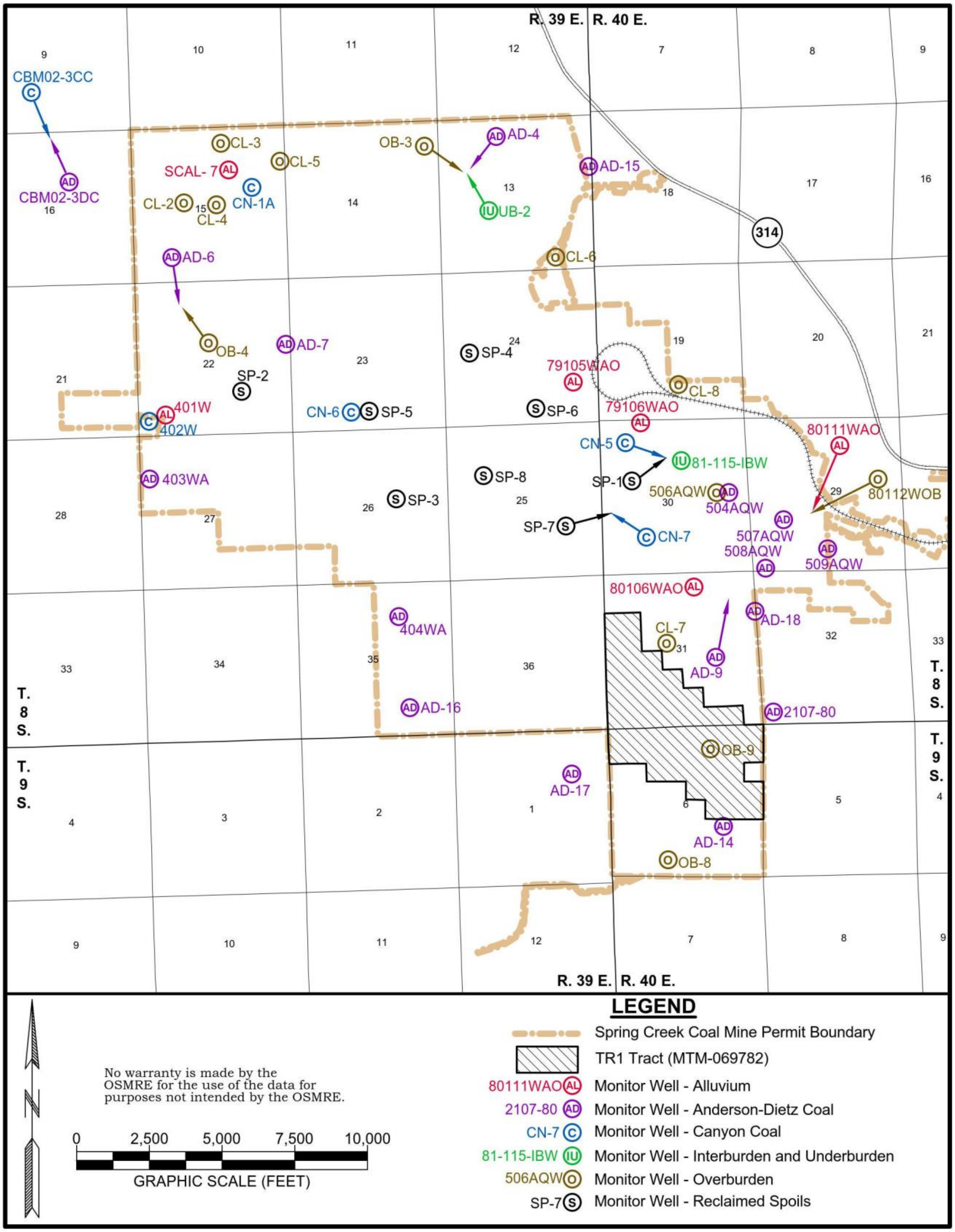
3.5 Water Resources

Section 3.5 of the 2010 LBM EA included detailed discussions of water resources related to MTM-069782. 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.

3.5.1 Groundwater

There are four major shallow geologic units related to the MTM-069782 containing groundwater that could be impacted by coal mining. These shallow units are the Quaternary alluvium, clinker (scoria or burn), overburden, and the Anderson/Dietz coal seam. Current groundwater monitoring well locations are indicated on **map 3-3**. Monitoring wells are identified by well number and completion aquifer, such as alluvium (6 wells), overburden/clinker (13 wells), interburden/underburden (2 wells), coal (23 wells), and backfill/spoil (8 wells).

According to groundwater quality monitoring results included in the SCM 2018 Annual Hydrology Report submitted to MDEQ, groundwater quality analyzed during the October 1, 2017 through September 30, 2018 reporting period was similar to the previous reporting period (SCC 2018b). The results of 2018 groundwater quality monitoring are included in **appendix C**.



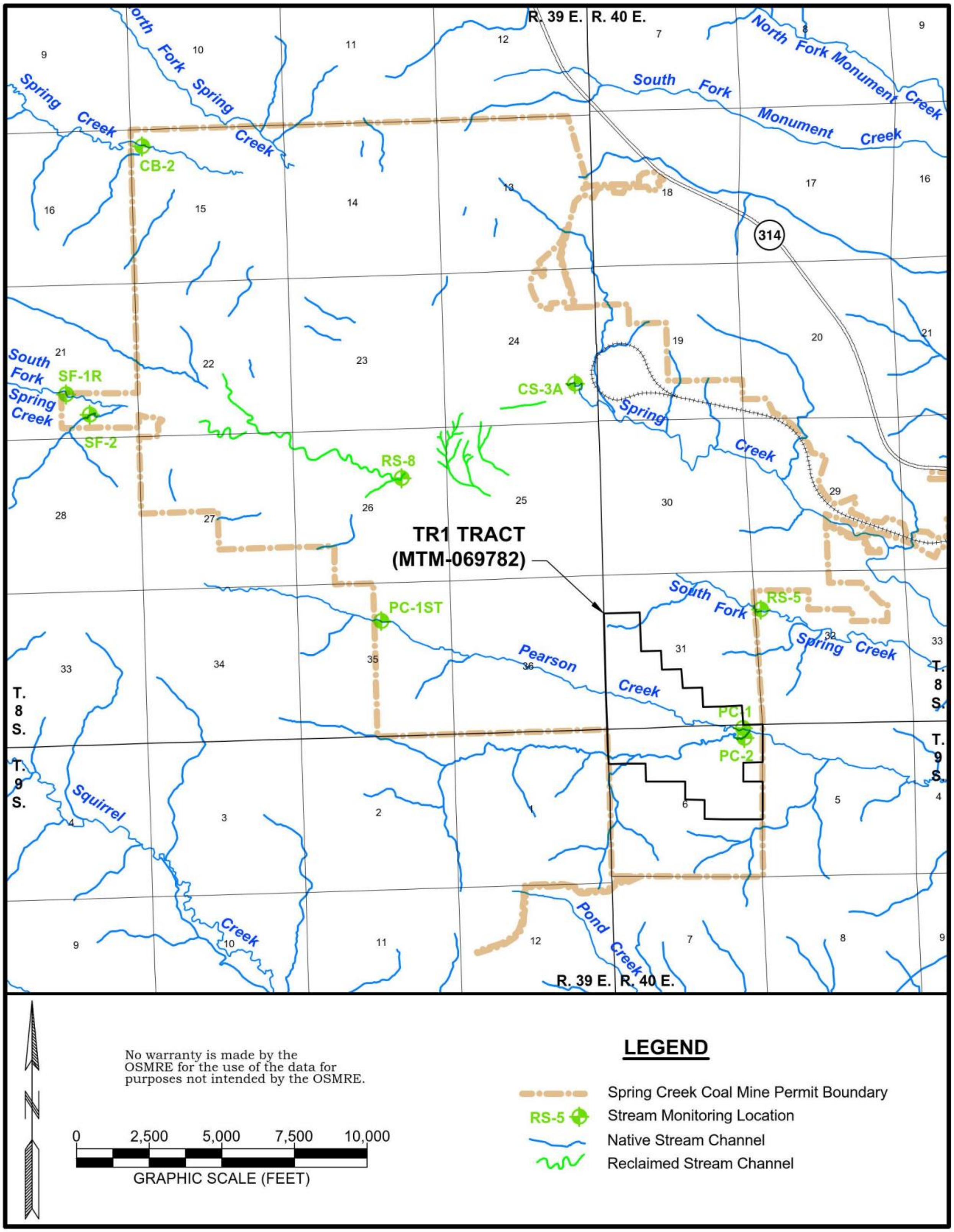
Map 3-3. Active Groundwater Monitoring Locations at the Spring Creek Mine

Water quality is highly variable depending on the source aquifer. The dominant ionic constituents within the coal waters are sodium and bicarbonate. The average total dissolved solids (TDS) concentration in the Anderson/Dietz coal aquifer (from 18 wells monitored in 2018) was recorded at approximately 1,829 milligrams per liter (mg/L). As the groundwater moves downward through the overburden and into the coalbed aquifers, the water becomes less mineralized, which is due mainly to cation exchange (softening and sulfate reduction) mechanisms. The quality of groundwater from the Anderson/Dietz coal seam is generally suitable for domestic and livestock purposes; however, due to the high sodium adsorption ratio (SAR) (average 9.1), only crops with high salt tolerance can be irrigated with water directly from the Anderson/Dietz coal seam (Ayers and Westcot 1976). Based on pre-mining potentiometric maps (Van Voast and Hedges 1975), the flow direction of the pre-mine groundwater system was from recharge zones in highlands east and west of the mine toward the hydrologic discharge boundary formed by the Tongue River. Current groundwater conditions have changed in the SCM area as a result of coalbed natural gas (CBNG) development and ongoing mining operations at the SCM and Decker Mine. Because CBNG production requires the reduction of pressure head, pumping produced substantial, widespread water level decline in numerous coal aquifers in the Decker area (MDEQ-WQD 2020). Interpretative drawdown for the hydraulic properties of coal and overburden aquifers, such as 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 spoil backfill has a more uniform hydraulic conductivity in contrast to undisturbed, bedded lithology where vertical conductivity is usually lower than horizontal conductivity (MDEQ-WQD 2020).

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 (MDEQ-WQD 2020).

3.5.2 Surface Water

The main surface water features within and adjacent to the SCM include the Tongue River Reservoir, North Fork Spring Creek, South Fork Spring Creek, Spring Creek, Pearson Creek, and Squirrel Creek. The ephemeral stream channels within the SCM area convey runoff and transport sediment loads, based on the magnitude of the runoff event. The TR1 Tract is located within the Pearson Creek and Spring Creek watersheds. The flows of Spring Creek and its north and south forks are currently detained in flood control reservoirs located upstream from the mining operation to keep the runoff out of the SCM pits. Pearson Creek flow is not currently detained by the mine, but flows have been substantially altered by a man-made diversion and impoundment associated with the West Pit of the Decker Mine. These flood control structures have been in place for several years, effectively cutting off Spring Creek and Pearson Creek flows upstream of the Tongue River. Stream flow and surface-water quality associated with the SCM are currently monitored at nine monitoring sites (**map 3-4**). Since the publication of the 2010 LBM EA, three monitoring sites have been removed and two sites have been added to the MDEQ-approved surface-water monitoring network for the SCM. Five sites (CB-2, SF-1R, RS-8, PC-1ST, and PC-2) provided data in 2018 (**appendix C**).



Map 3-4. Surface Drainages and Surface Water Monitoring Sites at the Spring Creek Mine

The surface-water quality varies with stream flow rate; the higher the flow rate, the lower the TDS concentration but the higher the suspended solids concentration. Due to the flow fluctuations in South Fork of Spring Creek and Pearson Creek, the surface water quality is usually unsuitable for domestic use but suitable for irrigation and livestock use (Ayers and Westcot 1976). In 2018, levels of dissolved aluminum, total iron, and total copper levels at several surface-water monitoring site were reported at levels above the DEQ-7 comparison criteria. Although elevated above the DEQ-7 comparison criteria, theses monitoring results represent ambient surface water conditions because some of the elevated levels were recorded at sites upstream of the mine, as well as sites within and below the mine. In 2018, levels of dissolved aluminum and conductivity levels at several surface-water monitoring sites were reported at levels above the MDEQ comparison criteria (SCC 2018b).

3.5.3 Water Rights

The Montana Department of Natural Resources and Conservation (DNRC) oversees surface water and groundwater rights in Montana. Prior to energy development in the area, water appropriations (either groundwater or surface water) were typically for livestock use. Currently, mining companies hold the majority of the water rights in the vicinity of the TR1 Tract. Records of the DNRC were searched for surface water and groundwater rights within a 2-mile radius of the tract to update water-rights information (Montana DNRC 2019).

DNRC records indicate that as of September 2019, there were 21 distinct (no duplicates) surface water rights within the 2-mile search area, of which 11 were owned by coal mining companies. The permitted surface-water rights uses include:

1. 9 stock
2. 3 industrial
3. 3 pollution abatement
4. 3 commercial
5. 2 sediment control
6. 1 irrigation

DNRC records indicate that, as of September 2019, there were 26 distinct groundwater rights within 2 miles of the tract, of which, 18 are owned by coal mining companies. The permitted groundwater rights uses include:

1. 12 industrial
2. 8 stock
3. 3 pollution abatement
4. 2 domestic
5. 1 fisheries

3.6 Alluvial Valley Floors

Alluvial valley floors (AVFs) within the TR1 Tract are described in section 3.6 of the 2010 LBM EA. Two possible AVFs, Spring Creek and South Fork Spring Creek, were investigated in 1980 to determine their AVF status (Volume 1, Section 17.24.325, SCC 2001). Spring Creek was found not to be an AVF. Approximately 90 acres of AVF delineated on South Fork Spring Creek were found to be an AVF that is insignificant to agriculture. Much of the South Fork Spring Creek AVF has already been disturbed, as approved in the current permit document.

3.7 Wetlands/Aquatic Features

Wetlands/aquatic features within the TR1 Tract are described in section 3.7 of the 2010 LBM EA. As verified by the U.S. Army Corps of Engineers (USACE), no potential jurisdictional wetlands were identified during field surveys of the TR1 Tract. Stock ponds and water impoundments with wetland soils, plants, and hydrology are present, but they are not considered jurisdictional because they either lack a continuous ordinary high-water mark or do not have a continuous nexus to other waters of the U.S. (WOTUS).

3.8 Soils

Soils within the TR1 Tract are described in section 3.8 of the 2010 LBM EA. The tract does not contain areas considered prime farmland. One map unit fits the criteria for prime farmland if irrigated but cultivation has not been historically practiced in this area and no reasonable sources of irrigation water are currently available.

3.9 Vegetation

Vegetation within the TR1 Tract is described in section 3.9 of the 2010 LBM EA. The plant communities present in the tracts are representative of the Montana Mixed Prairie Association. Much of the TR1 Tract occurs within a segment of the Pearson Creek drainage, which is characterized by stands of Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*), bluebunch wheatgrass (*Agropyron spicatum*), western wheatgrass (*Agropyron smithii*), little bluestem (*Andropogon scoparius*), silver sagebrush (*Artemisia cana*), winterfat (*Ceratoides lanata*), and black greasewood (*Sarcobatus vermiculatus*). Annual brome grasses are common in some areas of the drainage, as are a limited number of open and closed canopy forested areas.

Surveys for threatened and endangered (T&E) plant species have been performed for the SCM area. No T&E plant species (including Ute Ladies' Tresses [*Spiranthes diluvialis*]) were located within the vicinity of the TR1 Tract. In addition, the U.S. Fish and Wildlife Service (USFWS) has not designated any "critical" habitat for this species in the vicinity of the TR1 Tract at this time (USFWS 2019a).

Two vegetative species of concern, as indicated by Montana Natural Heritage Program (MNHP), were recorded during the 2006-2007 vegetation surveys for Pearson Creek. Barr's milkvetch (*Astragalus barrii*) and the woolly twinpod (*Physaria didymocarpa)* have been identified as occurring in the area. Barr's milkvetch is listed as sensitive under the BLM classification and has an S3 state rank (potentially at risk because of limited range, population and/or habitat). The 2006-2007 vegetation surveys indicated that Barr's milkvetch was broadly distributed, if not abundant, within the TR1 Tract. The wooly twinpod has an S2S3 state rank (at risk because of very limited and/or potentially declining population numbers, range and/or habitat). SCM has voluntarily conducted extensive conservation efforts to grow the wooly twinpod in nurseries and outplant it into reclamation. The Nuttall desert-parsley (*Lomatium nuttallii*), an S1 ranked species (at high risk because of extremely limited and/or rapidly declining population numbers, range and/or habitat) has been observed in southeastern Montana but it have not been observed in the Spring Creek area.

3.10 Wildlife

Wildlife associated with the TR1 Tract is described in section 3.10 of the 2010 LBM EA. No substantial 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 2010 LBM EA. 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), including federal Birds of Conservation Concern and Montana Species of Greatest Conservation Need (SGCN). The status of GRSG has also changed since publication of the 2010 LBM EA. Therefore, these species discussions have been updated in this EA.

3.10.1 Big Game

Extensive discussions of big game species (primarily pronghorn [*Antilocapra americana*], mule deer [*Odocoileus hemionus*], and white-tailed deer [*Odocoileus virginianus*]) were included in the 2010 LBM EA and in subsequent annual wildlife monitoring reports. The discussion included in this EA is related to an evaluation of Montana Fish, Wildlife and Parks' (MFWP) classification of the tract relative to their Crucial Areas Planning System (CAPS) for winter range habitat (MFWP 2016).

None of the 728.4 acres of new disturbance associated with the TR1 Tract is considered high value big game winter range habitat, although approximately 546.3 acres (75.0 percent) of the proposed disturbance are considered moderate value big game winter range. The remaining 182.1 acres (25.0 percent) are not rated as winter range. No big game migration corridors have been identified within or near the wildlife study area boundary.

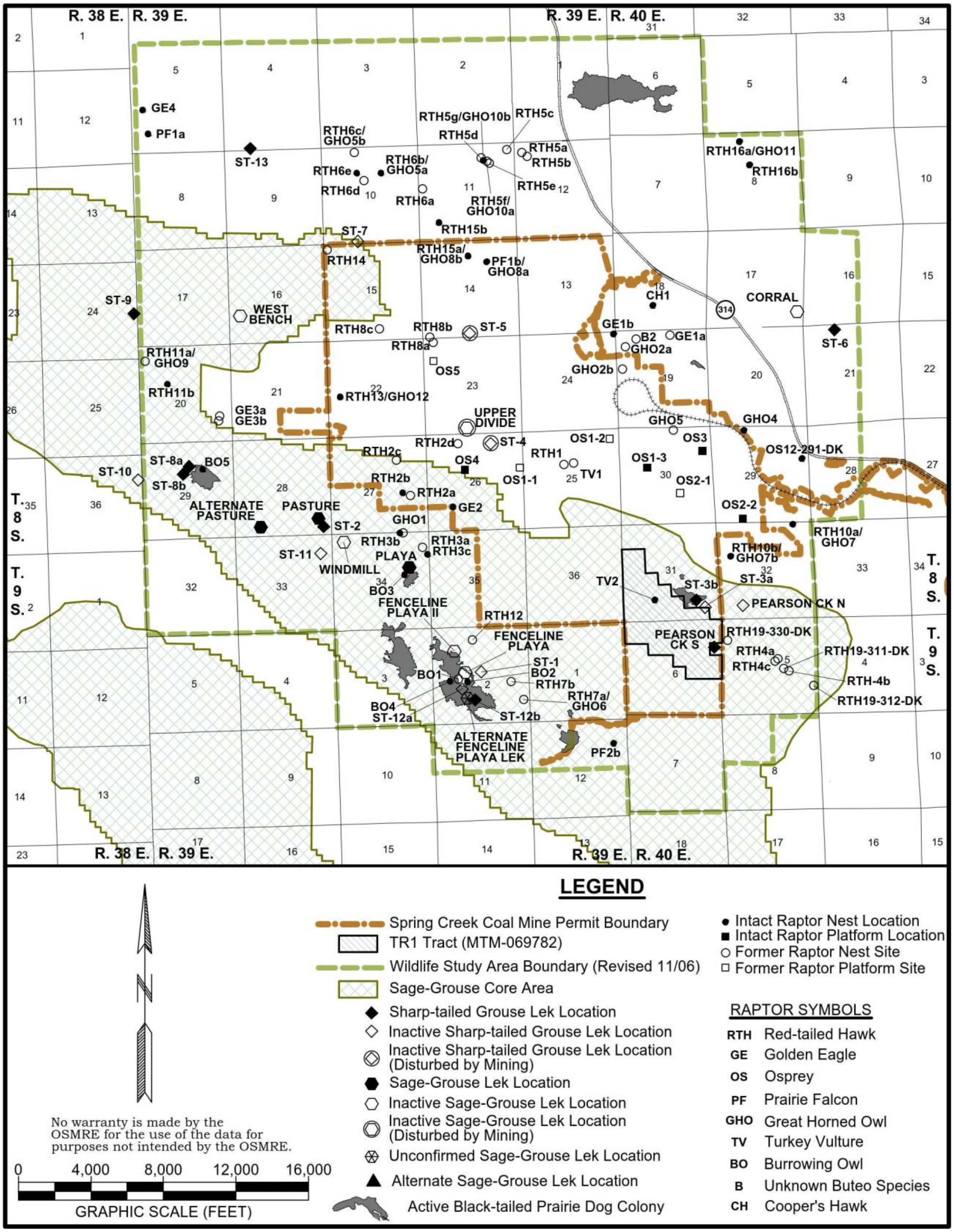
3.10.2 Raptors

The 2018 annual report identified the location and annual status of raptor nests for 2018 (Great Plains Wildlife Consulting, Inc. [Great Plains Consulting] 2019). The location and status are included on (**map 3-5**). One intact raptor nest (TV2 - turkey vulture [*Cathartes aura*]) is located within the proposed disturbance limit needed to recover coal within the TR1 Tract. This species is a migratory bird, which is protected under the MBTA (USFWS 2019b). This nest has not been used since at least 1994.

Raptor SOSI that could potentially occur in the area include the burrowing owl (*Athene cunicularia*), ferruginous hawk (*Buteo regalis*), bald eagle (*Haliaeetus leucocephalus*), golden eagle (*Aquila chrysaetos*), northern goshawk (*Accipiter gentilis*), Swainson's hawk (*Buteo swainsoni*), prairie falcon (*Falco mexicanus*), and peregrine falcon (*Falco peregrinus*) (**appendix D**). All of these species have been observed in the Spring Creek wildlife study area but none nest within the TR1 Tract (**map 3-5**).

SCC has developed a general management plan regarding raptor 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:

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



Map 3-5. Wildlife Use Associated with the TR1 Tract within the Spring Creek Mine Area

3.10.3 Greater Sage-Grouse (GRSG)

Based on the current classification system for GRSG (MFWP 2019), the SCM annual wildlife monitoring area (see **map 3-5)** includes three confirmed active lek sites, five confirmed inactive leks, one unconfirmed site, and one confirmed extirpated (mined through) lek (**table 3-15**). Long-term results from annual lek monitoring (1981-2018) suggest that GRSG populations in the SCM annual wildlife monitoring area are cyclic, with periodic peaks and declines (Great Plains Consulting 2019). The population at SCM was highest during the late 1980s and mid-2000s. However, peak male counts did not exceed nine males over the monitoring period. Despite occasionally elevated GRSG numbers, peak counts at the monitored leks were below the long-term average of 2.9 males per lek during 19 of the last 39 years (Great Plains Consulting 2019). This pattern is common throughout their range (Crawford et al. 2004). These data suggest that the SCM area may only support larger groups of GRSG when regional populations are especially high.

Table 3-15. Peak GRSG Counts at Leks Within the Spring Creek Mine Annual Monitoring Area During Spring, 2018

LEK	MALES	FEMALES	TOTAL	CURRENT MANAGEMENT STATUS [1]
Windmill	0	0	0	Confirmed Inactive
Pasture/ Alternate Pasture	0/0	0	0/0	Confirmed Active/ Confirmed Active
Playa	0	0	0	Confirmed Active
Corral	0	0	0	Confirmed Inactive
Fenceline Playa/ Alternate Fenceline Playa	0/0	0/0	0/0	Confirmed Inactive/ Unconfirmed lek
Fenceline Playa II	0	0	0	Confirmed Inactive
West Bench	0	0	0	Confirmed Inactive
Upper Divide	--	--	--	Confirmed Extirpated by fall 1984

[1] As defined by Montana Fish, Wildlife and Parks (2017): Active = at least two males present in at least 1 year followed by fresh sign within 10 years of that observation; Inactive = no males present for last 10 consecutive years; Confirmed extirpated = lek site physically disturbed; Unconfirmed-Possible lek = grouse activity documented but insufficient data to classify as active.

3.10.4 Threatened, Endangered, and Candidate Species, and Special Status Species

3.10.4.1 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 Montana (USFWS 2018). The USFWS also provides the Information for Planning and Consultation (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 3.10.7 of the 2010 LBM EA, which included evaluations of bald eagles, interior least terns (*Sterna antillarum athalassos*), and black-footed ferrets (*Mustela nigripes*). The current USFWS list of T&E species that may occur in Big Horn County, Montana only includes the black-footed ferret (USFWS 2018). The bald eagle was removed from the federal list of T&E species on August 9, 2007 (USFWS 2011) and the interior least tern is not included on the current T&E list for Big Horn County (USFWS 2018). The

USFWS has not designated any "critical" habitat for any of these two species in the vicinity of the SCM at this time (USFWS 2019a). While the official list of T&E species that may occur in the TR1 Tract (USFWS 2019a) indicated that there are no listed species identified within project area, the one species included on the county list will be reevaluated.

The black-footed ferret is listed as endangered, experimental, non-essential for the SCM area. Targeted surveys for this species have not yet been required or conducted for mine-related activities due to the lack of disturbance in potential habitat (prairie dog colonies). Neither ferrets nor their sign (e.g., trenching, scat, tracks) have ever been documented in the vicinity of the SCM, or at other regional mines, despite long-term annual monitoring (diurnal and nocturnal) of other wildlife species, including prairie dogs, and periodic targeted ferret surveys conducted in similar habitats elsewhere in the vicinity (Great Plains Consulting 2017). Based on the USFWS's (2013) recent update to the Black-Footed Ferret Recovery Plan, the SCM is not located near an active or potential reintroduction area for this species. Based on a recent (2015) map of ferret reintroduction populations in Montana, the nearest reintroduction site is within the Crow Reservation, approximately 45 miles northwest of the SCM (Great Plains Consulting 2017).

3.10.4.2 Species of Special Interest (SOSI)

For the purposes of this discussion, SOSI include BLM-designated sensitive species, Montana Natural Heritage Program (MTNHP) species of concern (SOC), MFWP's State Wildlife Action Plan (SWAP) species, and species under the jurisdiction of the USFWS through the MBTA or the Bald and Golden Eagle Protection Act (BGEPA). USFWS T&E species are not included in this category since they are included in the T&E discussion, above. There is a considerable amount of crossover between the species occurrence on the various lists included in SOSI. BLM sensitive species include those species listed or proposed for listing under the ESA together with species designated internally as BLM sensitive in accordance with BLM Manual 6840 (BLM 2008). MTNHP has developed a list of SOC in Montana that are native Montana animals that are considered to be "at risk" due to declining population trends, threats to their habitats, and/or restricted distribution (MTNHP 2019). Montana's SWAP identifies community types, Focal Areas, and species in Montana with significant issues that warrant conservation attention (MFWP 2015). The MBTA makes it illegal to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or the parts, nests, or eggs of such a bird except under the terms of a valid federal permit. The BGEPA prohibits taking bald eagles, golden eagles, or their eggs, parts, or nests without a permit issued by USFWS. MFWP-designated SGCN include wildlife species with low and declining populations that are indicative of the diversity and health of Montana's wildlife (MFWP 2019).

The SCC wildlife study area boundary is within Bird Conservation Region (BCR) 17 (Badlands and Prairies) of the United States (USFWS 2008). The 2008 (most current available) list of birds of Conservation Concern for BCR 17 contains 28 species (**appendix D**). Several of the species in BCR17 have been documented at least once within the SCM wildlife study area boundary over time, though nearly half of those observations occurred with varying degrees of infrequency. The most abundant species recorded over time consisted of common raptors and passerine species known to nest in the survey area.

Twenty-four of the 38 Montana vertebrate SOSI that could potentially occur in the area have been documented within or immediately adjacent to the SCC wildlife study area boundary, from 1994 through 2018 (Great Plains Consulting 2019). The list includes 7 mammals, 14 birds, and 6 reptiles/amphibians. The entire SOSI list is included in **appendix D**.

3.11 Land Use and Recreation

Land use and recreation (under Ownership and Use of the Land) on the TR1 Tract is described in section 3.11.1 of the 2010 LBM EA. The surface ownership within the LBM tract includes 77.1 acres of federal BLM-administered land and 421.0 acres of private land. Livestock grazing and wildlife habitat are the primary land uses.

3.12 Cultural Resources

Information regarding background cultural resources within the current SMP C1979012 permit boundary was included in section 3.12 of the 2010 LBM EA. A summary of the cultural resources management process for cultural resource sites inside SMP C1979012 as of 2018 is included in **appendix E**. According to information provided in SCC's 2018 Annual Mining Report, 122 cultural resources sites have been identified within the SMP C1979012 permit boundary, of which, 13 have been designated as eligible for listing on the National Register of Historic Places (NRHP). Only one (24BH3392) of the 13 NRHP eligible sites within the permit boundary is within the disturbance area associated with the TR1 Tract.

Native American tribes were consulted during the preparation of the 2010 LBM EA and this EA. In response to the 2010 LBM EA consultation, the Northern Cheyenne Tribe Preservation Office requested additional information and participated in a discussion of the cultural resource issues related to the TR1 Tract and accompanied mine personnel on tour of several of the sites on January 22, June 19 and 29, and July 1, 2009 and on January 14, 15, and 19, 2010. On February 11, 2016, OSMRE requested continued consultation with Native American tribes for the stages of the proposal development and implementation of the final federal action. No Native American tribes responded to OSMRE's consultation request.

3.13 Visual Resources

Visual resources related to the TR1 Tract is described in section 3.13.1 of the 2010 LBM EA. The SCM facilities and some mining activities are currently visible from Federal-Aid Secondary (FAS) 314. Under the mine plan for the existing leases, mining has approached this public road and is plainly visible to passers-by. The TR1 located over 2.5 miles from FAS 314. The tract would not be plainly visible from the transportation corridor. Most of the people traveling this road are commuting to work at the SCM and the nearby Decker Mine. However, during periods of peak recreational activity this highway generates higher traffic volume. Landscapes found within and adjacent to the SCM area, and visible from FAS 314, include gently rolling benches of sagebrush, and mid-short-grass prairie. Major man-made intrusions include ranching, farming, transportation facilities and electrical power lines.

3.14 Noise

Noise related to the TR1 Tract is described in section 3.14.1 of the 2010 LBM EA. Existing noise sources in the area of proposed TR1 Tract are coal mining activities, agricultural and recreational activities, traffic on FAS 314 and the county road, rail traffic, boat traffic, and birds and animal life. FAS 314, which is a continuation of Wyoming Secondary Route 87, is over 2.5 miles from tract. This public highway is the primary route to and from work for the Sheridan residents employed at the mines north of Sheridan and is a secondary route for farm-market vehicles including large trucks. Traffic on FAS 314 is heaviest during the daylight hours and at shift changes. SCC has developed internal criteria on noise performance to ensure the protection of local community health and the environment.

Noise and vibration are traditionally linked in environmental impact assessments for rail because the two disciplines are perceived to have many physical characteristics in common. Railroad operation noise can result from diesel locomotive engine and wheel/rail noise and horn noise, which includes locomotive warning horns sounding at at-grade rail/roadway crossings (Surface Transportation Board [STB] 2015a). Noise from trains is primarily a function of train speed, train length, track construction, and number and type of locomotives. Vibration caused by trains radiates energy into the adjacent soil in the form of different types of waves that propagate through the various soil and rock strata to nearby structures and other receptors.

A number of federal noise and vibration statutes, regulations, and guidelines are applicable to rail transport, including the Noise Control Act of 1972 (42 U.S.C.§ 4910), STB and Federal Railroad Administration (FRA) regulations and guidance, EPA's Railroad Noise Emission Standards (40 C.F.R. Part 201), Federal Transit Authority (FTA) assessment methods, and noise limits related to occupational safety.

3.15 Transportation

3.15.1 Vehicle Transportation

Transportation discussions related to the TR1 Tract are included in section 3.15.1 of the 2010 LBM EA. Nearby transportation facilities include FAS 314 (which is a continuation of Wyoming Secondary Route 87) and local access roads. FAS 314 is classified as a two-lane, secondary major collector (MDT 2019). The highest annual average daily traffic (AADT) in the past 5 years on FAS 314 at a count station just north of the Montana/Wyoming border was 866 vehicles (MDT 2019), which equates to 36 vehicles per hour. According to MDT information the design hourly volume for the road at this site in 2018 was 126. The highest AADT in the past 5 years on FAS 314 at a count station approximately 3.5 miles south of the entrance to the of the SCM was 630 vehicles, which equates to 26 vehicles per hour. According to MDT information the design hourly volume for the road at this site in 2018 was 74 (MDT 2019).

3.15.2 Rail Transportation

Information is available on the destination of approximately 13.77 Mt of coal mined at the SCM is shipped to various destinations using a railroad spur owned by Spring Creek Coal and used by Burlington Northern-Santa Fe (BNSF) and BNSF-owned/maintained mainline railroad tracks (**map 1-3**). According to U.S. Energy Information Administration (USEIA) information, 7.9 Mt of coal were shipped from the SCM in 2018 to six power plants in the U.S. (USEIA 2019). In addition, the SCM shipped 4.5 Mt of coal to the Westshore Port in Washington for export overseas (**Table 3-16**). The remaining 1.3 Mt of the 2018 SCM coal shipments were to various other destinations not accounted for in the USEIA database and the destinations were not publicly available. The USEIA information represents approximately 90 percent of the coal shipped from the SCM. Based on USEIA information, coal shipments utilized approximately 1,982,000 miles of rail lines for 797 round trips. Using a simple calculation of tons per train (15,600) and miles per ton (0.2), the remaining 1.3 Mt of coal would result in approximately 86 additional train round trips and the utilization of approximately 213,150 miles of rail lines. The total rail miles for 2018 would be approximately 2,195,200 miles. For comparison purposes, in 2018 freight was hauled by rail in the U.S. over 476,500,000 miles (U.S. Department of Transportation [USDOT] 2019). Therefore, the annual rail transport of coal resulting from the 2018 SCM coal shipments represented approximately 0.46 percent of the total 2018 U.S. rail freight traffic.

Table 3-16. Destinations, Tonnages, and Distances for Coal Mined at the SCM in 2018

Destination	Tons Shipped	Percent of Shipments	Number of Trips[2]	Round-trip Rail Miles[1]	Total Rail Miles
Asia (Westshore Port, British Columbia)	4,503,000	36.22	289	3,000	865,962
DTE-BRSC Shared Storage (Wisconsin)	3,756,426	30.22	241	2,064	497,004
Transalta Centralia Generation (Washington)	2,361,244	18.99	151	2,400	363,268
Clay Boswell (Minnesota)	659,895	5.31	42	1,954	82,656
Coronado (Arizona)	563,243	4.53	36	2,876	103,839
Hoot Lake (Minnesota)	326,360	2.63	21	1,660	34,728
Presque Isle (Wisconsin)	260,860	2.10	17	2,064	34,514
Total (from USEIA)	*12,431,028*	*90.3*	*797*	*16,018*	*1,981,971*
Addition Shipments (Information not publicly available)	1,337,027	9.7	86 [3]	--	213,200 [3]
Total	**13,768,055**	**100.00**	**883** [3]	16,018	**2,195,171** [3]

1. Approximate miles
2. Round trip, based on an estimated 15,600 tons of coal per train
3. Estimated value

-- Data are not publicly available

Source: USEIA 2019

3.15.3 Vessel Transportation

At the Westshore Port, coal is loaded onto ocean-going vessels for overseas transport to ports in the Republic of Korea (ROK). The average ocean transport distance between Westshore and possible coal ports in the ROK is estimated to be approximately 4,300 nautical miles one-way (SCM 2019). Specific customers, combustion locations/facilities, and ports used are not known and would be too speculative to analyze further. Approximately 4.5 Mt of coal were shipped overseas in 2018, resulting in an estimated 36 round trip vessel (barge) trips.

3.16 Hazardous and Solid Wastes

Hazardous and solid waste discussions related to the TR1 Tract are included in section 3.16.1 of the 2010 LBM EA. Potential sources of hazardous or solid waste on the tract include spilling, leaking, or dumping of hazardous substances, petroleum products, and/or solid waste associated with coal mining activities. No such hazardous or solid wastes are known to be present on the tract at this time. Wastes produced by the mining and/or disturbance of the tract would be similar to those currently produced at the SCM.

3.17 Socioeconomics

Information regarding socioeconomics was included in section 3.17 of the 2010 LBM EA. Discussions related to housing, local government services, and environmental justice have not significantly changed enough to require reevaluation in the EA. Updated discussions on the local economy, population, and employment are included below.

3.17.1 State/Local Economy

Montana has relied on its natural resources as a primary source of tax revenue. Generally, natural resource taxes are categorized as either severance/license taxes or some form of ad valorem (property) taxes. Total natural resource tax collection for the State of Montana in fiscal year (FY) 2018 was $253,021,454. Montana coal severance taxes accounted for approximately 23 percent of the total 2018 FY tax revenues from natural resources (Montana Department of Revenue 2018).

Coal production, as reported by the Montana Coal Council (2018), showed Montana's coal production was 35.3 Mt in 2017. This was an increase of approximately 9.0 percent over the 32.4 Mt produced in 2016. The 2017 production was less than the record 44.9 Mt produced in 2008. Montana's output of coal has remained relatively constant since 1988, with relatively significant annual fluctuations. Montana was the seventh-largest coal producer among the 50 states in 2016 (Montana Coal Council 2018).

Total cumulative royalties from the SCM amounted to approximately $482.4 million in 2017. SCC is the third largest surface coal mining monetary payer in the State of Montana (Montana Coal Council 2018). State and federal governments are the major beneficiaries of these payments, whereas private owners of pre-mining land leases are minor beneficiaries of these payments. Mineral royalties are collected on the amount of production and the value of that production. The current royalty rate for federal coal leases at surface mines is 12.5 percent, with half of this revenue returned to the state. Coal severance taxes are collected by the state of Montana. Currently, Montana collects 15 percent of the price of the coal as severance tax.

3.17.2 Population

According to U.S. census data, in 2018 Sheridan County had a population of 30,233 (U.S. Census Bureau 2019). The 2010 population of Sheridan County was 29,119. Therefore, there was an increase of 1,034 persons or 3.8 percent since SCM's 2010 LBM EA was issued.

Population in Big Horn County, Montana continues to be sparse. According to the U.S. Census Bureau, Big Horn County had a population of 13,338 in 2018. The 2010 population of Big Horn County was 12,865. Between 2010 and 2018, the population of Big Horn County grew by approximately 3.7 percent (U.S. Census Bureau 2019).

3.17.3 Employment

A majority of the employees at the SCM reside in Sheridan County. The average total labor force in Sheridan County in December 2018 stood at 15,232 with an unemployment rate of 3.8 percent (Wyoming Department of Employment 2019). Total employment in Sheridan County generally decreased between December 2018, when compared to December 2017. In 2017, the largest employment sector in Sheridan County was the management, business, science, and arts sector, with 41.1 percent of the employees. This was followed by sales (20.2 percent), service (17.5 percent), natural resources, construction, and maintenance (12.1 percent), and production, transportation, and materials moving (9.2 percent) (U.S. Census Bureau 2019).

Decker and Spring Creek Mines are two of the three primary mining employers in Big Horn County. Montana receives the payroll taxes, royalties, and production taxes, but most of the employees reside in Sheridan County. In 2017, the Decker and Spring Creek mines employed 137 and 247 people, respectively, with estimated payrolls of $11,037,000 and $23,677,000, respectively (Montana Coal Council 2018).

4.0 Environmental Consequences/Cumulative Effects

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., major, moderate, minor, negligible, or no impact). For purposes of discussion and to enable use of a common scale for all resources, resource specialists considered the following impact levels in qualitative terms.

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

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

- Direct impacts are defined as those impacts which are caused by the action and occur at the same time and place (40 C.F.R. § 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 C.F.R. § 1508.8(b)).
- Cumulative impacts are those impacts that result from incremental effects of an action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or other entity undertakes such other actions (40 C.F.R. § 1508.7). Cumulative impacts occur over a given time period when the impacts of past, present, and reasonably foreseeable future actions overlap with the time period when project impacts would occur (including the coal recovery and reclamation phases).

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

- Short-term impacts generally occur over a relatively short period and revert to pre-disturbance conditions within a few years after mining occurs. For the purposes of the evaluation, short-term impacts include those related to the actual mining of the coal, which estimated to be completed in the TR1 Tract by 2031.
- Long-term impacts are defined as those that would remain beyond mining-related activities (including reclamation), generally, lasting the life the alternative being evaluated (e.g., federal mining plan modification approval) and beyond.

The direct, indirect, and cumulative effects of the Proposed Action and No Action Alternative are comparable to those described in the 2010 LBM EA, except as noted herein. In addition to addressing the specific issues identified in **chapter 1**, these 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 2010 LBM EA and the 2012 federal mining plan modification were approved. The environmental consequences have been assessed assuming a 14.2-Mtpy production rate. The estimated annual production is in line with recent annual production, as discussed in **section 1.2.1**.

Regarding other relevant regional activity, the Decker Mine is a surface coal mine owned and operated by Lighthouse Resources Inc., located approximately 1.5 miles southeast of the TR1 Tract. The permitted mine operations area for the Decker Mine is approximately 11,718 surface acres and the 2017 coal production was 4.2 million tons.

Lighthouse Resources, Inc. also owns the Big Horn Mine, which is a surface coal mine approximately 12 south of the TR1 Tract. The mine's permitted mine operations area is approximately 1,385 acres. The mine is no longer producing coal and is awaiting final bond release on the completed reclamation.

The Absaloka Mine is a surface coal mine located on and adjacent to the Crow Reservation, owned and operated by Westmoreland Resources, Inc. The mine is located approximately 45 miles northwest of the SCM. The permitted mine operations area is approximately 10,427 surface acres and the 2017 coal production was 3.6 million tons.

Brook Mining Company LLC., a subsidiary of Ramaco, LLC, has submitted a mining-permit application to the WDEQ-LQD to mine a maximum of 8 Mtpy of coal using a highwall mining technique. The Brook Mine is located in Wyoming, approximately 15 miles southwest of the SCM and encompasses approximately 4,549 acres of privately-held coal resources. Recoverable coal resources held by Ramaco are approximately 100 Mt (Billings Gazette 2014). While the mine plan is still under review by WDEQ-LQD and the mine is not yet operational, it is likely that mining will be initiated before 2031.

The Youngs Creek Mine is owned by NTEC and is located in Wyoming approximately 7 miles southwest of the SCM. It encompasses approximately 7,822 acres of predominately privately-held coal resources and surface rights. Estimated recoverable coal resources are 287 Mt (CPE 2015). The mine is permitted, but there are no current mining operations. Due to the uncertainty of development and the length of time required for project startup and development, this mine would not be fully operational by 2031. Therefore, this proposed project is not included in the cumulative effects analysis.

Big Metal Coal, a wholly-owned subsidiary of NTEC, and the Crow Tribe of Indians signed an exploration agreement and option to lease up to 1.4 billion tons of coal from three project areas in the southeast corner of the Crow Indian Reservation west of SCM. On June 7, 2018, Big Metal Coal provided the Crow Tribe notice it was exercising its lease option on the Upper Youngs Creek project area and extending its coal lease options for the Squirrel Creek and Tanner Creek project areas. After Big Metal Coal and the Crow Tribe sign the Upper Youngs Creek coal lease, the coal lease will require approval from the DOI and will require related regulatory actions before the lease is effective. The Big Metal Project is not under concurrent consideration by any state agency through pre-impact statement studies, separate impact statement evaluation, or permit processing procedures. Due to the uncertainty of development and the length of time required for project startup and development, this mine would not be fully operational by 2031. Therefore, this proposed project is not included in the cumulative effects analysis.

There are no conventional oil and gas facilities associated with the tract or within 2 miles of the tract and CBNG recovery has essentially ceased in Big Horn and Rosebud counties (Montana Board of Oil and Gas Conservation [MBOGC] 2019). The nearest coal-fired power plants are the Colstrip coal-fired power plant, located about 55 miles north-northeast of the tract, and the Hardin plant, located about 57 miles northwest of the tract (**map 3-2**).

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 MTM-069782 would be approved. Impacts from coal recovery related to the Proposed Action will be assessed using an annual production rate of 14.2 Mt, which is the 2014 through 2018 average annual production. Since the actual destinations of future coal shipments are not known at this time, impacts assessments related to coal shipments will utilize variables associated with 2014 through 2018 destinations. The recovery of the remaining federal coal would add approximately 4 additional years to the LOM, to 2031.

Under the No Action Alternative, the federal mining plan modification for the federal coal would not be approved. SCM would mine its remaining 75.7 Mt of recoverable federal coal reserves within the existing mine leases in approximately 5.3 years at an average production rate of 14.2 Mtpy.

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 substantially different than those described in Section 4.1.1 of the 2010 LBM EA. The Proposed Action would impact the topography and physiography of the remaining portions of lands included in MTM-069782, but these impacts would be similar to those currently occurring on the existing SCM coal leases as coal is mined and the mined-out areas are reclaimed. The direct effects on topography and physiography resulting from the Proposed Action are expected to be moderate and permanent on the tract. There would be no indirect effects under the Proposed Action.

4.2.1.2 No Action Alternative

The impacts to topography under the No Action Alternative would be similar in nature to those under the Proposed Action but the magnitude of the impacts would be reduced since disturbance to 728.4 acres to recover federal coal within the tract would not occur.

4.2.2 Cumulative Effects

The cumulative effects to topography and physiography would not be substantially different than those described in the 2010 LBM EA and primarily be related to the existing SCM and the adjacent Decker Mine. Following surface coal mining and reclamation, topography would be modified and the topography outside of the valley bottoms would be less rugged, more homogeneous, and gentler. In general, pre-mining features that were more topographically unique (e.g., steeper hills and ravines, rock outcrops, etc.) would be smoothed with more uniform slopes. The cumulative effects on topography and physiography resulting from the Proposed Action are expected to be moderate and permanent on the tract.

4.2.3 Mitigation Measures

No mitigation measures would be necessary for topography.

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 substantially different than those described in Section 4.1.2 of the 2010 LBM EA. The stratigraphic units from the base of the Anderson/Dietz coal seam to the land surface would be subject to permanent change (mixing) on the areas of coal removal and mining would alter the resulting subsurface physical characteristics of these lands. These impacts are occurring on the existing SCM coal leases as coal is mined and the mined-out areas are reclaimed. The Proposed Action would result in the recovery of approximately 53.6 Mt of federal coal within the Anderson/Dietz coal seam. The Proposed Action would also result in the loss of CBNG though venting and/or depletion of hydrostatic pressure in Anderson/Dietz coal resulting from mining adjacent areas. The Proposed Action would not impact conventional oil and gas recovery since there are no conventional oil and gas facilities within the tract and oil and gas producing formations are well below geological layers affected by mining.

As of September 11, 2019, 908 CBNG wells had been completed within the CX Field, which includes the TR1 Tract (MBOGC 2019), but no CBNG wells have been completed within the tract. The Final Montana Statewide Oil and Gas Environmental Impact Statement and Proposed Amendment of the Powder River and Billings Resource Management Plans (BLM 2003) assumed an average well life of 20 years for CBNG wells in the PRB of Montana, based on a review of average production well life for existing wells east and west of the Tongue River. It is unlikely that any CBNG would be recovered from the Anderson/Dietz coal seam within the TR1 Tract due to the absence of existing CBNG wells on the tract and the relatively fast onset of mining activity scheduled for the tract, if the federal mining plan modification request is approved. CBNG reserves not recovered from the Anderson/Dietz coal seam prior to mining would be vented to the atmosphere. There are no existing facilities or equipment associated with CBNG production and development on the tract.

No unique or significant paleontological resources have been identified or are suspected to exist on the tract. The likelihood of encountering significant paleontological resources is very small. Lease and permit conditions require that should previously unknown, potentially significant paleontological sites be discovered, work in that area must stop and measures must be taken to assess and protect the site.

The direct and indirect effects on mineral resources and paleontology are expected to be moderate and permanent on the tract.

4.3.1.2 No Action Alternative

The impacts to geology, mineral resources, and paleontology under the No Action Alternative would be similar in nature to those under the Proposed Action but the magnitude of the impacts would be reduced since disturbance to 728.4 acres to recover federal coal within the tract would not occur. Impacts to CBNG resources would be moderate and permanent as a result of mining activities on adjacent lands.

4.3.2 Cumulative Effects

The cumulative effects to geology, mineral resources, and paleontology would not be significantly different than those described in the 2010 LBM EA but would be extended by approximately 4 years, to 2031. The cumulative effects would primarily be related to the existing SCM and the adjacent Decker Mine but, to a minor extent, would also include the PRB coalfield, which encompasses an area of about 12,000 square miles. The U.S. Geological Survey (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 (USGS 2013). The recovery of 53.6 Mt of coal related to the Proposed Action would have a minor impact on the availability of coal in the region.

There would not be cumulative impacts to conventional oil and gas recovery since there are no conventional oil and gas facilities within the tract and producing formations are well below the geological layers affected by mining.

According to September 11, 2019 information from the MBOGC website, 1,119 CBNG wells have been drilled in Big Horn County and 6 CBNG wells have been drilled in Rosebud County. The MBOGC records indicate that a majority of the wells are privately held or state minerals, with only approximately 16 percent of the wells (176 of 1,119) being federal minerals. Status of these wells includes shut-in, producing, plugged and abandoned, and injection. As of September 2019, 42 of the CBNG wells in Big Horn County were considered to be in production. No CBNG wells drilled in Rosebud County were in production. The pace of CBNG development in Montana has recently slowed considerably (MBOGC 2019). No production has been reported from the CX Field, which is adjacent to the TR1 Tract, since 2013 (MBOGC 2019).

Impacts to paleontological resources as a result of the currently authorized and reasonably foreseeable 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 would result from the destruction, disturbance, or removal of fossil materials as a result of surface-disturbing activities, as well as unauthorized collection and vandalism. A beneficial impact of surface mining can be the exposure of fossil materials for scientific examination and collection, which might never occur except as a result of overburden removal, exposure of rock strata, and mineral excavation. The cumulative effects on geology, mineral resources, and paleontology resulting from the Proposed Action are expected to be moderate on the local area and minor on a regional basis but the cumulative impacts would be 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

4.4.1 Particulate Matter

4.4.1.1 Direct and Indirect Effects

4.4.1.1.1 Proposed Action

The direct and indirect effects to air quality from particulate matter would not be different than those described in section 4.1.3 of the 2010 LBM EA. Direct emissions from particulate matter from the Proposed Action would include fugitive emissions generated from coal excavation and reclamation activities and tailpipe emissions from equipment. Fugitive particulate emissions would also result from dust being generated during dragline operation, coal haulage, bulldozers, scrapers, loaders, baghouse, and other equipment operating at SCM. The results of 24-hour and annual dispersion modeling are included in **table 4-1**. Under the modified federal mining plan proposed, the SCM would not cause or contribute to a violation of the federal 24-hour PM_{10} NAAQS of 150 $\mu g/m^3$ (CPE/Redhorse 2014).

Table 4-1. SCM Particulate Matter Dispersion Modeling Results

Pollutant	Averaging Period	Modeled Concentration ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)	NAAQS/MAAQS ($\mu g/m^3$)
		2016	Mine	Year	
PM_{10}	24 hour	76.55[a]	33.0	109.55	150[c]
	Annual	20.22[b]	17.5	37.72	50[d]
$PM_{2.5}$	24 hour	11.15[b]	15.0	26.15	35[e]
	Annual	4.13[b]	5.5	9.63	12[f]
		2018	Mine	Year	
PM_{10}	24 hour	90.82[a]	33.0	123.82	150[c]
	Annual	23.98[b]	17.5	41.48	50[d]
$PM_{2.5}$	24 hour	14.53[b]	15.0	29.53	35[e]
	Annual	4.14[b]	5.5	9.64	12[f]

[a] Highest, second-high modeled value
[b] Highest modeled value
[c] Violation occurs with more than one expected exceedance per calendar year, averaged over 3-years
[d] Violation occurs when the 3-year average of the arithmetic means over a calendar year exceeds the value. EPA revoked the annual PM_{10} standard effective December 17, 2006.
[e] Violation occurs when the 3-year average of the 98th percentile values exceed the standard. Per EPA policy, use the maximum modeled concentration for comparison to the standard.
[f] Violation occurs when the 3-year average of the spatially averaged calendar year means exceed the standard

PM_{10} and $PM_{2.5}$ inventories for the mining activities at SCM were prepared for all years in the currently anticipated LOM. Two years were then selected for worst-case dispersion modeling of PM_{10} and $PM_{2.5}$ based on mine plan parameters and emission inventories. Fugitive emission sources and point sources were modeled using AERMOD. The modeling follows the methods presented in a dispersion modeling protocol for the project submitted to MDEQ in April 2013 (CPE/Redhorse 2014) and on MDEQ comments on the original modeling analysis submitted September 2013. Per MDEQ guidance, modeling for NO_2 was not required because increased NO_X potential to emit (PTE) would be well below 40 tpy (CPE/Redhorse 2014).

The dispersion modeling was conducted for a revision to air quality permit MAQP #1120-12 and was based on a production rate of 30.0 Mtpy, which is over 2 times greater than the anticipated production for the SCM evaluated in this EA (14.2 Mtpy). Modeling indicates the currently projected mine activities would be in compliance with the 24-hour and annual PM_{10} ambient air standard for the life of the SCM. Based on mine plan parameters and highest emissions inventories, the years 2016 and 2018 were selected as the worst-case years for evaluation, because those years had the highest modeled PM_{10} concentrations. The results of 24-hour and annual dispersion modeling are included in **table 4-1**. Under the Proposed Action, the SCM would not cause or contribute to a violation of the federal 24-hour PM_{10} NAAQS of 150 $\mu g/m^3$ (CPE/Redhorse 2014).

An inventory of all point sources, controls, and emissions for the MAQP #1120-12 air quality permit showed a maximum potential to emit 21.0 tpy; therefore, a PSD increment consumption analysis was not necessary (a value below the 100 tpy major source threshold limit specified in ARM 17.8, Subchapter 8 – PSD and Subchapter 12 – Operating Permit Program means that SCM would not be subject to the Title V operating permit program (CPE/Redhorse 2014)).

There have been no recorded exceedances of the 24-hour or annual PM_{10} NAAQS or MAAQS at the SCM, and, based on estimated $PM_{2.5}$ values, there were no exceedances of the 24-hour or annual $PM_{2.5}$ NAAQS at the mine. The 2014 AERMOD modeling conducted for the current SCM permit predicted no future exceedances of the 24-hour and annual PM_{10} NAAQS/MAAQS at a 30 Mtpy production rate. The 2014 AERMOD modeling also predicted no future exceedances of the 24-hour or annual $PM_{2.5}$ NAAQS at a 30-Mtpy production rate (CPE/Redhorse 2014).

At the estimated average annual production rate of 14.2 Mt mining would be extended by approximately 4 years to 2031 and there would be an increase in overburden thickness; however, fugitive dust emissions are projected to remain within daily and annual NAAQS and MAAQS limits. The direct and indirect effects from particulate matter emissions resulting from the Proposed Action are expected to be moderate but extended to 2031 on the tract. As discussed in **section 4.4.3**, the effects of particulate matter emissions from coal combustion would be minor, when compared to total U.S. particulate emissions.

4.4.1.1.2 No Action Alternative

Impacts from particulate matter emissions have resulted from current mining activity and therefore under this alternative, particulate matter emission impacts in the area would be similar to those under the Proposed Action but would not be extended for an additional 4 years.

4.4.1.2 Cumulative Effects

The cumulative effects from particulate matter emissions are expected to be moderate but extended to 2031. Cumulative impacts from particulate matter emissions could be higher in the short term in this area due to coal mining activities if surface inversion occurs in the region. An inversion can occur when a layer of cooler air is trapped near the ground by a layer of warmer air above, allowing particle pollution levels to increase before the inversion lifts (EPA 2019e). This would be temporary, lasting only during the inversion. Air quality impacts would cease to occur after mining and reclamation are complete. The effects of particulate matter emissions from coal combustion are included in **section 4.4.3**. The Decker Mine, located adjacent to the SCM, would contribute additional particulate matter emissions to the surrounding area. Modeling conducted for MAQP #1120-12 air quality permit included effects from the Decker Mine. As the model indicated, under the modified federal mining plan proposed, the SCM would not cause or contribute to a violation of the federal 24-hour PM_{10} NAAQS of 150 $\mu g/m^3$ (CPE/Redhorse 2014).

4.4.1.3 Mitigation Measures

No mitigation measures beyond those required by the SCM air quality permit would be required for emissions of particulate matter (CPE/Redhorse 2014).

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

While, per MDEQ guidance, modeling for NO_2 is not required because estimated NO_X PTE would be well below 40 tpy, the SCM did model for total annual NO_X emissions for 2013 through 2025. As with particulate matter modeling, the years 2016 and 2018 were selected as the worst-case years, because 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 SCM and Decker Mine and information for railroads, roads, power plants, and regional sources provided by MDEQ ARMB were included in the model (CPE/Redhorse 2014). The amount of NO_X emissions from blasting is related to the amount of ammonium nitrate fuel oil (ANFO) blasting agent used. Total annual NO_X emission rates for 2016 and 2018 were modeled to be 558.9 ton and 555.8 ton, respectively. These NO_X values were included in SCC's 2014 air quality permit application that was submitted to MDEQ-ARMB, for a revision to MAQP #1120-12 (CPE/Redhorse 2014). MDEQ-PCD determined that, based on the modeling analysis and past monitoring, mining at a 30.0 Mtpy rate would not likely substantially degrade air quality (MDEQ-PCD 2014). 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 Route FAS 314, which is within approximately 1.4 miles northeast of the proposed TR1 Tract disturbance and there are occupied dwellings located approximately 2.8 miles north of the disturbance. The nearest recreational opportunities are at the Tongue River Reservoir, approximately 2.6 miles east of the tract. The direct and indirect effects from NO_X emissions resulting from the Proposed Action are expected to be moderate but extended to 2031 on the tract.

Based on information included in the PAP that mining methods would not be significantly different than those currently employed at the mine (SCC 2019), the direct and indirect effects from O_3 emissions resulting from the Proposed Action are expected to be minor but extended to 2031.

4.4.2.1.2 No Action Alternative

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 4 years.

4.4.2.2 Cumulative Effects

The cumulative effects from NO_X and O_3 emissions are expected to be moderate but extended to 2031. Cumulative impacts from NO_X and O_3 could be higher in the short term in this area due to coal mining activities if surface inversion occurs in the northern portion of the PRB. This would be temporary, lasting only during the inversion. Air quality impacts would cease to occur after mining and reclamation are complete.

4.4.2.3 Mitigation Measures

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

4.4.3 Emissions of Sulfur Dioxide (SO_2), Mercury (Hg), Lead (Pb), and Other Non-Greenhouse Gases (Non-GHG)

4.4.3.1 Direct and Indirect Effects

4.4.3.1.1 Proposed Action

As presented in **table 3-8**, SO_2 data collected at the three sites were below the 1-hour MAAQS (0.50 ppm) 99th percentile concentrations. Therefore, it is likely that ambient air quality within the vicinity of the Proposed Action is currently in compliance with the SO_2 MAAQS and NAAQS.

Given the absence of CO nonattainment areas in the region and the results of ongoing SO_2, Hg, and Pb monitoring in the area that show no exceedances of these AQ parameters, the effects of emissions of CO, SO_2, Hg, and Pb from the Proposed Action would be minor but would be extended to 2031.

4.4.3.1.2 No Action Alternative

Impacts from non-GHG emissions have resulted from current mining activity and therefore the impacts related to non-GHG emissions under the No Action Alternative would be similar to those under the Proposed Action but would not be extended for an additional 4 years.

4.4.3.2 Cumulative Effects

The mines in Big Horn and Rosebud counties would contribute additional non-GHG emissions to the surrounding area. Based on past monitoring, the permit modification request would not likely increase SO_2, Hg, or Pb emissions. While cumulative impacts from non-GHG emissions could be higher in the short term in this area due to coal mining activities if surface inversion occurs in the northern portion of the PRB, this would be temporary, lasting only during periods of inversions. Air quality impacts from mining would cease to occur after reclamation is complete. Therefore, the cumulative effects from SO_2, Hg, and Pb emissions are expected to be minor but extended to 2031.

4.4.3.3 Mitigation Measures

No mitigation measures beyond those required by the SCM air quality permit would be required for emissions of non-GHGs.

4.4.4 Air Quality Related Values (AQRVs)

4.4.4.1 Direct and Indirect Effects

4.4.4.1.1 Proposed Action

Visibility

Techniques for blasting, coal removal, and coal processing would be expected to continue as described in the approved MAQP #1120-12 (MDEQ-PCD 2014). Material movement would continue to utilize direct cast blasting, draglines, and/or truck and shovel fleets for overburden and truck and shovel fleets and overland conveyors within the permit area to transport coal to processing facilities for coal. Thus, emissions from blasting are not expected to increase substantially. The expected levels of pollutants and particulates that effect visibility would be within the approved MAQP #1120-12. 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 but extended to 2031.

Air Quality Related Values Related to Coal Combustion

Emissions that affect air quality also result from combustion of fossil fuels. **Table 4-2** presents the estimated PM_{10}, $PM_{2.5}$, SO_2, NO_X, and Hg emissions estimates from coal mined at the SCM used for power generation in comparison with 2014 through 2018 values. Estimated annual emissions for 2020 through 2031 are also provided based on the projected average coal recovery for the time period and the weighted average of distances and tons of coal shipped.

Based on emissions shown in **table 4-2,** indirect impacts to air quality related to coal combustion under the Proposed Action would be within the 2014 through 2018 emission ranges estimated for combustion of SCM coal. When compared to total U.S. emissions, indirect effects would be minor (less than one percent of the U.S. average emissions) but they would be extended by approximately 4 years, to 2031.

Table 4-2. Estimated Annual PM_{10}, $PM_{2.5}$, SO_2, NO_X, Hg, and CO Contributions from Coal Combustion for 2014-2018 and 2020-2031, Compared to 2014 U.S. Total Emissions

Source	2014	2015	2016	2017	2018	2014-2018 Average	2020-2031 Average	2014 Total U.S.	2020-2031 Average % U.S.
Mt Tons of Coal Recovered	17.3	17.0	10.3	12.7	13.6	14.2	14.2	--	--
PM_{10} (Tons)	3,872.9	3,797.5	2,293.4	2,846.4	3,033.1	3,168.7	3,168.7	20,616,000	0.02%
$PM_{2.5}$ (Tons)	1,181.2	1,158.2	699.5	868.1	925.1	966.4	966.4	6,033,000	0.02%
SO_2 emissions (Tons)	71,421.0	70,030.0	42,293.5	52,490.2	55,934.1	58,433.8	58,433.8	4,991,000	1.17%
NO_X emissions (Tons)	27,597.2	27,059.7	16,342.3	20,282.3	21,613.0	22,578.9	22,578.9	12,412,000	0.18%
Hg emissions (Tons)	0.28	0.27	0.16	0.20	0.22	0.23	0.23	52.0	0.44%
CO emissions (Tons)	4,298.8	4,418.9	4,331.2	4,246.9	2,564.8	3,183.2	3,392.0	52,483,810	0.01%

Source: WWC completed calculations, which are provided in **appendix B**.

Acidification of Lakes

The SCM is not required by MDEQ to monitor H_2S so a direct comparison to MAAQS 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 SCM. As indicated in **table 3-12**, the 2014-2018 trend in H+ at monitoring site MT00 appears to be relatively stable. Based on this comparison of the current information available, the Proposed Action is not expected to contribute to increased direct or indirect effects from acidification of lakes

4.4.4.1.2 No Action Alternative

Impacts to air quality related values have resulted from current mining activity and therefore the impacts related to AQRVs under the No Action Alternative would be similar to those under the Proposed Action but would not be extended by 4 years.

4.4.4.2 Cumulative Effects

Blasting, coal crushing, loading and hauling of coal, moving equipment, and other activities associated with surface coal mining, the combustion of coal at power plants, and activities related to CBNG produce particulates that can be released into the air that could impact AQRVs.

As discussed in **section 3.4.1.3**, the nearest Class I area is located approximately 19 miles north of the tract at the Northern Cheyenne Indian Reservation. Because this Class I area is not in line with the prevailing wind (see **section 3.4**), it would not be impacted by the Proposed Action and is not included in the cumulative effects analysis. **Section 4.1** indicates that CBNG activity has essentially ceased in Big Horn and Rosebud counties.

The cumulative effects on AQRVs are expected to be moderate but extended to 2031. Cumulative impacts to AQRVs could be high 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. Inversion modeling was not conducted for the SCM area, but all air quality standards are currently being met at the mine. Air quality impacts would cease to occur after mining and reclamation are complete. The cumulative effects that would increase the potential for acidification of lakes resulting from the Proposed Action are expected to be minor but extended to 2031. Air quality impacts from the SCM would cease to occur after mining and reclamation are completed.

4.4.4.3 Mitigation Measures

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

4.4.5 Greenhouse Gas Emissions

4.4.5.1 Direct and Indirect Effects of the Proposed Action

4.4.5.1.1 Proposed Action

OSMRE has elected to quantify direct and indirect GHG emissions and evaluated these emissions in the context of national GHG emission inventories based on 100-year and 20-year time horizons. In addition, direct and indirect GHG emissions are evaluated in the context of state, national, and global GHG emission inventories. Each GHG has a different lifetime in the atmosphere and a different ability to trap heat in the atmosphere. To allow different gases to be compared and added together, emissions can be converted into CO_2e emissions. Annual CO_2e emissions from combined sources, based on the average annual coal recovered between 2014 and 2018 at the SCM, were estimated (**section 3.4.1.5**). The same variables were used to calculate annual CO_2e emissions for 2020-2031.

As presented in **table 4-3**, the estimated annual CO_2e emissions from coal mined between 2020 and 2031 would be the slightly higher (0.35 percent) than estimated annual emissions between 2014 and 2018. The increase in estimated emissions is related to the distance used to calculate transportation emissions (per-trip weighted average of 1,144 rail miles for the 2014-2018 time frame versus per-trip weighted average of 1,210 for the 2020-2031 time frame).

Table 4-3. Estimated Annual CO_2e Emissions for the Proposed Action from Coal Mined at the SCM (2014-2018 Average and 2020-2031 Average) Under 100-year and 20-year Time Horizons

100-year Time Horizon		
Source	**2014-2018 Average Annual Emissions**	**2020-2031 Average Annual Emissions**
General		
Mt tons of coal recovered	14.21	14.20
Average transport miles (one way)	1,144	1,210
Number of train trips (loaded and returning empty)	1,822	1,820
Vessel transport miles (one-way)	4,300	4,300
Direct emission sources[1]		
Fuel	27,910	27,882
Electricity consumed in mining process	45,322	45,276
Mining process	8,208	8,200
Total direct emissions	*81,440*	*81,357*
Indirect emission sources[1]		
Transport	931,448	1,040,517
From coal combustion[2]	29,792,278	29,792,278
Total indirect emissions	*30,723,727*	*30,832,796*
Total estimated CO_2e production[1]	**30,805,167**	**30,914,153**
20-year Time Horizon		
Source	**2014-2018 Average Annual Emissions**	**2020-2031 Average Annual Emissions**
General		
Mt tons of coal recovered	14.21	14.20
Average transport miles (one way)	1,144	1,210
Number of train trips (loaded and returning empty)	1,822	1,820
Vessel transport miles (one-way)	4,300	4,300
Direct emission sources[1]		
Fuel	28,052	28,024
Electricity consumed in mining process	45,553	45,506
Mining process	8,250	8,241
Total direct emissions	*81,855*	*81,771*
Indirect emission sources[1]		
Transport	936,188	1,045,812
From coal combustion[2]	29,943,871	29,943,871
Total indirect emissions	*30,880,058*	*30,989,683*
Total estimated CO_2e production[1]	**30,961,913**	**31,071,454**

1 In metric tons - see **appendix B** for calculations
2 Calculated by WWC (2019)

According to the EPA (2019d) in 2017 (the most recent year of available CO_2 data at this time), estimated CO_2e emissions from fossil-fuel combustion in the U.S. totaled 4,912 million metric tons in 2017. Using the 2017 U.S. estimate for comparison purposes, the estimated annual 100-year CO_2e contribution from the Proposed Action would be 30.9 million metric tons, or approximately 0.63 percent of the 2017 U.S. total. According to the IPCC 2014 Climate Change Synthesis Report, the estimated total 2010 global CO_2e emissions totaled 49,100 million metric tons. The IPCC report estimated that approximately 78 percent (i.e., 38,298 million metric tons) of the total global CO_2e emissions are from fossil fuel combustion. Using the 2010 global estimate for comparison purposes, the estimated annual 100-year CO2e contribution from the Proposed

Action would be 30.9 million metric tons, or approximately 0.081 percent of the 2010 global fossil fuel emissions. The direct and indirect effects of the Proposed Action on annual CO2e emissions would be moderate but they would be extended by approximately 4 years, to 2031.

The direct and indirect effects of the Proposed Action on annual CO_2e emissions would be moderate but they would be extended by approximately 4 years, to 2031.

4.4.5.1.2 No Action Alternative

The impacts directly resulting from GHG emissions under the No Action Alternative would be less than those under the Proposed Action and would not be extended to 2031.

4.4.5.2 Cumulative Effects

The analyses provided above include direct and indirect effects analysis for GHG emissions. Emissions of GHGs resulting from the Proposed Action would increase the atmosphere's concentration of GHGs, and in combination with past, present, and future emissions from all other sources, they would contribute incrementally to the global warming that produces the adverse effects of climate change described previously.

However, the climate change research community has not yet developed tools for evaluating or quantifying endpoint impacts attributable to the emissions of GHGs from a single source. The current tools for simulating climate change generally focus on global and regional-scale modeling; therefore, a separate cumulative impacts analysis for GHG emissions at the project level would not provide useful information for the decision maker and was not prepared.

4.4.5.3 Mitigation Measures

No mitigation measures have been defined for GHG emissions.

4.4.6 Climate Change Cause and Effect

4.4.6.1 Direct and Indirect Effects of the Proposed Action

4.4.6.1.1 Proposed Action

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 or to determine the resulting environmental impacts in a quantitative manner.

The electric power sector is the largest consumer of coal in the U.S., with coal accounting for 93 percent of all coal consumed for energy in the United States in 2017. However, the amount of coal and the percent of total electricity generation from coal has been decreasing over time. Coal-fired electric generation (in kilowatt-hours [kWh]) decreased from 54 percent of generation in 1990 to 31 percent in 2017 (EPA 2019b). The combustion of coal for the generation of electricity does contribute to GHG emissions and **table 4-4** shows the U.S., regional, and local trend in GHG emissions between 2005 and 2017 (the most recent EPA data available). **Table 4-4** also shows the trend in global GHG emissions (including a sperate row for China). It is important to note that while global GHG emissions have increased over time, the U.s and regional GHG emissions have decreased significantly.

Table 4-4. Trends in Global, U.S., Regional, and Local GHG Emissions and Contributing Factors

Gas/Source	2005	2017	Percent Change
Contributing Factors (Mt)			
Coal Produced in the U.S.	1,164.5	767.7	-34.1
Coal Produced in Montana PRB	40.3	34.5	-14.4
Coal produced at the SCM	13.1	12.7	-3.1
Global GHG Emissions (Million Metric Tons CO_2e)			
Total GHG emissions	44,153	53,500	21.2
GHG emissions from fossil fuel	29,912	37,180	24.3
China GHG emissions from fossil fuel	6,265	11,877	129.9
U.S. GHG Emissions (Million Metric Tons CO_2e)			
Total GHG emissions	7,339.0	6,456.7	-12.0
GHG Emissions from power generation	2,450.4	1,772.7	-27.7
GHG emissions from coal-fired power generation	2,430.9	1,757.9	-27.7
Montana GHG Contributions (Million Metric Tons)			
GHG emissions from fossil fuels (CO_2 Only)	34.9	30.3	-13.2
SCC GHG Contributions (Million Metric Tons)			
GHG emissions from combustion of SCC coal	27.4	26.7	-2.6

Source: EPA 2019b, USEIA 2006 and 2018

As concluded from the information presented above, Montana PRB surface coal mines were responsible for approximately 64.1 million metric tons of the estimated U.S. CO_2e emissions from fossil-fuel combustion for power generation in 2017. The coal mined at the SCM resulted in about 23.1 million metric tons (1.3 percent) of the estimated 2017 U.S. CO_2 emissions from coal power generation. In 2017, approximately 134,000 tons (1.0 percent) of coal mined at the SCM was burned in Montana power plants (SCC 2019). Information included in Montana's CCAP estimated that approximately 15.2 Mt of GHG were emitted in 2010 (the most current Montana GHG emission estimates available) to generate electricity or from the fossil fuel industry (CCAC 2007). Using these numbers, it is estimated that the coal from the SCM that was burned in Montana power plants in 2010 accounted for approximately 80,560 tons of GHG.

As stated above, estimated CO_2 emissions in the U.S. decreased 12.0 percent from 2005 to 2017 (EPA 2019b). Under the Proposed Action, coal production has been evaluated at 14.2 Mtpy levels, using existing production and shipping methods. As determined from **table 4-3**, the estimated annual CO_2e emissions from coal mined at the SCM under the 100-year time horizon would be approximately 30.9 million metric tons for the 4 additional years. Because CO_2 emissions have been declining in recent years and because CO_2 from coal mined at the SCM would remain at or only slightly above current levels, climate impacts associated with direct/indirect emissions from TR1 Tract mining, transportation, and combustion would be moderate but short term (4 years).

4.4.6.1.2 No Action Alternative

The impacts from GHG emissions under the No Action Alternative would be similar to those under the Proposed Action but would not be extended by approximately 4 years. While annual CO_2e emissions would remain the same as the Proposed Action for approximately 5.3 years, the LOM CO_2e emissions would decrease by approximately 30.9 million metric tons as a result of the No Action Alternative, based primarily on 4 fewer years of combustion of SCM coal.

4.4.6.2 Cumulative Effects of the Proposed Action

The human and natural causes of climate change, and the impacts of climate change, are global. GHG emissions do not remain localized but become mixed with the general composition of the

Earth's atmosphere. On a global scale, the GHG emissions contribution of any single geographic subunit (such as a SMCRA-delegated state regulatory authority or OSMRE regional office) or source (such as Federal minerals) on a subnational scale is dwarfed by the large number of comparable national and subnational contributors. The relative contribution of GHG emissions from production and consumption of Federal minerals will vary depending on contemporaneous changes in other sources of GHG emissions. A single subnational contributor is very unlikely to influence global cumulative emissions. Therefore, this analysis does not separate the particular contribution of the Proposed Action's GHG emissions to global climate change impacts from the multitude of other past, present, and RFFAs that have produced or would produce or mitigate GHG emissions. At present, the climate change research community has not yet developed tools for evaluating or quantifying endpoint impacts attributable to the emissions of GHGs from a single source. The current tools for simulating climate change generally focus on global and regional-scale modeling.

Cumulative climate change effects from future coal mining and coal combustion are difficult to quantify due to market and regulatory forces that affect the amount of coal produced and the use of coal for U.S. electricity generation. For example, recent increasing supplies of natural gas has led to a decline in the cost of natural gas, making coal less competitive based on price and regulatory conditions have also affected the coal industry (Wyoming Mining Association 2017). As a result, U.S. electricity generation from coal-fired power plants has declined and is expected to continue to decline. From 2005 to 2017, GHG emissions from U.S. power plants decreased approximately 13 percent (EPA 2019b). However, some generalizations of effects can be made.

The USGS has produced estimates of the GHG resulting from the extraction and end-use combustion of fossil fuels produced on federal lands in the United States, as well as estimates of ecosystem carbon emissions and sequestration on those lands (Merrill et al. 2018). The study reports GHG emissions from extraction, transport, fugitives, and combustion of fuel over a 10-year period (2005-2014). In 2014, nationwide gross GHG emissions (CO_2, CH_4, and N_{2O} combined) from fossil fuels extracted from federal lands was 1,332.1 million metric tons CO_2e. Emissions from fossil fuels produced on federal lands represent, on average, 23.7 percent of national emissions for CO_2, 7.3 percent for CH_4, and 1.5 percent for N_2O over the 10 years, included in USGS estimate (Merrill et al. 2018). Trends and relative magnitude of emissions are roughly parallel to production volumes. Montana federal fossil-fuel-related gross emissions in 2014 were 43.5 million metric tons of CO_2e, approximately 3.3 percent of the estimate of national emissions from federal fossil fuels.

The linear trend of the USGS data shows a decrease of 0.7 million metric tons CO_2e/yr in Montana between 2005 and 2014. Assuming this trend continues, projected Montana federal fossil fuel emissions in 2031 would be 31.2 million metric tons CO_2e. Estimated lease sale emissions between 2020 and 2031would add to the USGS calculated emissions by 421.8 million metric tons CO_2e.

Federal lands also uptake carbon in vegetation, soils, and water. In 2014, carbon storage on federal lands was 83,600 million metric tons CO_2e nationally and 6,230 million metric tons CO_2e in Montana. Soils stored 57.5 percent of carbon with dead organic matter and vegetation and storing 13.2 percent and 2.8 percent, respectively. The national rate of net carbon uptake (sequestration) varies from 51 million metric tons CO_2e/yr to 475 million metric tons CO_2e/yr to due to changes in climate/weather, land use, land cover change, wild fire frequency, and other factors. From 2005 to 2014, terrestrial ecosystems on federal lands sequestered an average of 195 million metric tons CO_2e/yr, offsetting about 15 percent of emissions resulting from federal fossil fuel extraction and combustion nationally. In Montana, the annual average ecosystem carbon storage was 6,141.4 million metric tons CO_2e, with soils accounting for about 58.0 percent. The annual average sequestration in Montana over the 10 years was 18.9 million metric tons CO_2e/yr, offsetting about 43.5 percent of extraction and combustion emissions from fossil fuels produced on federal lands in Montana.

Electricity generation has accounted for approximately 28 percent of U.S. GHG emissions (EPA 2019b). However, state and federal regulations will decrease GHG emissions from power plants. And as of January 2013, 29 states had a renewable portfolio standard, which requires utilities to supply a certain amount of electricity to customers from renewable energy sources or install a certain amount of electricity-generating capacity from renewable energy sources in a set time frame (U.S. Department of State 2014). In addition, the EPA recently proposed three new regulations to reduce CO_2 emissions from new, existing, and modified or reconstructed power plants (U.S. Senate 2015). Montana has formulated a climate action plan that evaluated GHG reduction opportunities in various sectors of Montana's economy (CCAC 2007). Montana's climate action plan provided recommendations, including the fossil fuel production sector, to reduce GHG emissions in the state over the period from 2007 through 2020 and their respective net costs or benefits on a cost-effectiveness (i.e., cost-per-ton-reduced) basis (CCAC 2007).

Social Cost of Carbon

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 group1 to assist Federal agencies in addressing EO 12866, Regulatory Planning and Review, which requires the assessment of the cost and the benefits of proposed regulations as part of their regulatory impact analyses. The SCC is an estimate of the economic damages associated with an increase in CO_2 emissions and is intended to be used as part of a cost-benefit analysis for proposed rules. As explained in the Executive Summary of the 2010 SCC Technical Support Document, "the purpose of the [SCC] estimates . . . is to allow agencies to incorporate the social benefits of reducing carbon dioxide (CO_2) emissions into cost-benefit analyses of regulatory actions that have small, or 'marginal,' impacts on cumulative global emissions" (Interagency Working Group on the Social Cost of Carbon 2010). While the SCC protocol was created to meet the requirements for regulatory impact analyses during rulemakings, there have been requests by public commenters or project applicants to expand the use of SCC estimates to project-level NEPA analyses.

The decision was made not to expand the use of the SCC protocol for the Federal coal tracts for a number of reasons. Most notably, this action is not a rulemaking for which the SCC protocol was originally developed.

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[1] On March 28, 2017, President Donald Trump issued EO 13783, which, among other actions, withdrew the technical support documents upon which the protocol was based and disbanded the earlier Interagency Working Group on the Social Cost of Greenhouse Gases. The EO further directed agencies to ensure that estimates of the social cost of GHGs used in regulatory analyses "are based on the best available science and economics" and are consistent with the guidance contained in the U.S. Office of Management and Budget (OMB) Circular A-4, "including with respect to the consideration of domestic versus international impacts and the consideration of appropriate discount rates" (EO 13783, Section 5(c)). In compliance with OMB Circular A-4, interim protocols have been developed for use in the rulemaking context; however, OMB Circular A-4 does not apply to project decisions, so there is no EO requirement to apply the SCC protocol to project decisions.

Further, NEPA does not require a cost-benefit analysis (40 CFR 1502.23), although it does require consideration of "effects" that include "economic" and "social" effects (40 CFR 1508.8(b)). Without a complete monetary cost-benefit analysis, which would include the social benefits of the Proposed Action to society as a whole and other potential positive benefits, sole inclusion of an SCC cost analysis would be unbalanced, potentially inaccurate, and not useful in facilitating an authorized officer's decision. 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, in as much as such impacts might be viewed by another person as negative or undesirable due to potential increases in local population, competition for jobs, and concerns that changes in population would change the quality of the local community. Economic impact is distinct from economic benefit as defined in economic theory and methodology, and the socioeconomic impact analysis required under NEPA is distinct from cost-benefit analysis, which is not required.

Finally, 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 CO_2 emissions—typically expressed as a 1 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. But the dollar cost figure is generated in a range and provides little benefit in assisting the authorized officer's decision for project-level analyses because it is too uncertain. For example, in a previous EIS, OSMRE estimated that the selected alternative had a cumulative SCC ranging from approximately $4.2 billion to $22.1 billion depending on dollar value and the discount rate used. The cumulative SCC for the No Action Alternative ranged from $2.0 billion to $10.7 billion.

Given the uncertainties associated with assigning a specific and accurate SCC resulting from 4 additional years of operation under the mining plan modification, and that the SCC protocol and similar models were developed to estimate impacts of regulations over long time frames, OSMRE's ability to evaluate these impacts on a project-level would be doubtful2 (Anthoff and Tol 2013;

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

Hope 2013; Nordhaus 2014; Pindyck 2013; Waldhoff et al. 2011, 2014). Without a complete monetary cost-benefit analysis, which would include the social benefits of the Proposed Action to society as a whole and other potential positive benefits, inclusion solely of an SCC cost analysis would be unbalanced, potentially inaccurate, and not useful in facilitating an authorized officer's decision.

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) NEPA does not require cost-benefit analysis and one has not been conducted here; and 3) the full social benefits of coal-fired energy production have not been monetized, and quantifying only the costs of GHG emissions, but not the benefits, would yield information that is both potentially inaccurate and not useful. On a global scale, the GHG emission contribution of any single geographic subunit (such as a SMCRA-delegated state regulatory authority or OSMRE regional office) or source (such as Federal minerals) on a subnational scale is dwarfed by the large number of comparable national and subnational contributors. The relative contribution of GHG emissions from production and consumption of Federal minerals will vary depending on contemporaneous changes in other sources of GHG emissions. A single subnational contributor is very unlikely to influence global cumulative emissions. See Section 4.4.6.1 for more details.

Given the uncertainties associated with assigning a specific and accurate social cost of carbon estimate resulting from 4 additional years of operation under the mining plan modification, and that the social cost of carbon 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 Montana and U.S. GHG emission inventories, as discussed in **section 4.4.6.1**.

4.4.6.3 Direct and Indirect Cumulative Effects on the Proposed Action/No Action Alternative

Climate impacts and trends tend to be realized at local levels but a lack of reliable projections of climate change at the local level remains an impediment (USGCRP 2018). Therefore, the direct and indirect effects on the Proposed Action/No Action Alternative related to climate change will be discussed on a regional (county and state) scale.

The Fifth Assessment Report of the IPCC (AR5) includes a summary of data from 30 different global climate models that evaluate the natural systems and feedback mechanisms contributing to climate variability. A range of global GHG emissions scenarios known as representative concentration pathways (RCP) were considered in the modeling analysis to assess potential degrees of climate change impacts. A stringent mitigation scenario (RCP2.6), a low emissions scenario (RCP4.5), an intermediate emissions scenario (RCP 6.0), and an aggressive emissions scenario (RCP8.5) were evaluated in the report. These scenarios correspond to atmospheric concentrations of CO_2 by the year 2100 of 421 ppm for RCP2.6, 538 ppm for RCP4.5, 670 ppm for RCP6.0, and 936 ppm for RCP8.5. The range of likely change in global surface temperature by 2050 ranges from 0.3 to 1 degree Celsius for the RCP2.6 scenario and from 0.5 to 2.0 degrees Celsius for the RCP8.5 scenario. Generally, the more stringent climate change mitigation, the lower the projected change in global surface temperatures. When discussing regional impacts, however, it is important to note

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ascertain the best available science and economics in accordance with E.O. 13783." The BLM's discussion is in the context of a rulemaking for which the SCC was developed. The uncertainties regarding the applicability of the social cost of carbon by OSMRE in the context of a specific project is even greater.

that degrees of surface temperature increases vary from region to region. To discuss the cumulative impacts of GHG emissions for the project area, regional-scale projected impacts are discussed for the state of Montana. The USGS National Climate Change Viewer (USGS 2019) can be used to evaluate potential climate change at the state level. The viewer provides data showing projections of future climate trends under RCP emission scenarios RCP4.5 and RCP8.5. Data presented in the USGS Climate Change Viewer data can also be extrapolated to get a general understanding of impacts under RCP2.6 and RCP6.0. Generally, the RCP2.6 scenario can be assumed to contribute to a lesser degree of climate change impacts in the region, while the RCP6.0 can be assumed to contribute to impacts that are of lesser magnitude than RCP8.5 but of greater magnitude than RCP4.5. Projected changes to the maximum and minimum temperature and precipitation for Big Horn County, MT are presented for RCP4.5 and RCP8.5 to assess regional cumulative impacts from GHG emissions in Table 4-5, below. The RCP4.5 and RCP8.5 scenarios forecast similar levels of climate impacts in the region over the next few decades; however, impacts over the next century diverge significantly. Because of uncertainties in the climate models, especially toward the end of the century, the impacts projected represent a forecast but are not certain to occur at the magnitudes projected.

USGS predicted potential impacts for Montana and Big Horn County, Montana between 1981 and 2010 versus between 2025 and 2049 using a moderate climate change scenario (RCP4.5, which assumes GHG concentrations are stabilized) and an aggressive climate change scenario (RCP8.5, which assumes no new climate change regulations or reductions would be implemented) (USGS 2019). In addition, BLM prepared the Northwest Plains Rapid Ecoregional Assessment (REA) to predict future climate change conditions, including the region of Montana that contains the SCM, for a variety of elements (BLM 2012).

The potential climate change impacts for the State of Montana and Big Horn County, Montana evaluated by the USGS are included in **table 4-5**. Since the Proposed Action would extend the SCM LOM 4 years (to 2031), the Proposed Action would not contribute to the full extent of these potential climate change impacts. However, for analysis purposes, the EA assumes that the maximum impacts would be realized during the life of the mine.

Table 4-5. The Potential Climate Change Impacts in Montana and Big Horn County, Montana for Various Data Variables

Climate Indicator Variable	Montana	Big Horn County
Maximum Temperature Departure (˚F) – RCP4.5	2.9	2.9
Maximum Temperature Departure (˚F) – RCP8.5	3.2	3.2
Precipitation Departure (Inches) – RCP4.5	0.0	0.0
Precipitation Departure (Inches) – RCP8.5	0.0	0.0
Runoff Amount Departure (Inches/month) – RCP4.5	0.0	0.0
Runoff Amount Departure (Inches/month) – RCP8.5	0.0	0.0
Snow Water Equivalent Departure (Inches) – RCP4.5	-0.3	-0.1
Snow Water Equivalent Departure (Inches) – RCP8.5	-0.3	-0.1
Soil Water Storage Capacity Departure (Inches) – RCP4.5	0.0	0.0
Soil Water Storage Capacity Departure (Inches) – RCP8.5	0.0	0.0
Evaporation Deficit Departure (Inches/month) – RCP4.5	0.1	0.2
Evaporation Deficit Departure (Inches/month) – RCP8.5	0.1	0.1

Source: USGS 2019

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 4-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 4 years, mine dewatering may compensate for climate change related streamflow reduction, or may have no additional influence on streamflow. The potential climate change impacts predictions included in **table 4-5** indicate that precipitation and runoff will not likely change as a result of climate change through 2049. 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 disturbance of approximately 728.4 acres not currently approved under SCM's current federal mining plan. As described in **section 4.8.1.1**, the direct and indirect effects related to the Proposed Action to soils would be moderate but extended to 2031 on the tract. However, the USGS climate viewer does not predict any annual mean changes to runoff so there would be negligible impacts on soils from climate change.

Greater Sage Grouse

The Proposed Action is consistent with MFWP's MGRSG Advisory Council guidance (MGRSG Advisory Council 2014) and BLM's Approved Resource Management Plan (BLM 2015), which take into account potential climate change. Impacts from climate change on the GRSG during the life of the project are anticipated to be negligible. In addition, the BLM evaluated the potential impacts of climate change on Greater sage-grouse in the Northwestern Plains Rapid Ecoregional Assessment (REA) for the period between 2050 and 2069 (BLM 2012). The REA indicated that Greater sage-grouse would be moderately vulnerable to the impacts of climate change during the period. However, it remains difficult to draw conclusions from the data presented in the REA as the climate change models are highly variable and often difficult to predict (BLM 2012).

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. MDEQ regulates surface coal mining operations and the surface effects of underground coal mining on federal lands within the state of Montana. Federal coal leaseholders in Montana must submit a permit application package to OSMRE and MDEQ 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 SCM would require the approval of MDEQ. 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

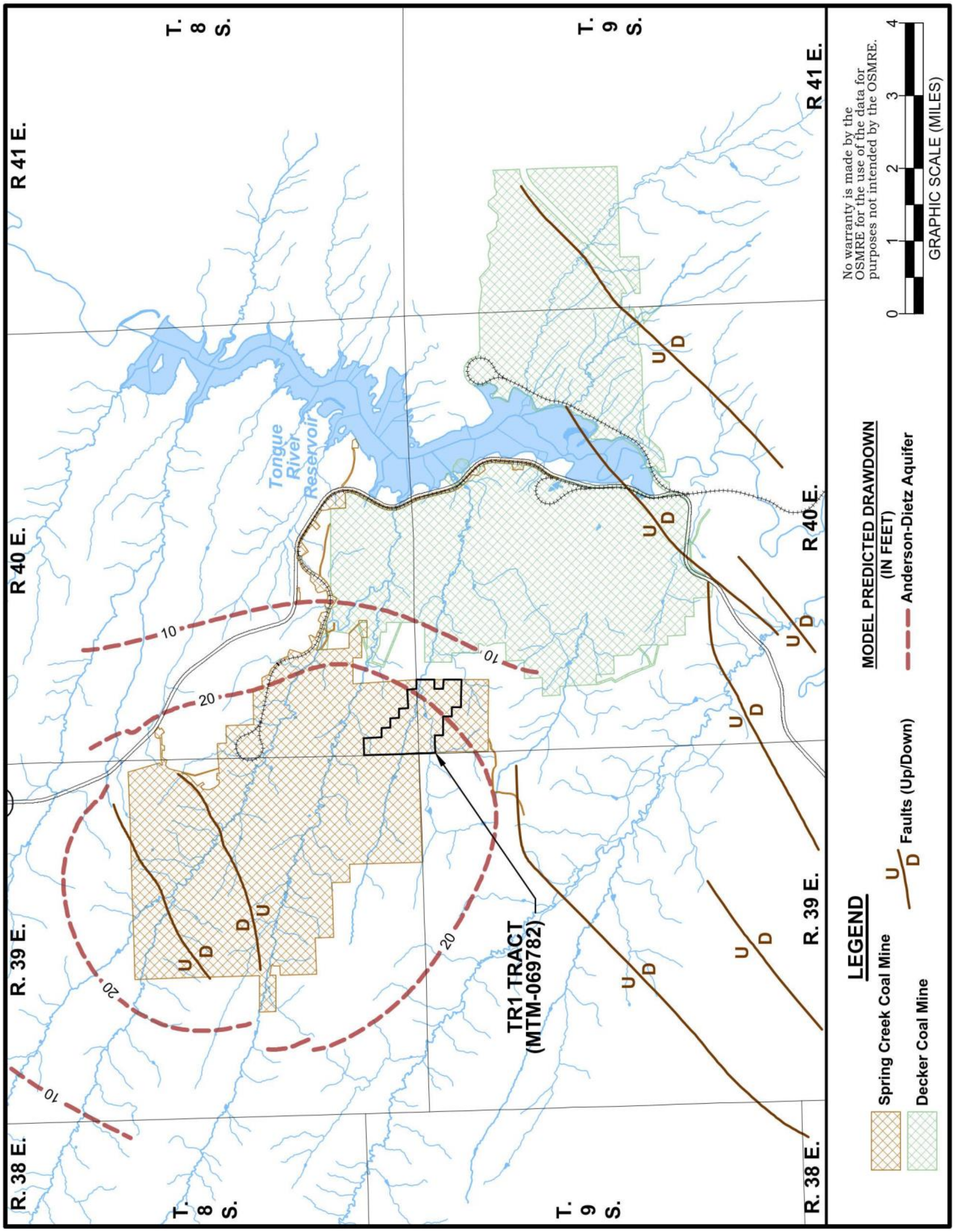
Additional discussions regarding groundwater can be found in sections 3.5.1 and 4.1.4 of the 2010 LBM EA and the groundwater portion of the 2020 CHIA (MDEQ-WQD 2020). The groundwater portion of the 2020 CHIA evaluated mining south of the Pearson Creek drainage, including the TR1 Tract. Under the Proposed Action, mining of the TR1 Tract would extend the area of coal removal onto approximately 498.1 acres of federal surface. Additionally, approximately 728.4 acres of surface disturbance would occur under the Proposed Action to recover the federal coal.

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

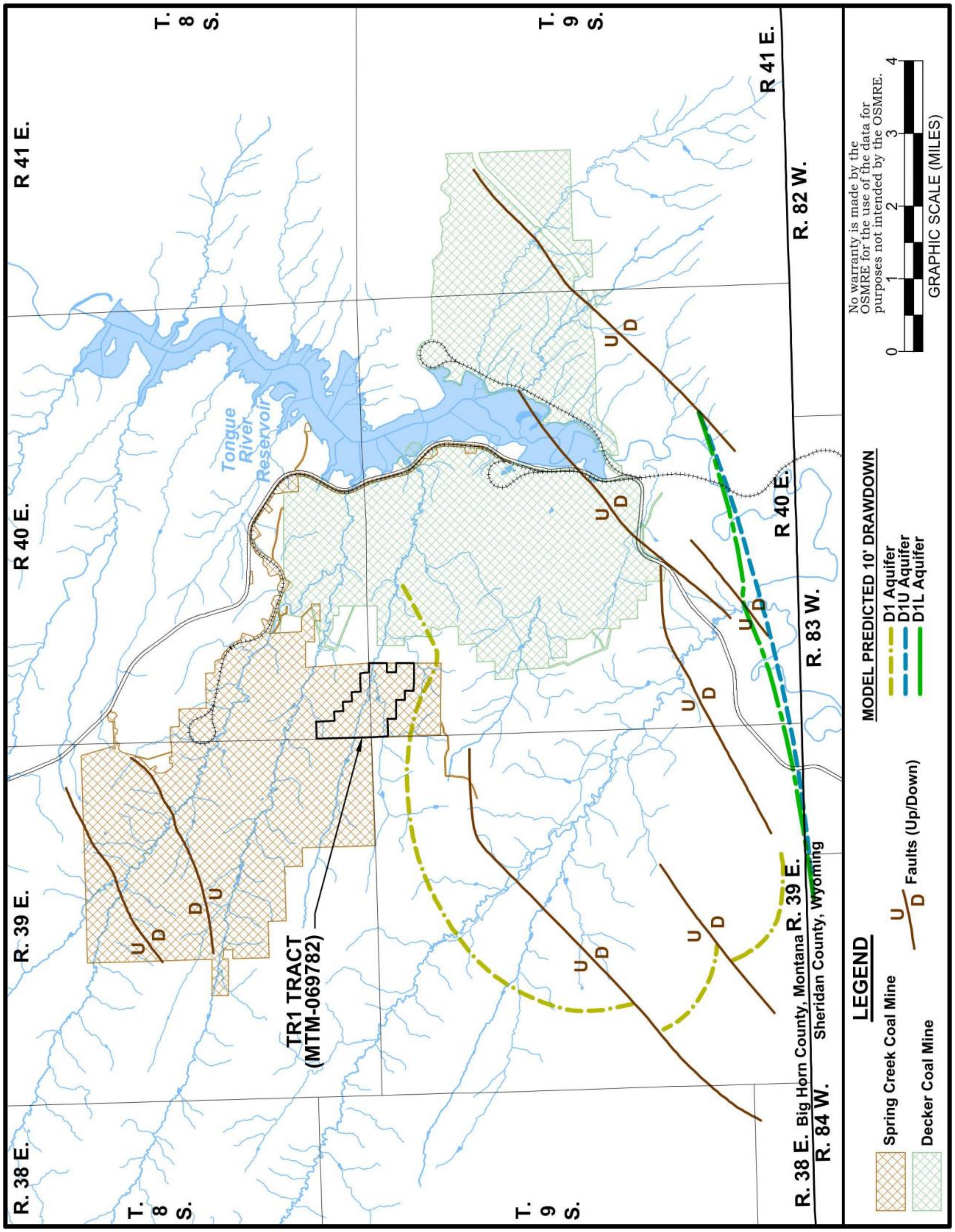
- The removal of the uppermost coal aquifer and the much smaller, largely discontinuous overburden and alluvial aquifers within the areas that are mined would continue. The uppermost coal aquifer would be replaced with backfilled overburden material; this post-mine aquifer is expected to function similar to pre-mine conditions and meet existing groundwater uses in the area. This is based on groundwater modeling and ongoing aquifer recovery monitoring.
- In the short term, groundwater levels (quantity) within the mine area would be impacted through dewatering, but modeling indicates the aquifer (consisting of backfilled overburden material) would recover in the long term to pre-mine levels. Ongoing monitoring of the backfilled overburden aquifer indicates that recovery of this aquifer is occurring.
- The groundwater quality in the backfilled overburden aquifer would change when compared to the groundwater quality in the coal it replaced. The total dissolved solids concentrations in the backfill water is projected to reach maximum during initial saturation and then decrease to an equilibrium level after one or more pore volumes of water pass through the backfill. As re-saturation of the backfill continues, salt concentrations are expected to be extremely variable and peak at concentrations potentially two to three times that of the baseline coal groundwater quality and then decline to an equilibrium value after being flushed by one or more pore volumes of groundwater. Groundwater quality is expected to meet the existing uses (i.e., livestock watering) during all phases of mining and post-mining; this is supported by ongoing aquifer recovery monitoring inside and outside mine-affected areas.

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.

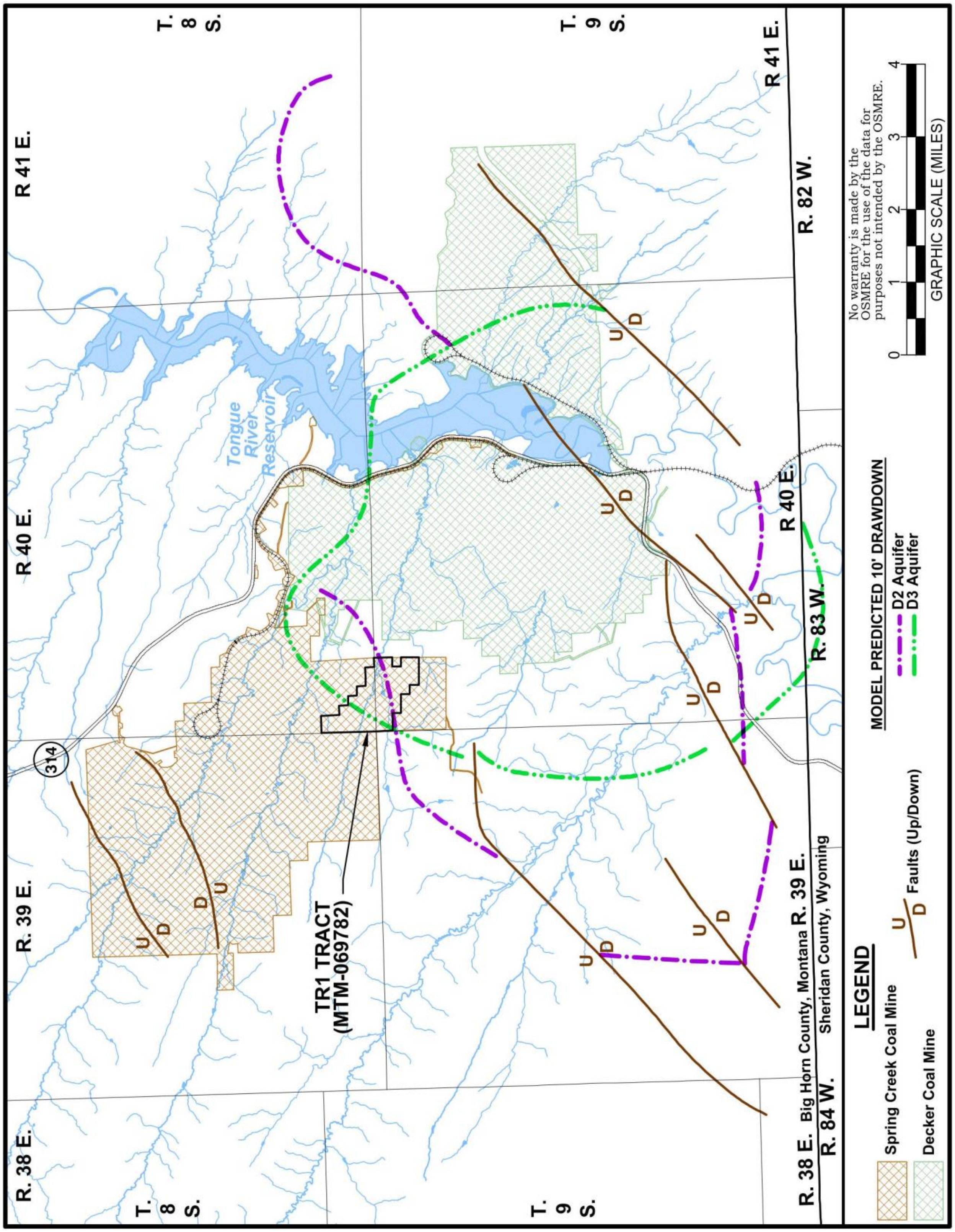
Additional alluvial, overburden, and Anderson/Dietz coal aquifers would be removed within the TR1 Tract during the mining process. These aquifers would be replaced with backfilled overburden and interburden materials. The physical characteristics of the reclaimed backfill material are dependent upon mining methods and premining overburden lithology. Overall, the permeability and porosity of the spoils within the tract are expected to be greater than the original material. The reclaimed spoil aquifer could provide adequate water quantity for stock wells. Predicted drawdowns for the Anderson-Dietz; the D1, D1L, and D1U; and D2 and D3 aquifers are presented on **maps 4-1**, **4-2**, and **4-3,** respectively.



Map 4-1. Predicted Drawdown in the Anderson Dietz Aquifer



Map 4-2. Predicted 10-Foot Drawdown in the D1, D1U, and D1L Aquifers



Map 4-3. Predicted 10-Foot Drawdown in the D2 and D3 Aquifers

The direct and indirect effects to groundwater resources resulting from the Proposed Action on the tract due to aquifer removal are expected to be moderate and short term (immediate effects from aquifer removal) and moderate and long term (related to reestablishing aquifer characteristics).

4.5.1.1.2 No Action Alternative

Impacts to groundwater under the No Action Alternative would be similar to those under the Proposed Action, but the aerial extent of groundwater aquifer removal would be reduced by approximately 728.4 acres. Impacts to overburden and coal aquifers have already occurred within the TR1 Tract related to coal recovery on adjacent federal coal leases, ongoing mining activities at nearby mines, and CBNG recovery. Under the No Action Alternative, the duration of impacts to groundwater would not be extended. Therefore, implementation of the No Action Alternative would have negligible effect on reducing the magnitude of these impacts, but would reduce the extent and duration.

4.5.1.2 Cumulative Effects

The effects of removal of the coal and overburden aquifers and replacing them with backfilled overburden are the foremost groundwater concern regarding cumulative effects. Mining of the TR1 Tract would increase the cumulative size of the backfill area in the Tongue River drainage basin. The extent of water level drawdown in the coal and shallower aquifers in the area surrounding the mines also would be expected to increase slightly as a result of mining in the tract and from dewatering the active mine pits. Where the effects of pumping from mines (e.g., Spring Creek, North, West and East Decker mines) overlap, additional water level declines result from concurrent operations. In 2020 MDEQ prepared a CHIA related to expanding mining at the SCM to the south into the Pearson Creek drainage (MDEQ-WQD 2020). The 2020 CHIA evaluated impacts from mining at the SCM and the Decker Mine. MDEQ is in the process of preparing an updated CHIA but this document has not been made public and is not avail for inclusion into this EA. A main component of a CHIA is to determine if material damage would result from a proposed project. As defined at Montana Code Annotated (MCA) 82-4-203(30), material damage occurs if, outside of a permit boundary, land uses or beneficial uses of water are adversely affected, a water quality standard is violated, or if water rights are impacted. MDEQ concluded that no material damage was identified outside the permit boundaries of the Spring Creek or Decker Coal mines, and based on hydrologic analysis, no material damage was anticipated.

Mitigation Measures

Montana State 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 Montana State regulations also require surface coal mine permittees to restore the essential hydrologic function of disturbed land surfaces. According to MCA 82-4-203(30), proposed mining operations must be designed and conducted in a way to prevent material damage to the hydrologic balance outside the permit area (MCA 2015).

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 and 4.1.4 of the 2010 LBM EA and the surface-water portion of the 2020 CHIA.

The 2020 CHIA presents information that exceedances of MDEQ water standards from the Spring Creek/South Fork Spring Creek drainages, which includes the TR1 Tract, have occurred in samples from locations upstream and downstream of the mine. Exceedances of livestock thresholds in samples both upstream and downstream of mining in the Spring Creek drainage have also been noted. Baseline monitoring for the Pearson Creek drainage showed similar constituent concentrations. The 2020 CHIA also states that current mining operations at the SCM in the Spring Creek and South Fork Spring Creek drainages have not resulted in measurable changes in water quality.

Changes in surface runoff characteristics and sediment discharges would occur during mining on the 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. According to MCA 82-4-203(30), proposed mining operations must be designed and conducted in a way to prevent material damage to the hydrologic balance outside the permit area (MCA 2015). While the entire disturbance area associated with the Proposed Action has been approved for disturbance under the recently approved TR1 MR for SMP C1979012, approximately 728.4 acres of surface disturbance are anticipated related to mining the federal coal within the TR1 Tract. However, reclamation would be ongoing and concurrent with mining so there would not be a significant increase in the size of the area that is disturbed at any given time. The direct and indirect effects to surface water would not be significantly different than those described in the 2010 LBM EA and are expected to be moderate but extended to 2031.

4.5.2.1.2 No Action Alternative

The impacts to surface water under the No Action Alternative would be similar in nature to those under the Proposed Action but the magnitude of the impacts would be reduced since disturbance to 728.4 acres to recover federal coal within the tract would not occur. Therefore, implementation of the No Action Alternative would have negligible effect on reducing the magnitude of surface water impacts.

4.5.2.2 Cumulative Effects

The cumulative impact area for potential surface water impacts includes proposed LOM disturbance area for the SCM and Decker Mine within local drainage basins, and the adjacent Tongue River Reservoir area. Mining related impacts to surface water are expected to be measurable in the short term within and below mined area drainages and would diminish with reclamation and distance downstream. MDEQ concluded in the 2020 CHIA that no material damage to surface-water systems would result from the mining evaluated in the CHIA.

4.5.2.3 Mitigation Measures

Montana State regulations require surface coal mine permittees to restore the essential hydrologic function of disturbed land surfaces. 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 (MCA 2015).

4.5.3 Water Rights

4.5.3.1 Direct and Indirect Effects

4.5.3.1.1 Proposed Action

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 Proposed Action. According to MCA 82-4-203(30), proposed mining operations must be designed and conducted in a way to prevent material damage to the hydrologic balance outside the permit area (MCA 2015).

Monitoring wells are placed between mine operations and nearby private wells to monitor for water level and water quality changes to anticipate any downgradient impacts. Currently, CBNG production has exceeded the amount of drawdown predicted to result from mining. Therefore, potential impacts from mining to stock and domestic wells in the area have become largely irrelevant (MDEQ-WQD 2020).

Numerous livestock water wells have been removed over the years to facilitate mining operations but no effects to domestic supplies have been reported. No material damage has been identified outside the permit boundaries of the SCM or Decker Mine and, based on hydrologic analysis, no material damage to water rights is anticipated (MDEQ-WQD 2020).

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 SCM area. As stated in **section 3.2.1**, current groundwater conditions have already changed in the SCM area as a result of CBNG development and ongoing mining operations at the SCM and Decker Mine. 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 SCM during mining is expected because runoff is currently being controlled within the SCM as a result of mining unrelated to the Proposed Action and the Decker Mine currently intercepts all remaining flows from Spring Creek and Pearson Creek. Therefore, impacts to groundwater or surface-water rights have already occurred from mining within the SCM and implementation of the Proposed Action would have negligible effect on increasing the extent of impacts.

4.5.3.1.2 No Action Alternative

The impacts on water rights under the No Action Alternative would be similar in nature to those under the Proposed Action but the magnitude of the impacts would be reduced since disturbance to 728.4 acres to recover federal coal within the tract would not occur. Impacts to water rights have already occurred within the tract related to coal recovery on adjacent federal coal leases, as approved by SMP C1979012 and OSMRE's 2012 federal MPDD. Therefore, implementation of the No Action Alternative would have negligible effect on reducing the magnitude of impacts on water rights.

4.5.3.2 Cumulative Effects

While the approval of the federal mining plan modification request would contribute to additional, more extensive mining disturbance in the SCM and Decker 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 SCM and the Decker Mine currently intercepts all remaining flows from Spring Creek and Pearson Creek.

4.5.3.3 Mitigation Measures

Montana State 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.

4.6 Alluvial Valley Floors

4.6.1 Direct and Indirect Effects

4.6.1.1 Proposed Action

The direct and indirect effects to alluvial valley floors (AVF) would not be significantly different than those described in Section 4.1.5 of the 2010 LBM EA. No AVFs have been delineated within the tract so there would be no direct or indirect effects to AVFs from the Proposed Action.

4.6.1.2 No Action Alternative

Because no AVFs have been delineated within the tract, impacts to AVFs in the area under the No Action Alternative 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 2010 LBM EA. One AVF has been delineated within the SCM permit boundary but it has been designated as insignificant to agriculture and is therefore not prohibited from mining. Much of this AVF has already been disturbed, as approved by SCC's Pearson Creek Amendment for SMP C1979012 and OSMRE's 2012 federal MPDD. No other AVFs have been delineated along the Spring Creek drainage system, above or below the SCM. As discussed in Appendix J of the mining permit for SMP C1979012, a hydrologic restoration plan has been developed that provides erosionally stable channels and floodplains following reclamation and plan calls for the restoration of the essential hydrologic functions, prevention of material damage, and re-establishment of the premining land usage of the hydrologic system of the South Fork Spring Creek.

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

No jurisdictional wetlands are present within the tract so there would be no direct or indirect effects to jurisdictional wetlands from the Proposed Action. Stock ponds and water impoundments with wetland soils, plants, and hydrology are present, but they are not considered jurisdictional because they either lack a continuous ordinary high-water mark or do not have a continuous nexus to other WOTUS.

4.7.1.2 No Action Alternative

No jurisdictional wetlands have been delineated within the tract so there would be no direct or indirect effects to jurisdictional wetlands from the No Action Alternative.

4.7.2 Cumulative Effects

While two delineated jurisdictional wetlands occur within the SCM permit boundary, no wetlands are present in the proposed tract. Cumulative impacts to jurisdictional wetlands would not be increased if the federal mining plan modification is approved. Wetlands disturbance within the SCM permit boundary are under the jurisdiction of the U.S. Army Corps of Engineers.

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

The direct and indirect effects to soils would not be significantly different than those described in Section 4.1.7 of the 2010 LBM EA. Soils of the tract would be altered under the Proposed Action. While the entire disturbance area associated with the Proposed Action has been approved for disturbance under the recently approved TR1 MR for SMP C1979012, approximately 728.4 acres of surface disturbance are anticipated related to mining the federal coal within the TR1 Tract. The direct and indirect effects related to the Proposed Action on soils would be moderate and short term.

4.8.1.2 No Action Alternative

The impacts to soils under the No Action Alternative would be similar in nature to those under the Proposed Action but the magnitude of the impacts would be reduced since disturbance to 728.4 acres to recover federal coal within the tract would not occur.

4.8.2 Cumulative Effects

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). 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 but extended to 2031.

4.8.3 Mitigation Measures

No mitigation measures would be necessary for soils resources.

4.9 Vegetation

4.9.1 Direct and Indirect Effects

4.9.1.1 Proposed Action

The direct and indirect effects to vegetation would not be significantly different than those described in Section 4.1.8 of the 2010 LBM EA. Short-term impacts associated with the removal of vegetation from the TR1 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 of disturbed lands with the SCM permit boundary is performed according to MDEQ regulatory standards (ARM 17.24.3). Reclamation 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, SCC would plan to reestablish vegetation types during reclamation that are similar to the premine types. Reestablished vegetation would be dominated by species mandated in the reclamation seed mixtures (to be approved by MDEQ). The reclamation plan for the SCM includes steps to control invasion by weedy (invasive nonnative) plant species. While the entire disturbance area associated with the Proposed Action has been approved for disturbance by MDEQ under the recently approved TR1 MR for SMP C1979012, approximately 728.4 acres of surface disturbance are anticipated related to mining the federal coal within the TR1 Tract. The direct and indirect effects related to the Proposed Action on vegetation would be moderate but extended to 2031.

4.9.1.2 No Action Alternative

While the entire disturbance area associated with the Proposed Action has been approved for disturbance under the recently approved TR1 MR for SMP C1979012, approximately 728.4 acres of surface disturbance are related to mining the federal coal within the TR1 Tract. These acres would not be disturbed under the No Action Alternative. Under this alternative, impacts to vegetation in the area would remain as described in **section 4.9.1.1**, but the affected area would be reduced by 728.4 acres.

4.9.2 Cumulative Effects

The overall contribution to cumulative effects 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

The environmental consequences related to mining the TR1 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 Section 4.1.9 of the 2010 LBM EA 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 tract to adjacent ranges during mining. Mule deer would be most affected as the tract contains good quality habitat. Pronghorn would not be substantially impacted, because 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 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 SCM, suggesting that some animals may become habituated to such disturbances.

As determined from information from MFWP, no portion of the TR1 Tract disturbance area has been designated as high value winter range for big game (MFWP 2016). Approximately 486.8 acres have been designated as moderate value winter range and the remaining 241.6 acres were designated by MFWP as not rated for winter range. SCM would be required to reclaim disturbed 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 and loss of trees, would cause a decrease in carrying capacity and diversity on the tract. Sagebrush and trees would gradually become re-established on the reclaimed land, but the topographic changes would be permanent.

General reclamation practices for establishing or enhancing post-mine wildlife habitat at the SCM are described in the Reclamation Plan (Section 17.24.313) of SMP C1979012. SCC also has developed a separate Habitat Recovery and Replacement Plan (HRRP) for the GRSG, which is a species of particular interest in the region. Because there is overlap between the big game winter range and the GRSG habitat areas, the reclamation of any GRSG habitat outlined the specific HRRP would fulfill the reclamation requirements for mule deer and pronghorn and would provide quality habitat for both big game and grouse that might be impacted by the Proposed Action. The direct and indirect effects related to the Proposed Action on big game would be moderate but extended to 2031.

4.10.1.1.2 No Action Alternative

While the entire disturbance area associated with the Proposed Action has been approved for disturbance under the recently approved TR1 MR to SMP C1979012, approximately 728.4 acres of surface disturbance are related to mining the federal coal within the TR1 Tract. These acres would not be disturbed under the No Action Alternative. Impacts to the big game species have resulted from current mining activity. Under this alternative, impacts to big game in the area would remain as described in **section 4.10.1.1.1**, but the affected area would be reduced by 728.4 acres and the duration of the effects would be shortened by 4 years.

4.10.1.2 Cumulative Effects

The regional EIS that covered the northern PRB (BLM 1984) predicted that large-scale surface coal mining could potentially result in significant cumulative effects to big game due to habitat loss;

restrictions in seasonal and daily movement caused by railroads, access roads, and mining operations; poaching; urban development; range overuse; possible lack of water sources; increased road kills; and crop depredation. However, no severe mine-caused mortalities have occurred and no long-lasting impacts on big game species have been noted on the SCM. MFWP-designated high and moderate value winter range occurs in the area. The cumulative effects on regional big game population would be moderate but extended to 2031.

4.10.1.3 Mitigation Measures

No mitigation measures specific to big game would be necessary. General reclamation practices for establishing or enhancing post-mine wildlife habitat at the SCM described in the Reclamation Plan (Section 17.24.313) of SMP C1979012 are in place. SCC also has developed a separate HRRP for the GRSG, which would provide quality habitat for big game.

4.10.2 Raptors

4.10.2.1 Direct and Indirect Effects

4.10.2.1.1 Proposed Action

One intact raptor nest (TV2) is located within the disturbance area for the TR1 Tract. Although still intact, this nest has not been used since at least 1994. Vultures have been seen soaring within the area in most years but no other intact nest sites have been found. This species is a migratory bird, which is protected under the MBTA (USFWS 2019b).

SCC 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 area 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, SCC 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 limited number of nesting raptors within the proposed tract disturbance (only one known intact turkey vulture nest) and the SCC'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 but extended to 2031.

4.10.2.1.2 No Action Alternative

While the entire disturbance area associated with the Proposed Action has been approved for disturbance under the recently approved TR1 MR for SMP C1979012, approximately 728.4 acres of surface disturbance are anticipated related to mining the federal coal within the TR1 Tract. These acres would not be disturbed at this time under the No Action Alternative. Impacts to the raptors have resulted from current mining activity. Under this alternative, impacts to raptors in the area would remain as described in **section 4.10.2.1.1**, but the affected area would be reduced by 728.4 acres and the duration of the effects would be shortened by 4 years.

4.10.2.2 Cumulative Effects

Cumulative impacts to most raptors would increase as additional habitat is disturbed by mining and other activities. These impacts would be moderate but would improve as land is 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 MDEQ ensure compliance with the Migratory Bird Treaty Act, the Bald and Golden Eagle Protection Act, and the ESA, thereby ensuring regional impacts to those protected wildlife species would be minor.

4.10.2.3 Mitigation Measures

No mitigation measures specific to raptors would be necessary. General reclamation practices for establishing or enhancing post-mine wildlife habitat at the SCM described in the Reclamation Plan (Section 17.24.313) of SMP C1979012 are in place. SCC 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

The SCM annual wildlife monitoring area includes five confirmed active lek sites, two confirmed inactive leks, one unconfirmed site, and one confirmed extirpated (mined through) lek. Long-term results from annual lek monitoring suggest that GRSG populations in the SCM annual wildlife monitoring area are cyclic, with periodic peaks and declines (Great Plains Consulting 2017). These data suggest that the SCM area may only support larger groups of GRSG when regional populations are especially high (Great Plains Consulting 2017).

To date, only the Upper Divide lek has been identified within the SCM permit area. It was eclipsed by mining operations in the early to mid-1980s. No other known GRSG leks would be physically disturbed by mine operations under the current SMP C1979012 LOM plan. The nearest active GRSG lek (Pasture Lek) is approximately 0.67 miles from the tract (**map 3-5**). Approximately 3,013 non-contiguous acres in GRSG core area PRB-2 are within the current permit area (Great Plains Consulting 2017). Under the Proposed Action, approximately 728.4 acres of this core area would be affected.

SMP C1979012 currently contains multiple monitoring and protection plans that include numerous specific measures for GRSG and their habitats, including those mentioned above. The MDEQ has strict bonding, reclamation, and bond-release requirements for all surface coal mines in Montana, 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. SCC's development and implementation of a detailed HRRP for GRSG at the mine and its voluntary participation (through CPE) in the Thunder Basin Grasslands Prairie Ecosystem Association (TBGPEA) is intended to offset potential impacts to GRSG due to mine-related activities. TBGPEA works in collaboration and cooperation with a variety of government and non-government entities, as well as with experts in academia and members of the private sector to protect and enhance existing habitat for species of concern within the sagebrush steppe and the short-grass prairie ecotypes (TBGPEA 2019).

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 SCM 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 but extended to 2031.

According to Executive Order No. 12-2015 (Amending and Providing for Implementation of the Montana Sage Grouse Conservation Strategy), 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 of the Montana Sage Grouse Conservation Strategy (Office of the Governor 2015). Approximately 707.5 acres (97.1 percent) of the disturbance associated with the Proposed Action is within the SCM's currently approved SMP C1979012 permit boundary, and these acres would not be managed according to the executive order. The remaining 20.9 acres (2.9 percent) of the proposed disturbance are outside of the currently approved permit boundary and would be subject to stipulations included in Executive Order No. 12-2015. Compliance with the stipulations in Executive Order No. 12-2015 are handled through the MDEQ permitting process and SCC would be required to address any stipulations relating to GRSG before disturbance would be allowed within the 20.9-acre parcel. As stated above, SCC has developed and implemented a detailed HRRP for GRSG at the mine and its voluntary participation in the TBGPEA to offset potential impacts to GRSG due to mine-related activities.

In addition, in fulfillment of MEPA and the Montana Strip and Underground Mine Reclamation Act (MSUMRA), SCC has developed general management and monitoring plans for wildlife species of interest that are part of SMP C1979012, as introduced in the TR1 MR EIS. The management and monitoring plans were developed through consultation with, and approval of the MDEQ, Montana Department of Fish, Wildlife and Parks (MDFWP), and the Montana Sage Grouse Habitat Conservation Program (MSGHCP).

4.10.3.1.2 No Action Alternative

While the entire disturbance area associated with the Proposed Action has been approved for disturbance under the recently approved TR1 MR for SMP C1979012, approximately 728.4 acres of surface disturbance are anticipated related to mining the federal coal within the TR1 Tract. These acres would not be disturbed at this time under the No Action Alternative. Impacts to the GRSG have resulted from current mining activity. Under this alternative, impacts to GRSG in the area would remain as described in **section 4.10.3.1**, but to a lesser extent.

4.10.3.2 Cumulative Effects

A conservation strategy was developed in collaboration with the USFWS, other state and federal agencies, and many other stakeholders in the region that would benefit numerous special interest species, including GRSG. SCC would implement a variety of conservation measures both on and off-property, with special emphases in habitats identified as Conservation Priority Areas (e.g., GRSG core areas, occupied short-grass prairie habitats, etc.) throughout the coverage area. These voluntary measures include a wide variety of land management actions that are designed to avoid or minimize impacts, and to restore, enhance, and/or maintain habitat benefiting one or more of the targeted species, including GRSG. Given these factors, ongoing cumulative energy development 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 cumulative effects related to the Proposed Action on regional GRSG populations would be moderate but extended to 2031.

4.10.3.3 Mitigation Measures

SCC has developed and implemented a detailed HRRP for sage-grouse at the mine and its voluntary participation in a large-scale conservation strategy highlighting sagebrush-steppe species across the region further offset potential impacts to sage-grouse due to mine-related activities. The plan is included in Section 17.24.312 of SMP C1979012 (SCC 2014). The HRRP consists of the following five parts:

- A habitat analysis of the permit areas.
- A detailed description of the methods selected by the lessee to recover, replace or mitigate habitat loss, together with a comparative analysis of alternate methods which were considered and rejected by the lessee and the rationale for the decision to select the proposed methods.
- A timetable specifying that which will be required to accomplish the habitat recovery or replacement plan and showing how this timetable relates to the overall federal mining plan.
- An evaluation of the final plan by the BLM, in consultation with the State of Montana.
- In the development of this plan, direct liaison with the State of Montana is essential.

Through CPE's membership, SCC also is a voluntary participant in the TBGPEA. The focus if the association is to

- work in collaboration and cooperation with a variety of government and non-government entities, as well as with experts in academia and members of the private sector,
- develop and implement a strategy of adaptive management that is informed by and responsive to current conditions and the results of previously implemented conservation efforts,
- conduct extensive vegetation monitoring and targeted wildlife monitoring to support and enable adaptive management, and
- work with the USFWS to implement incentives based conservation strategy to protect eight species of concern that inhabit the sagebrush steppe and short-grass prairie of northeastern Wyoming.

If the Proposed Action is approved, SCC would be required to pay $107,727 in compensatory mitigation into the Montana Sage Grouse Oversight Team's Stewardship Fund.

4.10.4 Threatened, Endangered, and Candidate (T&E) Species and Other Species of Special Interest (SOSI)

4.10.4.1 Direct and Indirect Effects

4.10.4.1.1 Proposed Action

The current USFWS list of T&E species that may occur in Big Horn County, Montana includes the black-footed ferret (USFWS 2018). The black-footed ferret is listed as endangered for the SCM area. Based on information in the USFWS's (2013) recent update to the *Black-footed Ferret Recovery Plan*, the SCM is not located near an active or potential reintroduction area for this species. Because black-footed ferrets have not been documented in the area, there would be no effect to black-footed ferrets as a result of the Proposed Action.

For the purposes of this discussion, SOSI include federal *Birds of Conservation Concern* and Montana *Species of Greatest Conservation Need*. **Appendix D** lists the vertebrate species of special interest, summarizes their habitat requirements, and indicates if they have been observed on or within 1 mile of the SCM permit area during long-term annual monitoring conducted for the SCM. The 2008 (most current available) list of *Birds of Conservation Concern* for BCR 17 contains 28 species. Several of the species in BCR 17 have been documented at least once within the SCM wildlife monitoring area over time, though nearly half of those observations occurred with varying degrees of infrequency. The most abundant species recorded over time consisted of common raptors and passerine species known to nest in the survey area. Twenty-three Montana *Species of Greatest Conservation Need* have been documented in or within 1 mile of the SCM permit area, from 1994 through 2015. Most of these species would be temporarily displaced but current reclamation practices in-place at the SCM 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 but extended to 2031.

4.10.4.1.2 No Action Alternative

While the entire disturbance area associated with the Proposed Action has been approved for disturbance under the recently approved TR1 MR for SMP C1979012, approximately 728.4 acres of surface disturbance are anticipated related to mining the federal coal within the TR1 Tract. These acres would not be disturbed at this time under the No Action Alternative. Indirect impacts to T&E species or SOSI have resulted from current mining activity. Under this alternative, impacts to T&E species and other species of special interest in the area would remain as described in **section 4.10.4.1**, but the affected area would be reduced by 728.4 acres and the duration of the effects would be shortened by 4 years.

4.10.4.2 Cumulative Effects

The cumulative effects to T&E species and SOSI would be similar to the direct and indirect impacts, discussed above.

4.10.4.3 Mitigation Measures

No mitigation measures specific to T&E species and SOSI would be necessary. General reclamation practices for establishing or enhancing post-mine wildlife habitat at the SCM described in the Reclamation Plan (Section 17.24.313) of SMP C1979012 are in place. SCC has also implemented a mitigation plan specific to the potential disturbance of an existing prairie falcon eyrie.

4.11 Land Use and Recreation

4.11.1 Direct and Indirect Effects

4.11.1.1 Proposed Action

Additional discussions regarding land use and recreation can be found in sections 3.11 and 4.1.10 of the 2010 LBM EA. Surface ownership in the area includes BLM and private lands and the proposed coal removal area is managed by the BLM and SCC. The major adverse ownership and land use consequences of mining the TR1 Tract would be reduction of livestock grazing, loss of wildlife habitat, and curtailment of other mineral development on about 728.4 additional acres during active mining. Wildlife (particularly big game) use would be displaced while the tract is being mined and reclaimed. Livestock grazing has already been prohibited due to the tract being inside the permit boundary and adjacent to active mine areas. Hunting on the tract is currently not allowed 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 long term related to the length of time needed to obtain bond release, which would open up the land for post-mining land use.

4.11.1.2 No Action Alternative

While the entire disturbance area associated with the Proposed Action has been approved for disturbance under the recently approved TR1 MR for SMP C1979012, approximately 728.4 acres of surface disturbance are anticipated related to mining the federal coal within the TR1 Tract. These acres would not be disturbed at this time under the No Action Alternative. Indirect impacts to ownership and use of the land have resulted from current mining activity. Under this alternative, ownership and use of the land in the area would remain as described in **section 4.11.1.1**, but the duration of the effects would be shortened by 4 years.

4.11.2 Cumulative Effects

The cumulative effects on land use and recreation would be similar to the direct and indirect impacts discussed above and to the cumulative effects discussed in Section 4.1.10 of the 2010 LBM EA.

4.11.3 Mitigation Measures

No mitigation measures specific to land use and recreation would be 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 and 4.1.11 of the 2010 LBM EA. The TR1 Tract has been subjected to Class III cultural resource inventories. One site within the TR1 Tract (24BH3392) is classified as an NRHP eligible site that would require mitigation prior to disturbance. Data recovery plans are in place that are designed to mitigate the loss of archaeological resources in the mine operations area by expanding archaeological knowledge about this region. The data recovery plans are in compliance with SCC's Memorandum of Agreement for cultural resources, which contains provisions for incidental cultural discoveries (MDEQ 2001). A mitigation plan for site 24BH3392 has been developed and approved by SHPO (BLM 2010b) and site testing will be completed in 2020. The direct and indirect effects on cultural resource from the Proposed Action would be negligible but long term.

4.12.1.2 No Action Alternative

While the entire disturbance area associated with the Proposed Action has been approved for disturbance under the recently approved TR1 MR for SMP C1979012, approximately 728.4 acres of surface disturbance are anticipated related to mining the federal coal within the TR1 Tract. These acres would not be disturbed at this time under the No Action Alternative. While site

24BH3392 would not be disturbed, disturbance to minor cultural resources sites would continue due to mine related activity authorized under the currently approved state mine permit and federal mining plan. The direct and indirect effects on cultural resource from the No Action Alternative would be negligible but long term.

4.12.2 Cumulative Effects

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

4.12.3 Mitigation Measures

Mitigation would be required for the loss of the one NRHP eligible site. SCC's cultural resources Memorandum of Agreement is in place to guide mitigation of incidental cultural discoveries that might be encountered during mining.

4.12.4 Unanticipated Discoveries

If a previously unidentified cultural resource is discovered in the TR1 Tract, SCC would take measures to protect the find locality and provide written notice to the MDEQ and the OSMRE within 48 hours of the discovery. A Montana-permitted archaeologist meeting the Secretary of the Interior's Professional Qualification Standards would, as soon as possible, evaluate the discovery, make a recommendation as to the NRHP eligibility of the resource, and provide written notice to the MDEQ and the OSMRE within 48 hours. The MDEQ and OSMRE would then consult with the Tribal Historic Preservation Office (THPO), SHPO, and the BLM (for federally managed sites) on the NRHP eligibility determination(s) and develop appropriate measures necessary to mitigate any adverse effects through the development of a treatment plan.

Should the discovery involve a burial or a resource thought to have potential religious and cultural significance, the tribe(s) with an interest would be notified and consulted as appropriate. When agreement is reached among all of the involved parties, the appropriate mitigation, if necessary, would be implemented. The tribes, OSMRE, MDEQ, SHPO, and the surface landowner must agree to any proposed treatment measures.

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 and 4.1.12 of the 2010 LBM EA. No visual resources have been identified on or near the tract that are unique, as compared to the surrounding area. The mining operations would affect landscapes classified as Visual Resource Management (VRM) Class III by BLM. The objective of this class is to partially retain the existing character of the landscape. Reclaimed terrain would be almost indistinguishable from the surrounding undisturbed terrain. Slopes might appear smoother (less intricately dissected) than the surrounding undisturbed terrain, and sagebrush and trees would not be as abundant for several years; however, within a few years after reclamation, the mined land would not be distinguishable from the surrounding undisturbed terrain except by someone very familiar with landforms and vegetation. The direct and indirect effects related to the visual resources would be moderate but extended to 2031.

4.13.1.2 No Action Alternative

While the entire disturbance area associated with the Proposed Action has been approved for disturbance under the recently approved TR1 MR for SMP C1979012, approximately 728.4 acres of surface disturbance are anticipated related to mining the federal coal within the TR1 Tract. These acres would not be disturbed at this time under the No Action Alternative. Indirect impacts to visual resources have resulted from current mining activity. Under this alternative, visual resources in the area would remain as described in **section 4.13.1.1**, but the duration of the effects would be shortened by 4 years.

4.13.2 Cumulative Effects

The principal visual impact in this area is from the visibility of mine pits and facility areas associated with the SCM and the Decker Mine. People most likely to see these mining facilities would be local residents, those passing through the area, those visiting it on mine related business, or recreationists using the Tongue River Reservoir. Pit and mine support facilities are generally not visible from more than a few miles away, but coal loading facilities and draglines can be seen from farther away. Due to the distance between mining operations, cumulative overlap of mining-related visual impacts is not likely. One public road (FAS 314), a railroad, and a power line also affect visual classification of the proposed tract. After mining, the reclaimed slopes might appear somewhat smoother than pre-mining slopes and there would be fewer gullies, bluffs, and rock outcrops than at present. Even so, the landscape of the reclaimed mine would look very much like undisturbed landscape in the area and, in this area, the reclaimed mine areas would be separated by areas where the topography is not disturbed. The cumulative effects related to the visual resources would be moderate but extended to 2031.

4.13.3 Mitigation Measures

No mitigation measures specific to visual resources would be necessary.

4.14 Noise

4.14.1 Direct and Indirect Effects

4.14.1.1 Proposed Action

Additional discussions regarding noise can be found in sections 3.14 and 4.1.13 of the 2010 LBM EA. Surface activities associated with the Proposed Action, including noise from equipment, mining activity, and blasting, would continue to generate noise for an additional 4 years in a manner comparable to the existing condition.

CPE has developed internal criteria on off-site noise acceptable for the protection of the local community and has established a 65 Adjusted decibels (dabs) threshold for noise. Modeling conducted for SCC indicates that this threshold would be exceeded at points less than 4,800 feet (0.91 mile) from the disturbance.

The nearest residence is approximately 2.8 miles from the TR1 Tract disturbance and FAS 314 is approximately 1.4 miles from the disturbance. The nearest recreational opportunity is at the Tongue River Reservoir, approximately 2.6 miles from the tract disturbance. Direct and indirect effects related to noise would be significant in the immediate vicinity of the tract disturbance from equipment, mining activity, and blasting but these effects would moderate rapidly as the distance from disturbance increased. Direct and Indirect effects to residents, people using FAS 314, and recreationalists using the Tongue River Reservoir would be minor due to the distance from mine related activity associated with the tract.

Because OSMRE does not regulate rail traffic (see **section 3.1**), for associated environmental impacts, this EA relies upon STB regulations, which only require analysis of noise where rail traffic increases at least 100 percent (i.e., doubles) or increases by at least 8 trains per day on any segment (49 C.F.R. Part 1105.7e(6)). As discussed in **section 4.15.1.1**, the Proposed Action could increase rail traffic by 3 percent and increase the number of trains per day by less than 1train. Therefore, a noise analysis associated with rail traffic is not required. Local impacts from noise and vibration would be increased by the addition of less than one additional train per day over 2018 traffic. Therefore, the impacts from noise and vibration from the Proposed Action would be minor.

4.14.1.2 No Action Alternative

While the entire disturbance area associated with the Proposed Action has been approved for disturbance under the recently approved TR1 MR for SMP C1979012, approximately 728.4 acres of surface disturbance are anticipated related to mining the federal coal within the TR1 Tract. These acres would not be disturbed at this time under the No Action Alternative. Noise from current mining activities have negligible impact people using FAS 314, and recreationalists using the Tongue River Reservoir. Under this alternative, noise impacts in the area would remain as described in **section 4.14.1.1**, but for a shorter duration.

4.14.2 Cumulative Effects

Existing land uses within the Spring Creek area (e.g., mining, livestock grazing, transportation, and recreation) contribute to noise levels, but wind is generally the primary noise source. Mining in the area increases the number of noise-producing facilities within the area and may augment the level of impacts to other resources (e.g., increased exposure of wildlife to noise impact, increased noise impacts to local residents and recreational users). Mining-related noise is generally masked by the wind at short distances, so cumulative overlap of noise impacts between the SCM and the Decker Mine is not likely.

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 SCM indicate that wildlife generally adapt to noise conditions associated with active coal mining. The cumulative effects related to noise as discerned by the public would be moderate but short term (4 years).

4.14.3 Mitigation Measures

No mitigation measures specific to noise impacts would be 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 **section 3.15** of this EA and in Sections 3.15 and 4.1.14 of the 2010 LBM EA. Major local roads and railroads are presented on **map 1-1** and U.S. railroad routes used by BNSF to transport SCM coal to various destinations are shown on **map 1-3**.

Vehicle Transportation

No new public roads would be required to support the Proposed Action and mining the proposed tract would not increase the current level of impact on FAS 314. As discussed in **section 3.15**, the highest average hourly vehicle count at a site just north of the Montana/Wyoming border over the last 5 years (36 vehicles in 2015) was well under the 2018 design hourly volume for the road (76). Therefore, mine-related traffic would continue to have minor impacts to public roads, but would extend the impacts by 4 years, until 2031.

Rail Transportation

Section 3.15 indicated that the annual 2018 rail traffic related to coal transport was approximately 2,195,150 miles (based on the shipment of 13.77 Mt of coal to 7 destinations). The 2014-2018 average annual rail traffic related to coal transport was approximately 2,266,376 miles to transport 14.21 Mt of coal. The annual rail traffic evaluated for the Proposed Action is difficult to calculate since the amount and destination of coal shipped is related to coal contracts negotiated by the mine with potential clients, which can vary from year to year, and the specific client information (specific destinations and tons shipped) is not publicly available. However, as determined from publicly available information, rail traffic related to SCM coal shipments has remained relatively consistent for the last 5 years, with approximately 91 percent of coal shipments going to the same 6 destinations. Therefore, this EA assumes that the destinations and the destination distances for SCM coal would remain relatively consistent through 2031. The Proposed Action is being evaluated at a coal production rate of 14.20 Mtpy so impacts from rail transportation related to the Proposed Action will be evaluated using 2,266,324 miles (based on the percent change of projected annual shipments compared to the 2014-2018 average number of shipments). The 2020-2031 average annual number of trips (loaded and empty) for trains shipping SCM would decrease from approximately 1,822 to approximately 1,820. It is reasonable to assume that the current total U.S. miles of freight shipped would remain relatively constant through 2031 based on 2014 through 2018 statistics from the USDOT. The average annual haul distance between 2014 and 2018 for freight trains throughout the U.S. was slightly less than 481,475,400 miles (USDOT 2019).

The potential for train derailments would continue for an additional 4 years. Even with fluctuations in the coal market, the railroad would maximize train traffic (Stephens 2018) and the overall number of trains would remain constant, independent of the number of coal trains.

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 percent compared to cars where no remedial measures have been taken (BNSF 2016).

This EA acknowledges that the Proposed Action would result in increased indirect impacts from coal-train transport (public health, collisions with wildlife, dust, noise, and vibration). However, mine-related coal shipments would have minor local and regional impacts (the potential for a 3 percent increase in rail traffic related to coal from the SCM, which translates to 50 additional trains per year and 0.14 train per day). The impacts related to public health, collisions with wildlife, dust, noise, and vibration would be minor but extended by 4 years, until 2031.

4.15.1.2 No Action Alternative

Under this alternative, transportation impacts in the area would remain as described in **section 4.15.1.1**, but the duration of the effects would be shortened by 4 years.

4.15.2 Cumulative Effects

Cumulative impacts to transportation are related to coal production. If coal production is extended, cumulative effects to transportation would be extended. Highway traffic accidents and delays at grade crossings could result from train traffic to power plants and ports. The local, regional, and national transportation facilities used to ship coal from the SCM are already in place and current coal production levels are not expected to change with the Proposed Action. However, the Proposed Action would extend the duration of mining by approximately 4 years at the SCM and thus the indirect impacts to transportation (the extension of the duration of traffic from mine employees, possible delays from train traffic, possible delays from mine equipment crossing FAS 314, and impacts from coal shipments using trains [public health, collisions with wildlife, dust, noise, and vibration] and overseas vessels) would be extended. The annual rail traffic generated by the Proposed Action represents an estimated 0.45 percent of the of the total U.S. rail freight traffic (based on 2018 U.S. rail transportation numbers and the shipment of 14.2 Mt of coal) so the cumulative effects related to transportation would be minor but extended to 2031.

4.15.3 Mitigation Measures

No mitigation measures specific to transportation would be 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 and 4.1.15 of the 2010 LBM EA. Wastes classified as non-hazardous, hazardous, and universal are generated during mining operations at the SCM. The SCM closed the onsite solid waste landfill in 2015. As a result, non-hazardous solid waste is shipped to the municipal landfill in Hardin, Montana. The only wastes disposed of onsite are wastes such as abandoned mining machinery, non-greasy wood, used tires, concrete, and other items permitted under the mine's existing MDEQ permit to mine. The SCM generates some non-hazardous liquids including used oil, used grease, used antifreeze, and spent non-hazardous solvents. The used oil, paper, cardboard, plastic bottles, aluminum cans, and scrap steel are shipped off-site for recycling. The SCM also generates some hazardous wastes including flammable liquids and other combustible materials determined to be hazardous by the EPA under the Resource Conservation and Recovery Act. Hazardous waste and non-hazardous used grease and used antifreeze are incinerated for energy recovery at an off-site EPA-permitted facility. The SCM also generates universal wastes including used batteries, electronic waste, and used light bulbs that are shipped off-site for recycling. No solid waste is deposited within 8 feet of any coal outcrop or coal storage area, or at refuse embankments or impoundment sites (SCC 2019). No direct or indirect effects from hazardous and solid waste are anticipated as a result of the Proposed Action.

4.16.1.2 No Action Alternative

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 effects would be shortened by 4 years.

4.16.2 Cumulative Effects

As indicated in Section 4.1.15 of the 2010 LBM EA, no additional cumulative hazardous or solid waste impacts are expected.

4.16.3 Mitigation Measures

No mitigation measures specific to hazardous and solid wastes would be necessary.

4.17 Socioeconomics

4.17.1 Direct and Indirect Effects

4.17.1.1 Proposed Action

Additional discussions regarding socioeconomic impacts can be found in sections 3.17 and 4.1.16 of the 2010 LBM EA. Under the Proposed Action, additional Montana revenues (royalties, severance tax, gross proceeds tax, and resource indemnity trust tax) could total approximately $134.4 million and additional federal revenues (royalties, black lung tax, and federal recreation tax) could total $61.2 million over the life of the mine. The primary difference between state and federal revenues is related to the fact that severance taxes are only paid to the state of Montana. The positive direct and indirect effects described above (additional revenues) would be moderate and would be extended by approximately 4 years, to 2031.

No new employees would be added under the Proposed Action and there would be no direct or indirect effects on the local work force. Mine employees would travel north from Sheridan and would not have to travel across either the Crow or Northern Cheyenne Reservations. SCC proposes to use emergency services from Sheridan, if necessary. The Proposed Action would not require employees to move into the area near the project. Therefore, no adverse human health or environmental effects would be expected to fall disproportionately on minority or low income populations as a result of the Proposed Action. No direct or indirect effects to environmental justice are anticipated as a result of the Proposed Action.

Mining in the TR1 Tract would not directly create new jobs and therefore, the availability of housing units would not be impacted. No additional employees are anticipated as a result of the tract being mined, although the Proposed Action would extend the duration of employment for current employees and extend the substantial economic benefits related to mining the federal coal. The positive direct and indirect effects described above (continued employment) would be moderate and would be extended by approximately 4 years, to 2031.

4.17.1.2 No Action Alternative

In terms of coal conservation; the No Action Alternative would mean that mineable federal coal within MTM-069782 would not be recovered. Approximately 53.6 Mt of federal coal would not be recovered along margins of existing leases. Montana revenues would be reduced by approximately $134.4 million and federal revenues of approximately $61.2 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 4 years would not be collected. In addition, the duration of employment for current employees would be reduced by 4 years. The No Action Alternative would result in moderate direct and indirect socioeconomic effects.

4.17.2 Cumulative Effects

Cumulative impacts related to the Proposed Action are not significantly different than those described in **section 4.17.1.1**, above. Montana and Big Horn County have been using the revenues for a variety of programs (Montana Department of Revenue 2018). Montana would collect additional revenues of approximately $134.4 million and federal revenues would increase by approximately $61.2 million related to this coal over the LOM, with a portion of the state revenues distributed to Big Horn County. Cumulative impacts would extend the duration of employment for current employees and extend the substantial economic benefits related to mining the federal coal. The positive cumulative effects on socioeconomics are expected to be moderate but short term (4 years).

4.17.3 Mitigation Measures

No mitigation measures specific to socioeconomic impacts are needed.

4.18 Short Term Uses and Long-term Productivity

This section relates to the balance or trade-off between short-term uses and long-term productivity for each resource in relation to the Proposed Action. The discussions contained throughout this environmental consequences chapter, in the existing SCM federal mining plan, and in the 2010 LBM EA adequate analyses and relationships of short-term uses (such as mining coal) and long-term productivity (such as generating electricity for homes, schools, and industry).

4.19 Unavoidable Adverse Effects

Unavoidable adverse impacts are the effects on natural and human resources that would remain after mitigation measures have been applied. For the Proposed Action, details regarding these impacts are presented in the preceding resource sections and the 2010 LBM EA. Unavoidable adverse effects are summarized in **table 4-6**.

Table 4-6. Unavoidable Adverse Effects of the Proposed Action

Resource	Unavoidable Adverse Effect
Topography and Physiography	Topographic effects of mining (surface configurations) 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 (stratigraphic units), mineral resources and buried paleontological resources may be permanently impacted by mining activities. Such impacts are unavoidable as the resources cannot be avoided by mining activities.
Air Quality	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.
Soil	Soil in disturbance area would exhibit more homogenous textures and may have coarser fragments near the surface following mining. Some soil loss may occur as a result of erosion, prior to stabilization.
Vegetation	Vegetation would be eliminated beginning with the initial disturbance and 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	Although searches would be conducted, undiscovered cultural resources could be impacted by subsidence and surface disturbing activities. All discovered sites would be mitigated as required by Section 106 of the NHPA. One site within the disturbance area for the TR1 Tract (24BH3392) is classified as an NRHP eligible site, which require mitigation prior to disturbance. Data recovery plans are in place that are designed to mitigate the loss of archaeological resources in the mine operations area by expanding archaeological knowledge about this region. The data recovery plans are in compliance with SCC's Memorandum of Agreement for cultural resources, which contains provisions for incidental cultural discoveries (MDEQ 2001). A mitigation plan for site 24BH3392 has been developed with consultation from MDEQ and SHPO and the site will be tested in 2020.
Visual Resources	Mining activity and associated disturbances and facilities would unavoidably alter the landscape during the mining term, affecting the aesthetic qualities. Some features could be visible from public access points, including Montana FAS 314. The effects would be negligible following reclamation.
Noise	Noise would result from mining activities and transportation similar to the existing condition, which is unavoidable.
Transportation Facilities	Route FAS 314 would continue to experience mine related traffic. BNSF rail lines would also continue to experience traffic. The effects would occur during the mining term.
Hazardous and Solid Waste	Coal mining and associated coal processing would yield unavoidable coal waste.

5.0 Consultation and Coordination

5.1 Public Comment Process

OSMRE 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 February 11, 2016 and is available at http://www.wrcc.osmre.gov/initiatives/SpringcreekMineTR1.shtm.

Public outreach letters describing the EA and soliciting scoping comments were mailed on February 11, 2016 to a total of 92 recipients, including city governments, adjacent landowners, and other interested parties. The legal notices and letters invited the public to comment on issues of concern related to the EA. OSMRE also sent letters of notification to 26 tribes/tribal representatives. These tribal notification letters were mailed on February 11, 2016.

OSMRE received written and e-mailed comments from 4,214 entities. A form letter in favor of the SCM accounted for 4,213 comments. Comment letters received during the public review period for this EA will be considered during the ASLM approval process. **Appendix A** presents a summary of the substantive EA scoping comments.

OSMRE released a public notice of the availability of the EA in the *Hardin Times* and the *Sheridan Press* on February 13, 2020. Written comments were solicited until March 13, 2020.

5.2 Preparers and Contributors

OSMRE personnel that contributed to the development of this EA are listed in **table 5-1** and third party contractors who contributed to the development of this EA are identified in **table 5-2**.

Table 5-1. OSMRE Personnel

Name	Organization	Project Responsibility
Logan Sholar	OSMRE	Project Lead/Project Coordination
Gretchen Pinkham	OSMRE	Air Quality
Roberta Martinez Hernandez	OSMRE	Hydrology
Ed Vasquez	OSMRE	Ecology
Stephanie Hamlett	OSMRE	Environmental Protection Specialist
Jeremy Iliff	OSMRE	Cultural/Historical/Paleontological

Table 5-2. Third Party Contractor Personnel

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

5.3 Distribution of the EA

This EA will be distributed to individuals who specifically request a copy of the document. It will also be made available electronically on the OSMRE website at http://www.wrcc.osmre.gov/initiatives/SpringcreekMineTR1.shtm.

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APPENDIX A

REVISIONS/ERRATA, PUBLIC SCOPING DOCUMENTS,
PUBLIC REVIEW COMMENTS SUMMARY,
PUBLIC REVIEW COMMENTS LOG, and
NOTICE OF AVAILABILITY MAILING LISTS

Revisions/Errata

Title Page	Revised EA date
Table of Content (TOC)	The TOC has been revised to address changes in the document.
Section 2.1.3.4, page 1-3	This section has been added to include an additional alternatives considered but eliminated from detailed analysis.
Section 2.1.3.4, page 1-3	This section has been added to include an additional alternatives considered but eliminated from detailed analysis.
Section 3.4.1.1, page 3-2	Revised the text to update the PM_{10} discussions.
Section 3.4.1.4, page 3-10	Revised/added this section to address climate change.
Section 3.4.1.5, page 3-11	This section has been added to accommodate the new discussion on climate change (see above) and revised to add additional GHG discussions.
Section 3.9, page 3-19	This section has been revised to include a discussion on the presence of an additional vegetation species of concern.
Section 4.4.5.1, page 4-11	This section has been revised to update the discussion on GHG emissions to address a public comment.
Section 4.4.6.1, page 4-13	This section has been revised to update the discussion on climate change cause and effect.
Table 4-4, page 4-14	The table has been revised to add global emissions and to correct errors in the table.
Section 4.4.6.2, page 4-16	This section has been revised to add a discussion on the social cost of carbon.
Section 4.4.6.3, page 4-18	This section has been revised to add discussion of two additional RCP scenarios.
Section 4.5.1.1.1, page 4-21	This section has been revised to reference the 202 CHIA.
Section 4.15.1, page 4-41	This section has been revised to add a discussion on the potential for train derailments.
Chapter 6 - References	The Reference Section has been revised to add new references and to update links.
Appendix B	Appendix B has been revised to add an Errata/Revisions table and a table of the public comments log.

United States Department of the Interior

OFFICE OF SURFACE MINING
RECLAMATION AND ENFORCEMENT
Western Region Office
1999 Broadway, Suite 3320
Denver, CO 80202-3050

October 13, 2015

Dear Interested Public Land User,

The U.S. Department of the Interior (DOI), Office of Surface Mining Reclamation and Enforcement (OSMRE), Western Region Office, will prepare an environmental assessment (EA) for a Federal mining plan modification for the Spring Creek Mine (SCM) lease by modification (LBM) to Federal coal lease MTM-069782 (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 LBM application was filed with the Bureau of Land Management (BLM) by Spring Creek Coal LLC (SCC) on May 17, 2007. As a result, the BLM prepared EA# MT-DOI-BLM-MT-020-2010-29 in cooperation with the OSMRE and the Montana Department of Environmental Quality (MDEQ) which was published in February 2010. BLM subsequently issued a finding of no significant impact for the lease modification and the LBM was issued on July 1, 2010. MDEQ has received an application for a major permit revision (TR1) for the SCM Permit C1979012, including mining portions of LBM MTM-069782.

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 SCM is located approximately 32 miles north of Sheridan, Wyoming. The SCM 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 122.4 million tons (mmt). The Project proposes to add 74.5 Federal surface acres, 498.11 Federal coal acres and 48.1 mmt of Federal coal to the approved Federal mining plan. The average SCM production rate is 18 million tons per year (mmtpy) and the maximum production rate is 30 mmtpy. The Project would not change the average or maximum production rate. SCM started operation in 1980 and the mine will continue to operate until 2025. The Project would extend the life of the mine 3 years.

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

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

ATTN: Spring Creek Mine TR1 EA
C/O: Lauren Mitchell,
Western Region Office, Office of Surface Mining Reclamation and Enforcement, 1999 Broadway, Suite 3320, Denver, CO 80202-3050
Email: OSM-NEPA-MT@OSMRE.gov

Comments should be received or postmarked no later than November 14, 2015 in order to be considered during the preparation of the EA. Comments received, including names and addresses of those who comment, will be considered part of the public record for this project and will be available for public inspection. Additional information regarding the Project may be obtained from Lauren Mitchell, telephone number (303) 293-5028 and the Project website provided below. When available, the EA and other supporting documentation will be posted at: http://www.wrcc.osmre.gov/initiatives/SpringcreekMineTR1.shtm

Sincerely,

Marcelo Calle, Manager
Field Operations Branch

Public Notice
Spring Creek Mine Mining Plan Modification
Environmental Assessment

The U.S. Department of the Interior (DOI), Office of Surface Mining Reclamation and Enforcement (OSMRE), Western Region Office, will prepare an environmental assessment (EA) for a Federal mining plan modification for the Spring Creek Mine (SCM) lease by modification (LBM) to Federal coal lease MTM-069782 (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 LBM application was filed with the Bureau of Land Management (BLM) by Spring Creek Coal LLC (SCC) on May 17, 2007. As a result, the BLM prepared EA# MT-DOI-BLM-MT-020-2010-29 in cooperation with the OSMRE and the Montana Department of Environmental Quality (MDEQ) which was published in February 2010. BLM subsequently issued a finding of no significant impact for the lease modification and the LBM was issued on July 1, 2010. MDEQ has received an application for a major permit revision (TR1) for the SCM Permit C1979012, including mining portions of LBM MTM-069782.

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 SCM is located approximately 32 miles north of Sheridan, Wyoming. The SCM 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 122.4 million tons (mmt). The Project proposes to add 74.5 Federal surface acres, 498.11 Federal coal acres and 48.1 mmt of Federal coal to the approved Federal mining plan. The average SCM production rate is 18 million tons per year (mmtpy) and the maximum production rate is 30 mmtpy. The Project would not change the average or maximum production rate. SCM started operation in 1980 and the mine will continue to operate until 2025. The Project would extend the life of the mine 3 years.

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

Spring Creek Mine TR1 EA Public Review Comments Summary

			Comment Topic							
Commenter	**Date**	**Address/Email**	**Water Quality**	**Wildlife**	**Level of NEPA/ NEPA Process**	**Climate Change/Social Cost of Carbon**	**Transportation**	**Against Coal Mining**	**# of Comments**	**# Commenters**
Western Environmental Law Center	03/18/20	westernlaw.org	3	5	11	11	5	1	36	1

Public Review Comment Log

Commenter	Comment	Final Response	Final Revision
Western Environmental Law Center (WELC)	1. The Conservation Groups incorporate by reference their prior comments on the TR1 expansion to the Montana DEQ, supplemental comments to Montana DEQ, and to Montana DEQ on Spring Creek Mine major revision.	1. As determined from Appendix B of the Final Environmental Impact Statement Spring Creek Mine TR1 Project, there were 15 comments from WELC to which MDEQ provided responses. This EA considered the information in the MDEQ TR1 EIS, including the Conservation Groups' comments, when preparing the final EA.	1. No changes made.
	2. The purpose and need statement in the draft EA is insufficient. It does not identify the statutory basis behind OSM's decision, including the directives under SMCRA and NEPA to protect the environment. The statement of need is equally inadequate because it is limited to SCC's need to mine coal and does not discuss any public needs.	2. OSMRE understands the need to accurately reflect the purpose and need of the EA. Therefore, OSMRE prepared the purpose and need statement according to CEQ's regulations and Section 8.2 (Purpose and Need) of OSMRE's Handbook on Implementing the National Environmental Policy Act, which states that that EAs "shall include brief discussion of the need for the proposal…" (40 CFR 1508.9(b). It is unclear from the comment which environmental directives under SMCRA and NEPA it is referring to but the EA, Section 1.1, notes that OSMRE completed the EA in accord with NEPA and the CEQ's implementing regulations. Further, the EA, Section 1.3.1, provides that the purpose of the action is established by the MLA and SMCRA and that "OSMRE is the agency responsible for making a recommendation, supported by meeting all the requirements of the statutes and regulations listed in Section 1.4.1,to the ASLM to approve, disapprove, or approve with conditions the proposed mining plan modification."	2. No changes made.
	3a. The alternatives analysis is also inadequate. 3b. The EA should discuss a middle ground alternative with reduced coal mining.	3a. OSMRE understands the need to address all reasonable alternatives. Therefore, Section 2.1 includes a full analysis of all reasonable alternatives. According to NEPA guidance in OSMRE's Handbook on Implementing the National Environmental Policy Act, an alternative is considered unreasonable if the "technical, economic, or jurisdictional obstacles make the ability to implement the alternative remote and speculative." The guidance also states that for externally generated actions, the range of alternatives will typically include at least a No Action alternative that would proceed without approval of the proposed action, the applicant proposed alternative (proposed action), and other alternatives that would meet the purpose and need. 3b. OSMRE understands the need to address all reasonable alternatives. Inclusion of this as a viable alternative would	3a. No changes made. 3b. An additional alternative was added to Section 2.1.3, Alternatives Considered but

Commenter	Comment	Final Response	Final Revision
		limit the amount of coal tonnage and/or acreage to be mined to lower levels than are proposed under the Proposed Action. This alternative was aimed at limiting the direct and indirect impacts of mining, hauling, and coal combustion. This alternative was not considered in detail because it would not meet the purpose and need (see Section 1.3) and would be inconsistent with the MLA requirement to maximize recovery by achieving maximum economic recovery of this energy resource (43 CFR 3480.0-5 (21)). Reducing the amount of coal reserves proposed to be mined would alter the proposed mine plan which may result in the permanent bypass of recoverable federal coal. OSMRE's purpose and need is to evaluate SCC's proposed mining plan modification submitted in accordance with the federal coal lease granted to SCC.	Eliminated from Detailed Analysis
	3c. The EA should also consider a clean energy alternative. Burning coal to make electricity is poisonous to people and the environment, and driving the large scale planetary crises of our time.	3c. OSMRE understands the need to address all reasonable alternatives. Inclusion of this as a viable alternative was dismissed because it is inconsistent with the project's stated purpose and would not add an environmental benefit.	3c. An additional alternative has been added to Section 2.1.3, Alternatives Considered but Eliminated from Detailed Analysis
	4a. The discussion of climate impacts is wholly inadequate.	4a. OSMRE understands the need to address climate impacts. Therefore, the EA uses sound climate information and current data to estimate the significance of direct, indirect, and cumulative impacts related to the Proposed Action and the no action alternative. The estimates include impacts from mining, transporting, and combustion of the coal for power generation. These estimates establish that the Proposed Action would not result in a significant increase in GHG emissions or have a significant impact related to climate change.	4a. Text has been added to Sections 4.4.5 and 4.4.6 to contextualize cumulative impacts to climate from the Proposed Action.
	4b. There is no discussion of the issue of climate change, which is intolerable given that recent research by the USGCRP, the IPCC, and USGS indicate that climate change has become a crisis and the window for action (rather than more of the same, fossil fuel extraction) is fast closing.	4b. Climate change is discussed in Sections 3.4.1.4, 4.4.5, 4.4.6 and Appendix B of the EA. The discussion in the EA includes consideration of and citations to many resources including information presented by USGCRP, IPCC and the USGS.	4b. Text has been added to Sections 4.4.5 and 4.4.6 provide additional discussions on 20- and 100-year time horizons for emissions and include discussions of global GHG emissions
	4c. Further, the EAs discussion of climate change is meaningless without identifying	4c. OSMRE understands the need to address climate impacts. OSMRE determined that the proposed project at Spring	4c. Text has been revised in Section 4.4.6.3 to provide current information on projected

Commenter	Comment	Final Response	Final Revision
	what level of atmospheric GHG emission is considered safe, what the current level is, what the current trajectory is, and how the Spring Creek Mine expansion is consistent or inconsistent with those level.	Creek Mine would not have a significant cumulative impact on global GHG emissions or the global climate change phenomenon due to the comparatively small amount and short-term nature of the GHG emissions produced from the Federal coal in the tract.	GHG emissions scenarios using information presented in the 5th Assessment of the IPCC.
	4d. This is critical because there is evidence that current GHG concentrations are not safe (and therefore every additional ton is harmful) or the remaining carbon budget for safe emissions is very narrow.	4d. No response required.	4d. No changes made.
	4e. The EA must identify a safe global concentration and identify the significant scientific controversy over what the safe concentration is (350 ppm, 430 ppm, 450 ppm).	4e. The analysis being requested is outside the scope of the NEPA analysis being conducted in the EA. Section 4.4.6.3 provides the most current description of the potential GHG emissions scenarios from the 5th Assessment of the IPCC and discloses information related to those scenarios in the context of the Proposed Action.	4e. No changes made.
	4f. The EA must also come clean with the public about the negative social value of coal and the exorbitant social cost of carbon.	4f. Section 4.4.6.2 provides OSMRE's rationale for not completing the social cost of carbon protocol, To summarize, the information provided by the protocol for an individual project such as the one being analyzed in the EA is so variable that OSMRE determined it would not be useful for the decision maker or the public in understanding potential impacts to climate change from the Proposed Action.	4f. No changes made.
	4g. Further, OSM's rationalizations for not using the social cost of carbon have been repeatedly debunked. As multiple courts have held, where, as here OSM trumpets economic benefits, it must also disclose costs.	4g. Section 4.4.6.2 provides OSMRE's rationale for not completing the social cost of carbon protocol, To summarize, the information provided by the protocol for an individual project such as the one being analyzed in the EA is so variable that OSMRE determined it would not be useful for the decision maker or the public in understanding potential impacts to climate change from the Proposed Action. As explained in the EA, any increased economic activity expected to occur with the project, is simply an economic impact which could be viewed as negative or positive depending on perspective. This same approach was recently upheld in the U.S. District Court for the District of Montana. *See 350 Montana et al. v. Bernhardt,* 2020 WL 1139674 (D. Mont.).	4g. No changes made.
	4h. Moreover, the EA's complete failure to include cumulative effects and discuss	4h. Section 4.4.5 and 4.4.6.2 provide information on the cumulative effects to climate change from GHG emissions	4h. No changes made.

Commenter	Comment	Final Response	Final Revision
	them is unlawful.	by quantitatively discussing project-related GHG emissions in the context of the Powder River Basin, state, national, and global GHG emissions as well as providing more qualitative information on the sources of GHG emissions in the U.S.	
	5a. The EA also fails to discuss the impacts of non-GHG emissions. 5b. OSM may not dilute these impacts to nothing by comparing them to total U.S. emissions (and if it does it must consider the cumulative effects of all US emissions). 5c. Further, OSM clearly knows the exact locations where this coal will be burned, as such it must consider the effects of air pollution on those communities.	5a. Section 4.4.3 of the EA includes discussions of potential impacts related to non-GHG emissions as a result of the Proposed Action. 5b. Section 4.4.3 of the EA includes discussions of potential impacts related to non-GHG emissions in the context of state and national emissions as a result of the Proposed Action. 5c. OSMRE does not know the future destinations and routes for coal mined at the Spring Creek Mine. Historical data for end destinations for Spring Creek coal has been disclosed to give perspective on potential indirect impacts. Per Section 3.15.2 Table 3-15, OSMRE provides information from the Energy Information Administration (EIA) that shows where coal mined at Spring Creek Mine has historically been transported and combusted. Using historical information in the EA gives the public and decision maker context, however, due to the variability described below, attempting to disclose effects to specific communities would be highly speculative. SCC's coal contracts are entered into on a yearly basis so fluctuations on how much coal is transported to a given destination, or whether a contract with a certain customer will be renewed for the next year are widely variable. Looking through the historic data from the EIA for Spring Creek Mine shows that the amounts of coal delivered (and presumably combusted) over the past 5 years fluctuates. Indeed, some end users of the coal appear to have stopped receiving coal from Spring Creek Mine altogether in more recent years. Therefore, any predictions on how much coal and where the coal will go in the future is highly speculative. Due to the speculative nature of the coal market and associated contracts that Spring Creek enters into, analyzing impacts of combustion related to the Federal coal being mined under the Proposed Action on specific local areas where coal is combusted quantitatively would not be useful to the decision maker or public with regards to understanding the potential impacts of the	5a. No changes made. 5b. No changes made. 5c. No changes made.

Commenter	Comment	Final Response	Final Revision
		Proposed Action. Section 4.15.2 provides a qualitative discussion of potential indirect impacts of coal transport by rail and Section 4.4.6.3 provides a qualitative analysis of the potential indirect impacts of GHG emissions from coal combustion. Section 4.4.3 of the EA includes discussions of potential impacts related to non-GHG emissions in the context of state and national emissions as a result of the Proposed Action.	
	6a. The EA must discuss the impacts of locomotive emissions on Montana communities, 6b. as well as the impacts of train derailments,	6a. Section 4.4.5 discusses CO2e emissions from coal transport, which include emissions from locomotives. The calculations are included in Appendix B. Information presented in these sections indicate that the Proposed action would not increase annual emissions from rail traffic but would extend the duration of emissions by 4 years. 6b. Section 4.15.2 discusses the cumulative transportation impacts from the Proposed Action. Information presented in this section indicates that the Proposed Action would not increase current rail traffic but would extend the duration of mine-related train traffic and its potential effects by 4 years. The EA acknowledges the indirect impacts (the extension of the duration of traffic from mine employees, possible delays from train traffic, possible delays from mine equipment crossing FAS 314, and impacts from coal shipments using trains [public health, collisions with wildlife, dust, noise, and vibration] and overseas vessels). The local, regional, and national transportation facilities used to ship coal from the SCM are already in place. The rate of derailments is expected to be the same as what is currently experienced, due to the annual amount of coal being transported from the mine not increasing as a result of a decision on the Federal mining plan modification. Potential effects from coal train derailments can also vary widely depending on the scale of the derailment event, the surrounding environment at the location of the derailment, whether the derailment involves full or empty rail cars, and how quickly and thoroughly the jurisdictional authority cleans up any hazardous material, etc. The annual rail traffic generated by the Proposed Action represents an estimated 0.45 percent of the of the total U.S. rail freight traffic (based on 2018 U.S. rail transportation numbers and the annual shipment of 14.2 Mt of coal) so the cumulative effects related to transportation would be minor but extended to 2031. Per Section 3.15.2 Table 3-15, OSMRE provides information	6a. No changes made. 6b. General information regarding potential indirect impacts related to train derailments has been added to Section 4.15.1.

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		from the Energy Information Administration that shows where coal mined at Spring Creek Mine has historically been transported and combusted. Coal contracts are worked on a yearly basis so fluctuations on how much coal is transported to a given destination, or whether a contract with a certain customer will be renewed for the next year are widely variable and thus highly speculative. Therefore, more specific predictions on possible locations of train derailments is also highly speculative and would not be useful to the decision maker or public with regard to understanding the potential effects of coal train derailments.	
	6c. and the impacts to wildlife from train strikes (given that OSM knows the coal destinations and train routes).	6c. Section 4.15.2 discusses the cumulative transportation impacts from the Proposed Action. Information presented in this section indicates that the Proposed Action would not increase current rail traffic but would extend the duration of mine-related train traffic and its potential effects by 4 years. The EA acknowledges the indirect impacts (the extension of the duration of traffic from mine employees, possible delays from train traffic, possible delays from mine equipment crossing FAS 314, and impacts from coal shipments using trains [public health, collisions with wildlife, dust, noise, and vibration] and overseas vessels). The local, regional, and national transportation facilities used to ship coal from the SCM are already in place. The rate of wildlife strikes is expected to be the similar as what is currently experienced, due to the annual amount of coal being transported from the mine not increasing as a result of a decision on the Federal mining plan modification. Potential effects from coal train strikes can also vary widely depending on the surrounding environment and whether or not T&E species or their habitat is present at the location of the strike along with other factors such as large roadways being located in proximity to the railroad. The annual rail traffic generated by the Proposed Action represents an estimated 0.45 percent of the of the total U.S. rail freight traffic (based on 2018 U.S. rail transportation numbers and the annual shipment of 14.2 Mt of coal) so the cumulative effects related to transportation would be minor but extended to 2031.Per Section 3.15.2 Table 3-15, OSMRE provides information from the Energy Information Administration that shows where coal mined at Spring Creek Mine has historically been transported and combusted. Coal	6c. No changes made.

Commenter	Comment	Final Response	Final Revision
		contracts are worked on a yearly basis so fluctuations on how much coal is transported to a given destination, or whether a contract with a certain customer will be renewed for the next year are widely variable and thus highly speculative. Therefore, any predictions on wildlife strikes is also highly speculative. Due to the speculative nature of the coal market and associated contracts, OSMRE analysis and estimates of wildlife strikes would also be highly speculative and would not be useful to the decision maker or public with regard to understanding the potential for wildlife strikes,	
	6d. Trains kill wildlife and additional trains from this mine will kill more wildlife.	6d.Section 4.15.2 discusses the cumulative transportation impacts from the Proposed Action. Information presented in this section indicates that the Proposed action would not increase current rail traffic but would extend the duration of mine-related train traffic by 4 years. The EA acknowledges the indirect impacts (the extension of the duration of traffic from mine employees, possible delays from train traffic, possible delays from mine equipment crossing FAS 314, and impacts from coal shipments using trains [public health, collisions with wildlife, dust, noise, and vibration] and overseas vessels). However, the local, regional, and national transportation facilities used to ship coal from the SCM are already in place and current annual coal production levels are not expected to change with the Proposed Action. The Proposed Action would extend the duration of mining by approximately 4 years at the SCM and thus the potential indirect impacts from transport of Federal coal by rail would be extended. The rate of wildlife strikes is expected to be the same as what is currently experienced, due to the annual amount of coal being transported from the mine not increasing as a result of a decision on the Federal mining plan modification. The annual rail traffic generated by the Proposed Action represents an estimated 0.45 percent of the total U.S. rail freight traffic (based on 2018 U.S. rail transportation numbers and the annual shipment of 14.2 Mt of coal) so the cumulative effects related to transportation would be minor but extended to 2031.	6d. No changes made.
	6e. In particular, OSM must address the impacts to grizzly bears, lynx, and threatened and endangered fish from train strikes, as well as cumulative impacts.	6e. At this time, OSMRE is not aware of any information that would either support this claim or support the implied claim that trains carrying coal from the Spring Creek Mine have been responsible for collisions with threatened and	6e. No changes made.

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		endangered species. Although the destination of the coal from Spring Creek Mine varies annually, historically, the majority of the coal transported by rail from the Spring Creek Mine does not go through grizzly bear or lynx habitat (See Map 1-3 in the EA). The EA discloses the potential for indirect impacts to wildlife from trains in Section 4.15.2. Indirect impacts resulting from transporting Federal coal by rail would be extended by 4 years under the Proposed Action, but annual rail traffic is not expected to increase. Therefore, to the extent trains from Spring Creek Mine travel through grizzly bear or lynx habitat or the habitat of other threatened and endangered species (see Map 1-3 in the EA), impacts to grizzly bears and lynx from train strikes and to other threatened and endangered species from train derailments would continue at the same rate, but for an additional 4 years.	
	6f. Because of the potential impacts to these species, OSM must consult with FWS under Section 7 of the Endangered Species Act.	6f. Because of the speculative nature of the coal market (i.e., where and how much coal is transported) and the relatively small amount of Federal coal related to this specific project, it is nearly impossible to quantify the indirect impacts to threatened and endangered species that occur near rail lines from transporting project-related coal using currently available data. Per current USFWS regulations in 50 CFR 402.17, in order for consequences of other activities caused by the proposed action to be considered effects of the action, both those activities and the consequences of those activities must satisfy a two-part test: (1) the effects would not occur but for the proposed action and (2) the effects are reasonably certain to occur. In this instance, the commenter is claiming that but for the approval of the proposal to mine Federal coal in the TR1 tract, there would be fewer wildlife strikes (specifically threatened and endangered species strikes) by trains on the railroads historically used to ship coal from the Spring Creek Mine. At this time, OSMRE is not aware of any information that would either support this claim or support the implied claim that trains carrying coal from the Spring Creek Mine have been responsible for collisions with threatened and endangered species. Yet, a conclusion of reasonably certain to occur must be based on clear and substantial information, using the best scientific and commercial data available. While it is reasonably certain to expect wildlife strikes by trains to occur on the same routes used by the trains carrying coal from the Spring	6f. No changes made.

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		Creek Mine, it is not reasonably certain that wildlife strikes by trains transporting Federal coal from the TR1 tract being considered in this EA would occur. That the wildlife strikes would involve a threatened and endangered species makes this consequence even less likely to occur. Per 50 CFR 402.17 (b)(3) – "The consequence is only reached through a lengthy causal chain that involves so many steps as to make the consequence not reasonably certain to occur." In the context of Federal coal mined from the TR1 tract, the coal train carrying TR1 coal would need to pass through T&E species habitat, the species would need to be present in the case of wildlife strikes or otherwise vulnerable to impacts in the case of a derailment, the train would need to be there at the wrong time (generally night time and foraging season in the case of a grizzly bear), and would then have to harass or kill individuals. Due to the reasons stated above, OSMRE has determined that it isn't necessary to consult with USFWS under Section 7 of the ESA.	
	6g. Further, it is clear that OSM has not properly designated an action area for its ESA analysis. The action area must consider direct and indirect impacts, including train impacts, which are foreseeable. These impacts must be in addition to the baseline and cumulative effects.	6g. Per section 3.10.4.1, the analysis area for threatened, endangered and candidate species is Big Horn County. Due to the speculative nature of the coal market, OSMRE is unable to determine how much coal will be shipped to any specific location or what the end destination of the Federal coal will be.**3** While it is reasonably certain to expect wildlife strikes by trains to occur on the same routes used by the trains carrying coal from the Spring Creek Mine, it is not reasonably certain that wildlife strikes by trains transporting Federal coal from the TR1 tract being considered in this EA would occur. That the wildlife strikes would involve a threatened and endangered species makes this consequence even less likely to occur. Per 50 CFR 402.17 (b)(3) – "The consequence is only reached through a lengthy causal chain that involves so many steps as to make the consequence not reasonably certain to occur." In the context of Federal coal mined from the TR1 tract, the coal train carrying TR1 coal would need to pass	6g. No changes made.

3 We note that we did use the historical average rail miles based on known past destinations and a historical annual production average to calculate air quality emissions from rail transport. We did this to provide data to the decision maker on the historic effects of the action; there is no assumption in the EA that the historical data used will predict future air quality emissions from transport.

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		through T&E species habitat, the species would need to be present in the case of wildlife strikes or otherwise vulnerable to impacts in the case of a derailment, the train would need to be there at the wrong time (generally night time and foraging season in the case of a grizzly bear), and would then have to harass or kill individuals. Due to the reasons stated above, OSMRE has determined that the analysis areas for potential direct, indirect and cumulative effects to T&E species is appropriate.	
	7. OSM must consider impacts to Sage Grouse and the fact that there is no evidence that sage brush steppe can be reclaimed after strip-mining. See the attached WELC comments to MDEQ, which are incorporated here by reference, and discuss this issue in depth.	7. Section 4.10.3 provides detailed discussions of the direct, indirect, and cumulative impacts of the Proposed Action and the No Action alternative on Greater sage-grouse. SCM reclamation plans and past vegetation reclamation success demonstrate the vegetation communities, including sagebrush-steppe, can be reestablished. In addition, SCM cannot receive Phase III bond release until at least 10 growing seasons after the last reclamation treatment (as defined in ARM 17.24.725). Phase III bond release requires a stable and established vegetative community that is consistent with the approved postmining land use, which would primarily be for wildlife use. The SCM has successfully reclaimed areas with sagebrush and other shrubs. OSMRE recognizes coal mining companies that achieve exemplary coal mine reclamation through an annual award called The Excellence in Surface Coal Mining Reclamation Award. OSMRE states that winning projects go beyond reclamation requirements to achieve superior results in returning a site to productive use after completion of mining. SCM won the 2017 award based on their innovative use of soil mixtures and a variety of planted and seeded vegetation over a large area (https://www.osmre.gov/programs/awards/ActiveWinners.shtm). The growth of a large assortment of plants led to greater and denser potential habitat for use by animals such as sage grouse, as well as songbirds, raptors, rabbits, mule deer, and pronghorn antelope. Also, SCM has demonstrated reclamation success with the approval of bond release application SL8 in 2015. This application included 407 acres for Phase III as wildlife habitat. These acres met the standards applicable for wildlife habitat, which were established based on baseline vegetation data in the mine and surrounding areas. Sagebrush density within this reclamation area had some stands exceeding 20,000 shrubs per acre.	7. No changes made.

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	8a. OSM must consider the impacts of salinity from spoils on the Tongue River.	8a. SCM has MPDES permits in place that require surface and ground water discharges that leave the mine to meet certain standards and not have excessive salinity and sediment loads or impact the Tongue River Reservoir. As described in the 2020 TR1 Major Revision CHIA, once the groundwater levels stabilize in the reclaimed areas, higher salinity waters will temporarily flow toward discharge at the Tongue River. However, due to the low transmissivity of the sediments, the volume of water delivered is expected to be very small in relation to the discharge of the river. Because of dilution effects, no material damage is expected from the addition of small volumes of higher salinity groundwater.	8a. No changes made.
	8b. The river is already nearly exceeding salinity standards at Miles City.	8b. TDS, SC, and SAR are water-quality constituents that indicate salinity. According to the 2020 TR1 Major Revision CHIA, TDS downstream of mining and downstream of the reservoir is generally similar or of lower concentration when compared to TDS upstream of mining and the reservoir. SC and SAR are similar upstream and downstream of mining operations. Coal mining would contribute cumulatively to the salinity of the Tongue River below the Tongue River Reservoir; however, water quality thresholds are applied to water discharged from the mine and water quality monitoring and reporting is required by the mining permit issued by the Montana Dept. of Environmental Quality (MDEQ). MDEQ enforces reported violations and the mine is responsible for correcting the cause of the violation.	8b. No changes made.
	8c. This will only worsen as more saline spoils water discharges into the Tongue River Reservoir (especially in light of cumulative impacts from the Decker Mine and historical mining in Wyoming.	8c. Mining is only one possible contributing factor for increased salinity in the Tongue River but long-term monitoring indicates that constituents that indicate salinity downstream of mining are at or below levels documented above the mining. It is apparent that current mining or the Proposed Action would not contribute to higher salinity downstream of mining.	8c. No changes made.

Notice of Availability Mailing List

Prefix	First Name	Last Name	Organization Name	Address	City	State	Zip
		Chairman	Crow Tribal Council	P.O. Box 159	Crow Agency	MT	59022-0159
Emerson	Bull Chief	Tribal Historic Preservation Officer	Crow Tribe	P.O. Box 159	Crow Agency	MT	59022-0159
Llevando	Fisher	President	Northern Cheyenne Tribal Council	P.O. Box 128	Lame Deer	MT	59043-0128
Attn	Chairman		Northern Cheyenne Tribe	P.O. Box 128	Lame Deer	MT	59043
Dave	Archambault II	Chairman	Standing Rock Sioux Tribal Council	P.O. Box D	Fort Yates	ND	58538
Waste 'Win	Young	Tribal Historic Preservation Officer	Standing Rock Sioux Tribe	P.O. Box D	Fort Yates	ND	58538
Roger	Trudell	Chairman	Santee Sioux Tribal Council	425 Frazier Ave N Ste 2	Niobrara	NE	68760-8605
		Administrator	Apache Tribe of Oklahoma	P.O. Box 1220	Anadarko	OK	73005
			Cheyenne-Arapaho Tribes of Oklahoma	P.O. Box 38	Concho	OK	73022
Margie	Murrow	NAGPRA Coordinator (Acting Director)	Comanche Nation	P.O. Box 908	Lawton	OK	73502
		Environmental Director	Kiowa Business Committee	P.O. Box 369	Carnegie	OK	73015
Harold	Frazier	Chairman	Cheyenne River Sioux Tribal Council	P.O. Box 590	Eagle Butte	SD	57625-0590
		THPO	Cheyenne River Sioux Tribe	P.O. Box 590	Eagle Butte	SD	57625 -0590
Roxanne	Sazue	Tribal Council Chairman	Crow Creek Sioux Tribe	P.O. Box 50	Fort Thompson	SD	57339-0050
		Office of Cultural Preservation	Flandreau Santee Sioux Tribe	P.O. Box 283	Flandreau	SD	57028
Lewis	Grass Rope	Chairman	Lower Brule Sioux Tribal Council	P.O. Box 187	Lower Brule	SD	57548-0187
John, Yellow Bird	Steele	President	Oglala Sioux Tribal Council	P.O. Box 2070	Pine Ridge	SD	57770-2070
		THPO	Oglala Sioux Tribe	P.O. Box 320	Pine Ridge	SD	57770-2070
Russell	Eagle Bear		Rosebud Sioux THPO	P.O. Box 809	Rosebud	SD	57570
William	Kindle	President	Rosebud Sioux Tribal Council	P.O. Box 430	Rosebud	SD	57570-0430
		Cultural Resource Coordinator	Rosebud Sioux Tribe	P.O. Box 675	Mission	SD	57555-0675
		Chairman	Arapahoe Business Council	P.O. Box 396	Fort Washakie	WY	82514-0396
		Director of Cultural Preservation	Eastern Shoshone Tribe	P.O. Box 1008	Fort Washakie	WY	82514
Darlene	Conrad	THPO	Northern Arapaho Business Council	P.O. Box 396	Fort Washakie	WY	82514-0396
		Chairman	Shoshone Business Council	P.O. Box 538	Fort Washakie	WY	82514-0538

First Name	Last Name	Organization Name	Address	City	State	Zip
		BLM Library	P.O. Box 25047	Denver	CO	80225-0047
	Environmental Protection Specialist	National Park Service - Air Quality	P.O. Box 25287	Denver	CO	80225-0287
Matt	McKeown	Rocky Mtn Region Solicitor	755 Parfet St Ste 151	Lakewood	CO	80215-5599
Peter	Morgan	Sierra Club	1650 38th Street, Suite 102W	Boulder	CO	80301
Taylor	Jones	WildEarth Guardians	1536 Wynkoop Street, Suite 301	Denver	CO	80202
Jeremy	Nichols	WildEarth Guardians	2590 Walnut Street	Denver	CO	80205
		Advisory Council on Historic Preservation	401 F Street NW, Suite 308	Washington	DC	20001-2637
Mitchell	Leverette-Division Chief	BLM WO320	20 M Street SE	Washington	DC	20003
Don	Sutherland	Bureau of Indian Affairs	1849 C St NW Stop 4516	Washington	DC	20240-0001
		Defenders of Wildlife	1130 17th Street, NW	Washington	DC	20036-4604
Phillips	Baker	National Mining Association	101 Constitution Ave NW Ste 500E	Washington	DC	20001-2133
		NPS 2310	1849 C St NW Stop 2749	Washington	DC	20240-0001
		U.S. Department of Energy	1000 Independence Ave. SW	Washington	DC	20585-0001
		US EPA	1200 Pennsylvania Ave., NW MC 1701A, Rm 3413 ARN	Washington	DC	20460
Dan	Roane		268 Bristol St	Northfield	IL	60093
Jason M. Ryan	Business Analytics Director	US Western Surface Operations	701 Market Street, 6th Floor	St. Louis	MO	63101
		Big Horn Conservation District	724 W 3rd	Hardin	MT	59034
	Weed Control Supervisor	Big Horn County	636 West Second	Hardin	MT	59034
	Commissioners	Big Horn County	P.O. Box 908	Hardin	MT	59034
Michael	Gulledge	Billings Gazette	P.O. Box 36300	Billings	MT	59107-6300
Jamie	Connell-State Director	BLM Montana State Office	5001 Southgate Drive	Billings	MT	59101
Coal	Coordinator	BLM Montana State Office	5001 Southgate Drive	Billings	MT	59101-4669
Darryl LaCounte	Regional Director	Bureau of Indian Affairs	2021 4th Ave N #200	Billings	MT	59101
	Superintendent	Bureau of Indian Affairs-Crow Agency	P.O. Box 69	Crow Agency	MT	59022
	District Manager	Bureau of Land Management	111 Garryowen Road	Miles City	MT	59301
		Custer Gallatin National Forest	10 E. Babcock Street	Bozeman	MT	59715
	Water Protection Bureau	Department of Environmental Quality	1520 E. 6th Ave.	Helena	MT	59620
	Air Resources Management	Department of Environmental Quality - Air Resources Management	1520 E. 6th Ave.	Helena	MT	59620
	Regional Supervisor	Department of Fish, Wildlife & Parks	2300 Lake Elmo Drive	Billings	MT	59105
	Regional Supervisor	Department of Fish, Wildlife and Parks	P.O. Box 1630	Miles City	MT	59301

First Name	Last Name	Organization Name	Address	City	State	Zip
	Safety Bureau	Department of Labor and Industry	1805 Prospect Ave.	Helena	MT	59624
	Administrator	Department of Natural Resources and Conservation - Water Resources Division	1625 Eleventh Ave.	Helena	MT	59620
	Administrator	Department of Natural Resources and Conservation - Trust Land Management Division	1625 Eleventh Ave.	Helena	MT	59620
Jenny	Harbine	Earthjustice	313 E. Main Street	Bozeman	MT	59715
Steve	Bullock	Governor of Montana	State Capitol Bldg, P.O. Box 200801	Helena	MT	59620-0001
Doug	McRae	Greenleaf Livestock	3952 Rosebud Cr. Road	Forsyth	MT	59327
Andrew C.	Emrich, P.C.	Holland & Hart, LLP	6380 S. Fiddlers Green Circle, Suite 500	Greenwood Village	CO	80111
Greg	Julian	Dept of Nat Res & Conservation Mineral Management Service	P.O. Box 201601	Helena	MT	59620-1601
		Montana Association of Counties	2715 Skyway Drive	Helena	MT	59602
		Montana State Historic Preservation Office	1301 East Lockey Avenue	Helena	MT	59620
Rae	Peppers	MT State Representative House District 41	P.O. Box 497	Lame Deer	MT	59043-0497
Sharon	Stewart-Peregoy	MT State Representative House District 42	P.O. Box 211	Crow Agency	MT	59022-0211
Jason	Small	MT State Senator Senate District 21	HC 42 Box 560	Busby	MT	59016-9703
Philip S.	Strobel	NEPA US Environmental Protection Agency Region 8	1595 Wynkoop	Denver	CO	80202
		Northern Cheyenne Cultural Commission	P.O. Box 128	Lame Deer	MT	59043-0128
Natalie	Snyders	Northern Plains Resource Council	220 S 27th Street Ste A	Billings	MT	59101
Kate	French	Northern Plains Resource Council	220 S 27th Street Ste A	Billings	MT	59101
Bob	LeResche	Northern Plains Resource Council	220 S 27th Street Ste A	Billings	MT	59101
Steve	Bullock, Governor	Office of the Governor State of Montana	P.O. Box 200801	Helena	MT	59620
Mike	Scott	Sierra Club	2401 Montana Avenue Ste 4	Billings	MT	59101
Stuart	Sanderson, President	The Colorado Mining Association	216 16th Street, Suite 1250	Denver	CO	80202
Keith	Williams, Group President	Thunder Basin Coal Company	P.O. Box 406	Wright	WY	82732
		US Army Corps of Engineers, Omaha District	10 W. 15th Street, Ste 2200	Helena	MT	59626
Brian	Smith	US Army Corps of Engineers, Omaha District	P.O. Box 2256	Billings	MT	59103
		US Environmental Protection Agency	10 West 15th Street Ste 3200	Helena	MT	59626
	Ecological Services	US Fish and Wildlife Service	585 Shepard Way, Suite 1	Helena	MT	59601
		US Geological Survey	3162 Bozeman Avenue	Helena	MT	59601
	State Office	US Natural Resources Conservation Service	10 East Babcock	Bozeman	MT	59715
Greg	Gianforte	US Representative-Montana	7 West 6th Avenue	Helena	MT	59601

First Name	Last Name	Organization Name	Address	City	State	Zip
Jon	Tester	US Senator-Montana	208 N Montana Avenue, Suite 202	Helena	MT	59601
Steve	Daines	US Senator-Montana	P.O. Box 1598	Helena	MT	59624
Clint	McRae		3633 Rosebud Cr. Road	Forsyth	MT	59327
Daniel	Hadley		730 E. Main Ste 106	Billings	MT	59105
		Montana Environmental Information Center	P.O. Box 1184	Helena	MT	59624
Don	Bailey		6111 Masters Blvd	Billings	MT	59106
Shiloh	Hernandez	Western Environmental Law Center	208 Paseo del Pueblo Sur Unit 602	Taos	NM	87571
Beth	Goodnough	Western Fuels Association	1901 Energy Court, Suite 328	Gillette	WY	82718
Jane	Thomas	Wyoming Analytical Laboratories, Inc.	1660 Harrison Street	Laramie	WY	82070
Eric	Barlow	Wyoming House of Representatives House District 3 ***VIA EMAIL***	Eric.Barlow@wyoleg.gov			
	Administrator	Apache Tribe of Oklahoma	P.O. Box 1220	Anadarko	OK	73005
Amy M.	Atwood	Center for Biological Diversity	P.O. Box 11374	Portland	OR	97211-0374
		BNSF Railway Company	P.O. Box 961057	Fort Worth	TX	76161-0057
		National Wildlife Federation	11100 Wildlife Center Drive	Reston	VA	20190
	Division of Habitat Resource Conservation	US Fish & Wildlife Service	5275 Leesburg Pike, Mail Stop: HRC	Falls Church	VA	22041
	Managing Editor	Associated Press	320 W 25th St Ste 310	Cheyenne	WY	82001
		Biodiversity Conservation Alliance	P.O. Box 1512	Laramie	WY	82073-1512
	Mayor	City of Sheridan	55 Grinnell Plaza	Sheridan	WY	82801
Darryl	Maunder	Navajo Transitional Energy Company	P.O. Box 3009	Gillette	WY	82717
Shannon	Anderson	Powder River Basin Resource Council	934 North Main Street	Sheridan	WY	82801
	County Engineer	Sheridan County	224 South Main Ste B-1	Sheridan	WY	82801
Mayor	City of Sheridan	City Hall	55 Grinnell Plaza	Sheridan	WY	82801
Roger	Miller-President	Trout Unlimited	334 N. Main Street	Sheridan	WY	82801
Mark	Rogaczewski	WDEQ Land Quality Division	2100 West 5th Street	Sheridan	WY	82801-6136
Jack	Fritz	WWC Engineering	1849 Terra Ave	Sheridan	WY	82801-6112
		Wyoming Mining Association	1401 Air Port Parkway Suite 230	Cheyenne	WY	82001
Alan & Jimmie	Pierce		HC 59 Box 10A	Decker	MT	59025
Albert & Debra	Pierce		960 6th Avenue E	Sheridan	WY	82801

First Name	Last Name	Organization Name	Address	City	State	Zip
		Fidelity Exploration California Street, Suite 2500 80202	1700 Lincoln St, Suite 2800	Denver	CO	80203
Florence	Young		HC 59 Box 15	Decker	MT	59025
James & Margoriem	Hamilton		HC 59 Box 13	Decker	MT	59025
Jeanette M	Davis		1815 N Mariposa Ln	Billings	MT	59102
Jodi & Tom	Edwards		HC 42 Box 642	Busby	MT	59016
Kevin	Smith	Department of Natural Resources and Conservation	1625 11th Avenue	Helena	MT	59601
Lane	Larson		P.O. Box 531	Sheridan	WY	82801
Mark & Mary Kay	Van Haele		HC 59 Box 11B	Decker	MT	59025
		Montana Rail Link	P.O. Box 16390101	Missoula	MT	59808
Frances	Schultz	Schultz Coal Co./Wolf Mountain Coal	191 Seymore St.	Sheridan	WY	82801
Bill	Pruitt	Decker Coal Company	12 Lakeshore Drive	Decker	MT	59025
Todd	Yeager	Bureau of Land Management	111 Garryowen Road	Miles City	MT	59301
Walter J. & Lila V.	Taylor		HC 42 Box 595	Busby	MT	59016
David	Lagesse	Bison Connect ***VIA EMAIL***	justdavengwen@comcast.net			
D. Steven	Degenfelder		4491 Sunrise Drive	Casper	WY	82604
Robert K.	Green		19005 Arabian Lane	Frenchtown	MT	59834
Keith	Walters		8 Bozeman Lane	Ranchester	WY	82839
Gordon	Box	Bison Connect ***VIA EMAIL***	woodchuckwy@msn.com			

APPENDIX B

CALCULATIONS of

GREENHOUSE GAS EMISSIONS;
PM_{10}, $PM_{2.5}$, SO_2, NO_X, Hg, CO, and CO_2 CONTRIBUTIONS from MINING;
and
EMISSIONS from COAL COMBUSTION

(Completed by WWC Engineering)

GHG Calculations Assumptions

Direct Emissions Variables

Source	CO_2e/Mt Coal Mined
Fuel Subtotal	1,963.5
Electricity Subtotal	3,188.4
Process Subtotal	577.4

Source: WWC Calculation 2019

Indirect Transportation Emissions Assumptions

120	Tons of Coal/Car
130	Cars/Train
15,600	Tons of Coal/Train
24	Tons/car empty1/2 are 22 tons and 1/2 are 26 tons
200	Tons/locomotivehttp://www.4rail.net/reference_nam_bnsf_locos1.php
3,920	Weight of empty 130/car train (tons)
19,520	Weight of loaded coal train (tons)
0.00000978	Tonnes CO2 per ton-mile coal from Vessels
4,300	One-way barge miles
36	Barge trips

Transportation Emissions Variables (Locomotives)

Emission Rate	(kg/gal)	100-year Time Horizon CO_2e Conversion Rate	20-year Time Horizon CO2e Conversion Rate	Kg CO_2e/Gal Diesel	Kg CO_2e/Mile/Ton
CO_2	10.21	1	1	10.21	0.023417431
CH_4	0.0008	28	84	0.0200	0.000001
N_2O	0.00026	264	265	0.07748	0.000016
Total				10.30748	0.0234

Source: Conversion Rate – EPA 2017a

Emission Rate – EPA 2014

Transportation Variables (Locomotives)

	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	1,042	0.0234	19,520.0	457.4	476,641.7	476.6
Empty	436	1,042	0.0234	3,920	91.9	95,719.0	95.7

1 FactCheck 2008

2 EPA 2014

SCM Production, 2014-2018

	2014	**2015**	**2016**	**2017**	**2018**	**2014-2018 Average**
Production (Tons)	17,324,830	16,987,420	10,259,276	12,732,724	13,768,055	14,214,461

Source: SCM 2019

Estimated 2005 Annual Spring Creek Mine CO_2e (in metric tons)

Estimated 2005 Spring Creek Mine Equivalent CO2e (in metric tons)

Source		Ave. Known Ratio	Coal (mm Tons)
Fuel	25,760	1963.5	13.12
Electricity	41,830	3188.4	
Mining Process	7,575	577.4	
Haulage	508,133		
Total at Mine	583,298		

2005 Average Coal Haulage

2005 Coal Production	13,119,202
Tons Coal/Train	15,600
Empty Train Tons	3,920
Loaded Train Tons	19,520
# Loaded Trains/year	841
# Empty Trains/year	841
Rail miles to power plant	1,100
Kg CO_2e/Mi/Loaded Train	457.43
Kg CO_2e/Mi/Empty Train	91.86
Kg CO_2e/year Empty	84,977,919.5
Kg CO_2e/year Loaded	423,155,354.3
Kg CO_2e/year Total	508,133,273.8
Metric Tons CO_2e/year	508,133.3

CO2e Source	**Year**
	2005
Direct Emissions	
Fuel	25,760
Electricity	41,830
Mining Process	7,575
Total Direct Emissions	**75,165**
Indirect Emissions	
Haulage	508,133
Power Plant Combustion	26,802,530
Total Indirect Emissions	**27,310,663**
Total Emissions	**27,385,828**

Estimated 2014-2018 Average Annual Spring Creek Mine CO_2e (in metric tons)

Source	Coal (Mt)	Ave. Known Ratio (metric tons CO_2e/Mt coal)	100-year Time Horizon Metric Tons CO_2e	20-year Time Horizon Metric Tons CO_2e
Direct				
Fuel	14.21	1,963.5	27,910	28,052
Electricity		3,188.4	45,322	45,553
Mining Process		577.4	8,208	8,250
Total Direct			*81,440*	*81,855*
Indirect				
Transport	100-year Time Horizon	20-year Time Horizon		
2014-2018 Coal Production	14,214,461	14,214,461		
Tons Coal/Train	15,600	15,600		
Empty Train Tons	3,920	3,920		
Loaded Train Tons	19,520	19,520		
# Loaded Trains/year	911	911		
# Empty Trains/year	911	911		
Average Rail miles to power plant	1,144	1,144		
Kg CO_2e/Mi/Loaded Train	457.43	459.72		
Kg CO_2e/Mi/Empty Train	91.86	92.32		
Kg CO_2e/year Empty	95,755,209.5	96,233,985.53		
Kg CO_2e/year Loaded	476,821,859.5	479,205,968.75		
Rail Kg CO_2e/year Total	572,577,068.9	575,439,954.27		
Rail Metric CO_2e/year Total	572,577.1	575,439.95		
Average Annual Overseas Shipments	3,708,000.0	3,708,000.0		
Round Trip Barge Shipment Miles	9,900.0	9,900.0		
Total Vessel Emissions (Metric Tons)	358,871.1	360,665.5		
Transport Metric Tons CO_2e/year	931,448	936,188		
Combustion (Tons CO_2e)	29,792,278	29,943,871		
Total Indirect CO_2e (Tons)	*30,723,727*	*30,880,058*		
Total Direct + Indirect CO_2e	**30,805,167**	**30,961,913**		

Appendix B

Estimated 2020-2031 Spring Creek Mine CO_2e (in metric tons)

Source	Coal (Mt)	Ave. Known Ratio (tons CO_2e/Mt coal)	100-year Time Horizon Metric Tons CO_2e	20-year Time Horizon Metric Tons CO_2e
Direct				
Fuel	14.20	1,963.5	27,882	28,024
Electricity		3,188.4	45,276	45,506
Mining Process		577.4	8,200	8,241
Total Direct			*81,357*	*81,771*
Indirect				
Transport	100-year Time Horizon	20-year Time Horizon		
2020-2031 Coal Production	14,200,000	14,200,000		
Tons Coal/Train	15,600	15,600		
Empty Train Tons	3,920	3,920		
Loaded Train Tons	19,520	19,520		
# Loaded Trains/year	910	910		
# Empty Trains/year	910	910		
Average Rail miles to power plant	1,210	1,210		
Kg CO_2e/Mi/Loaded Train	457.43	459.7		
Kg CO_2e/Mi/Empty Train	91.86	92.3		
Kg CO_2e/year Empty	101,176,512.3	101,682,394.9		
Kg CO_2e/year Loaded	503,817,734.8	506,336,823.5		
Rail Kg CO_2e/year Total	604,994,247.2	608,019,218.4		
Rail Metric CO_2e/year Total	604,994.2	608,019.2		
Average Annual Overseas Shipments	4,500,000	4,500,000		
Round Trip Barge Shipment Miles	9,900	9,900		
Total Vessel Emissions (Metric Tons)	435,523.2	437,700.8		
Transport Metric Tons CO_2e/year	1,040,517	1,045,812		
Combustion (Tons CO_2e)	29,792,278	29,943,871		
Total Indirect CO_2e (Tons)	*30,832,796*	*30,989,683*		
Total Direct + Indirect CO_2e	**30,914,153**	**31,071,454**		

Appendix B

Parameters Used to Calculate Combustion Emissions

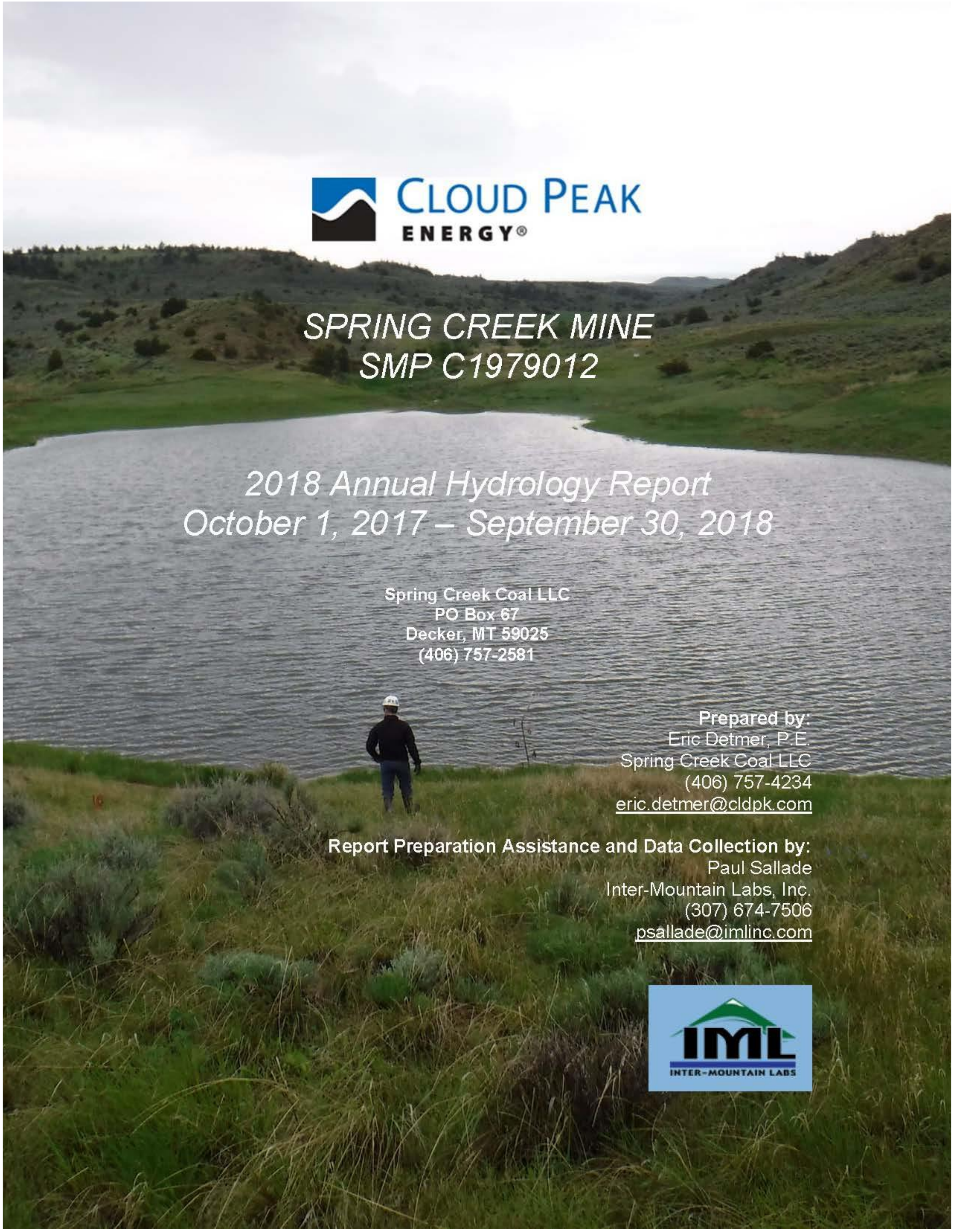
Btu per short ton	24,930,000
tons per kilogram	0.00110231
tons to generate 1Kilowatt-Hour	0.00052
tons to generate 1 Megawatt-Hour	0.52
PM10 Emissions per Btu (kilogram per Megawatt-Hour)	0.39
PM10 Emissions per Btu (ton per Megawatt-Hour)	0.000429901
PM2.5 Emissions per Btu (kilogram per Megawatt-Hour)	0.305
PM2.5 Emissions per Btu (ton per Megawatt-Hour)	0.00013112
SO2 Emissions per Btu (kilogram per Megawatt-Hour)	7.192
SO2 Emissions per Btu (ton per Megawatt-Hour)	0.007927814
NOx Emissions per Btu (kilogram per Megawatt-Hour)	2.779
NOx Emissions per Btu (ton per Megawatt-Hour)	0.003063319
Hg Emissions per Btu (kilogram per Megawatt-Hour)	0.000028
Hg Emissions per Btu (ton per Megawatt-Hour)	0.00000003
CO Emissions (lb) per ton	0.50000000

Combustion Emissions Values

Emissions Combustion	Past Production						Proposed Action	No Action	Total U.S. Emissions	2020-2031 Average % of U.S.
Years	**2014**	**2015**	**2016**	**2017**	**2018**	**2014-2018**	**2020-2031**	**2020-2031**	--	--
Tons mined (From SCC)	17,324,830	16,987,420	10,259,276	12,732,724	13,768,055	14,214,461	14,200,000	14,200,000	--	--
mw-h from coal mined	9,008,912	8,833,458	5,334,824	6,621,016	7,159,389	7,391,520	7,384,000	7,384,000	--	--
PM_{10} Emissions (Tons)	3,872.9	3,797.5	2,293.4	2,846.4	3,077.8	3,177.6	3,174.4	3,174.4	20,616,000	0.02%
$PM_{2.5}$ Emissions (Tons)	1,181.2	1,158.2	699.5	868.1	938.7	969.2	968.2	968.2	6,033,000	0.02%
SO_2 Emissions (Tons)	71,421.0	70,030.0	42,293.5	52,490.2	56,758.3	58,598.6	58,539.0	58,539.0	4,991,000	1.17%
NO_X Emissions (Tons)	27,597.2	27,059.7	16,342.3	20,282.3	21,931.5	22,642.6	22,619.6	22,619.6	12,412,000	0.18%
Hg Emissions (Tons)	0.28	0.27	0.16	0.20	0.22	0.23	0.23	0.23	52	0.44%
CO Emissions (Tons)	4,331.2	4,246.9	2,564.8	3,183.2	3,442.0	3,553.6	3,550.0	3,550.0	52,483,810	0.01%

APPENDIX C

2018 4th QUARTER and ANNUAL SPRING CREEK MINE
GROUNDWATER MONITORING RESULTS



CLOUD PEAK ENERGY®

SPRING CREEK MINE
SMP C1979012

2018 Annual Hydrology Report
October 1, 2017 – September 30, 2018

Spring Creek Coal LLC
PO Box 67
Decker, MT 59025
(406) 757-2581

Prepared by:
Eric Detmer, P.E.
Spring Creek Coal LLC
(406) 757-4234
eric.detmer@cldpk.com

Report Preparation Assistance and Data Collection by:
Paul Sallade
Inter-Mountain Labs, Inc.
(307) 674-7506
psallade@imlinc.com

IML INTER-MOUNTAIN LABS

Spring Monitoring Sample Analytical Results

Analyte	Units	Applicable Water Quality Criteria (1)	Rainy Spring (Grab)		
			12/7/2017	Field Duplicate FDSW1SA18 12/7/2017	3/2/2018
Physical Parameters					
pH	s.u.		8.2	8.2	8.2
Conductivity	□mho/cm		2460	2450	2430
Total Dissolved Solids (TDS) [180]	mg/L		2130	2100	2060
Common Ions					
Alkalinity (total as CaCO3)	mg/L		502	502	570
Hardness (total as CaCO3)	mg/L		1250	1250	1230
Bicarbonate (as HCO3)	mg/L		613	613	696
Carbonate (as CO3)	mg/L		ND [5]	ND [5]	ND [5]
Calcium	mg/L		179	179	168
Magnesium	mg/L		194	194	196
Potassium	mg/L		12	12	10
Sodium	mg/L		137	138	132
Chloride	mg/L		8	8	11
Fluoride	mg/L	4.0	0.4	0.4	0.4
Sodium Adsorption Ratio (SAR)			1.7	1.7	1.6
Sulfate	mg/L		1120	1080	1030
Nutrients					
Nitrogen, Nitrate-Nitrite (as N)	mg/L	10.0	ND [0.02]	ND [0.02]	ND [0.02]
Nitrogen, Ammonia (as N)	mg/L		ND [0.07]	ND [0.07]	0.0244J
Dissolved Metals					
Aluminum	mg/L		0.02J	0.0203J	0.0158J
Arsenic	mg/L	0.01	0.000585J, J-B	0.000551J, J-B	0.000428J
Boron	mg/L		0.13	0.13	0.12
Cadmium	mg/L	0.005	ND [0.0005]	ND [0.0005]	0.000219J
Copper	mg/L	1.3	0.00134J, J-B	0.00119J, J-B	0.000815J
Iron	mg/L		0.05	0.05	0.00861J
Lead	mg/L	0.015	ND [0.0003]	ND [0.0003]	0.0000942J
Manganese	mg/L		0.032	0.031	0.111
Nickel	mg/L	0.1	0.002	0.002	0.003
Selenium	mg/L	0.05	0.003	0.002	0.000886J
Vanadium	mg/L		0.000621J	0.000740J	0.000676J
Zinc	mg/L	2.0	ND [0.008]	ND [0.008]	ND [0.008]

Notes:
s.u. - standard units
µmho/cm - micromhos per centimeter
mg/L - milligrams per liter
ND [0.01] - Indicates analyte was not detected above the laboratory reporting limit (laboratory reporting limit in parentheses).
J - Estimated value; analyte was positively detected above the method detection limit but below the laboratory reporting limit.
J-B - Analyte detected in associated field blank and sample result is less than 10 times the blank concentration.
(1) - Unless otherwise noted, criteria listed are Groundwater - Human Health Standards from *Circular DEQ-7, Montana Department of Environmental Quality, updated October 2012.*
Shaded cells indicate an exceedance of the applicable criteria.

Mainstem Spring Creek Stream Sample Analytical Results

Analyte	Units	Montana Numeric Water Quality Criteria (1)	CB-2 (Grab)	CB-2 (Auto-sampler)
			3/15/2018	6/20/2018
Physical Parameters				
pH	s.u.	6.5-9.0 (2)	8.0	
Conductivity	□mho/cm	500 (3)	212	
Total Dissolved Solids (TDS) [180]	mg/L		160	
Total Suspended Solids (TSS)	mg/L		8	1130
Turbidity	NTU	(4)	10.7	
Oil & Grease	mg/L		ND [3.11]	
Common Ions				
Alkalinity (total as $CaCO_3$)	mg/L		69	
Hardness (total as $CaCO_3$)	mg/L		70	
Bicarbonate (as HCO_3)	mg/L		84	
Carbonate (as CO_3)	mg/L		ND [5]	
Calcium	mg/L		14	
Magnesium	mg/L		9	
Potassium	mg/L		12	
Sodium	mg/L		6	
Chloride	mg/L		2	
Fluoride	mg/L	4.0 (5)	0.0476J	
Sodium Adsorption Ratio (SAR)		3.0-7.5 (3)	0.29	
Sulfate	mg/L		27	
Nutrients				
Total Nitrogen as N (ammonium + nitrate/nitrite + organic nitrogen)	mg/L		2	
Total Phosphorous (inorganic + organic)	mg/L		0.62	
Nitrogen, Nitrate-Nitrite (as N)	mg/L	10.0 (5)	0.08	
Nitrogen, Ammonia (as N)	mg/L	(6)	0.42	
Dissolved Metals				
Aluminum	mg/L	0.087	0.11	
Arsenic	mg/L		0.000579J	
Boron	mg/L		0.0212J	
Cadmium	mg/L		0.000119J	
Copper	mg/L		0.003	
Iron	mg/L		0.12	
Lead	mg/L		0.0000623J	
Manganese	mg/L		0.03	
Nickel	mg/L		ND [0.002]	
Selenium	mg/L		0.000222J	
Vanadium	mg/L		0.00112J	
Zinc	mg/L		ND [0.008]	
Total Recoverable Metals				
Aluminum	mg/L		0.19	
Arsenic	mg/L	0.15	0.000716J	
Boron	mg/L		0.0289J	
Cadmium	mg/L	(7)	0.000193J	
Copper	mg/L	(7)	0.003	
Iron	mg/L	1.0	0.27	
Lead	mg/L	(7)	0.0003	
Manganese	mg/L		0.037	
Nickel	mg/L	(7)	0.000581J	
Selenium	mg/L	0.005	ND [0.001]	
Vanadium	mg/L		0.000794J	
Zinc	mg/L	(7)	0.00704J	

Notes:
s.u. - standard units
µmho/cm - micromhos per centimeter mg/L
- milligrams per liter
NTU - Nephelometric turbidity units
-- = not analyzed
ND [0.01] - Indicates analyte was not detected above the laboratory reporting limit (laboratory reporting limit in parentheses). J - Estimated value; analyte was positively detected above the method detection limit but below the laboratory reporting limit.
(1) - Because the surface water monitoring station is located on an undisturbed channel, criteria are presented for comparison only and do not represent water quality limits at Spring Creek Mine. Per ARM 17.30.611(1)(c), onsite streams are classified as C-3 and therefore criteria listed are from DEQ-7 in accordance with ARM 17.30.629(2)(h) and represent an appropriate comparison. Further, comparison criteria represent surface water - chronic aquatic life standards (except where noted) for additional conservativeness.
(2) - See narrative standard in ARM 17.30.629(2)(c)
(3) - See narrative standard in ARM 17.30.670(4)
(4) - See narrative standard in ARM 17.30.629(2)(d); maximum allowable increase above naturally occurring turbidity is 10 NTU.
(5) - No numeric chronic aquatic life standard available--criteria shown represents human health standards in surface water.
(6) - Criteria are temperature and pH-based (see DEQ-7, Note [7]); compared to chronic criterion (CCC), fish early life stages absent.
(7) - Criteria are hardness-based (see DEQ-7, Note [12]).
Shaded cells represent an exceedance of the comparison criteria.

South Fork Spring Creek Stream Sample Analytical Results

Analyte	Units	Montana Numeric Water Quality Criteria (1)	SF-1R (Grab)	SF-1R (Auto-sampler)
			5/25/2018	5/25/2018
Physical Parameters				
pH	s.u.	6.5-9.0 (2)	8.3	
Conductivity	□mho/cm	500 (3)	2430	
Total Dissolved Solids (TDS) [180]	mg/L		2020	
Total Suspended Solids (TSS)	mg/L		3	10
Turbidity	NTU	(4)	2.1	
Oil & Grease	mg/L		ND [3.11]	
Common Ions				
Alkalinity (total as $CaCO_3$)	mg/L		549	
Hardness (total as $CaCO_3$)	mg/L		1230	
Bicarbonate (as HCO_3)	mg/L		670	
Carbonate (as CO_3)	mg/L		ND [5]	
Calcium	mg/L		186	
Magnesium	mg/L		187	
Potassium	mg/L		15	
Sodium	mg/L		122	
Chloride	mg/L		10	
Fluoride	mg/L	4.0 (5)	0.4	
Sodium Adsorption Ratio (SAR)		3.0-7.5 (3)	1.5	
Sulfate	mg/L		1030	
Nutrients				
Total Nitrogen as N (ammonium + nitrate/nitrite + organic nitrogen)	mg/L		1.1	
Total Phosphorous (inorganic + organic)	mg/L		0.05	
Nitrogen, Nitrate-Nitrite (as N)	mg/L	10.0 (5)	0.14	
Nitrogen, Ammonia (as N)	mg/L	(6)	0.08	
Dissolved Metals				
Aluminum	mg/L	0.087	0.026J	
Arsenic	mg/L		0.002	
Boron	mg/L		0.12	
Cadmium	mg/L		0.000313J	
Copper	mg/L		0.003	
Iron	mg/L		0.0171J	
Lead	mg/L		0.0001J	
Manganese	mg/L		0.296	
Nickel	mg/L		ND [0.002]	
Selenium	mg/L		0.003	
Vanadium	mg/L		0.000815J	
Zinc	mg/L		0.00366J	
Total Recoverable Metals				
Aluminum	mg/L		0.0422J	
Arsenic	mg/L	0.15	0.002	
Boron	mg/L		0.13	
Cadmium	mg/L	(7)	0.0001	
Copper	mg/L	(7)	0.002	
Iron	mg/L	1.0	0.1	
Lead	mg/L	(7)	0.0000334J	
Manganese	mg/L		0.302	
Nickel	mg/L	(7)	0.005	
Selenium	mg/L	0.005	0.003	
Vanadium	mg/L		0.000744J	
Zinc	mg/L	(7)	0.013	

Notes:
s.u. - standard units
µmho/cm - micromhos per centimeter mg/L - milligrams per liter
NTU - Nephelometric turbidity units
-- = not analyzed
ND [0.01] - Indicates analyte was not detected above the laboratory reporting limit (laboratory reporting limit in parentheses). J - Estimated value; analyte was positively detected above the method detection limit but below the laboratory reporting limit.
(1) - Because the surface water monitoring stations are located on an undisturbed channel, criteria are presented for comparison only and do not represent water quality limits at Spring Creek Mine. Per ARM 17.30.611(1)(c), onsite streams are classified as C-3 and therefore criteria listed are from DEQ-7 in accordance with ARM 17.30.629(2)(h) and represent an appropriate comparison. Further, comparison criteria represent surface water - chronic aquatic life standards (except where noted) for additional conservativeness.
(2) - See narrative standard in ARM 17.30.629(2)(c)
(3) - See narrative standard in ARM 17.30.670(4)
(4) - See narrative standard in ARM 17.30.629(2)(d); maximum allowable increase above naturally occurring turbidity is 10 NTU.
(5) - No numeric chronic aquatic life standard available--criteria shown represents human health standards in surface water.
(6) - Criteria are temperature and pH-based (see DEQ-7, Note [7]); compared to chronic criterion (CCC), fish early life stages absent.
(7) - Criteria are hardness-based (see DEQ-7, Note [12]).
Shaded cells represent an exceedance of the comparison criteria.

Reclaimed South Fork Spring Creek Stream Sample Analytical Results

Analyte	Units	Montana Numeric Water Quality Criteria [1]	RS-8 (Grab)	RS-8 (Auto-sampler)	RS-8 (Grab)
			3/14/2018	5/30/2018	6/22/2018
Physical Parameters					
pH	s.u.	6.5-9.0 [2]	7.8		8.4
Conductivity	□mho/cm	500 [3]	84		1870
Total Dissolved Solids (TDS) [180]	mg/L		100		1550
Total Suspended Solids (TSS)	mg/L		5	93	4
Turbidity	NTU	[4]	9.2		2.6
Oil & Grease	mg/L		ND [3.11]		ND [3.11]
Common Ions					
Alkalinity (total as $CaCO_3$)	mg/L		40		231
Hardness (total as $CaCO_3$)	mg/L		30		821
Bicarbonate (as HCO_3)	mg/L		49		274
Carbonate (as CO_3)	mg/L		ND [5]		4J
Calcium	mg/L		8		124
Magnesium	mg/L		3		124
Potassium	mg/L		7		23
Sodium	mg/L		0.86J		129
Chloride	mg/L		0.78J		9
Fluoride	mg/L	4.0 [5]	0.046J		0.2
Sodium Adsorption Ratio (SAR)		3.0-7.5 [3]	ND [0.01]		1.96
Sulfate	mg/L		0.844J		855
Nutrients					
Total Nitrogen as N (ammonium + nitrate/nitrite + organic nitrogen)	mg/L		1.5		1.4
Total Phosphorous (inorganic + organic)	mg/L		0.25		0.12
Nitrogen, Nitrate-Nitrite (as N)	mg/L	10.0 [5]	0.17		0.017J
Nitrogen, Ammonia (as N)	mg/L	[6]	0.11		0.057J
Dissolved Metals					
Aluminum	mg/L	0.087	0.08		0.00855J
Arsenic	mg/L		0.000612J		0.002
Boron	mg/L		0.0212J		0.07
Cadmium	mg/L		0.000181J		0.000086J
Copper	mg/L		0.002		ND [0.002]
Iron	mg/L		0.09		0.14
Lead	mg/L		0.000148J		ND [0.0003]
Manganese	mg/L		0.006		0.088
Nickel	mg/L		0.00169J		0.003
Selenium	mg/L		0.000208J		0.000842J
Vanadium	mg/L		0.000345J		0.000869J
Zinc	mg/L		0.00378J		0.015
Total Recoverable Metals					
Aluminum	mg/L		0.08		0.0448J
Arsenic	mg/L	0.15	0.000379J		0.002
Boron	mg/L		0.0192J		0.07
Cadmium	mg/L	[7]	0.000231J		0.000384J
Copper	mg/L	[7]	0.002		ND [0.002]
Iron	mg/L	1.0	0.1		0.3
Lead	mg/L	[7]	0.000166J		0.0004
Manganese	mg/L		0.007		0.088
Nickel	mg/L	[7]	ND [0.002]		0.003
Selenium	mg/L	0.005	ND [0.001]		0.001
Vanadium	mg/L		0.000577J		0.00121J
Zinc	mg/L	[7]	ND [0.008]		0.026

Notes:
s.u. - standard units
µmho/cm - micromhos per centimeter mg/L - milligrams per liter
NTU - Nephelometric turbidity units
-- = not analyzed
ND [0.01] - Indicates analyte was not detected above the laboratory reporting limit (laboratory reporting limit in parentheses). J - Estimated value; analyte was positively detected above the method detection limit but below the laboratory reporting limit.
(1) - Because the surface water monitoring stations are located on an undisturbed channel, criteria are presented for comparison only and do not represent water quality limits at Spring Creek Mine. Per ARM 17.30.611(1)(c), onsite streams are classified as C-3 and therefore criteria listed are from DEQ-7 in accordance with ARM 17.30.629(2)(h) and represent an appropriate comparison. Further, comparison criteria represent surface water - chronic aquatic life standards (except where noted) for additional conservativeness.
(2) - See narrative standard in ARM 17.30.629(2)(c)
(3) - See narrative standard in ARM 17.30.670(4)
(4) - See narrative standard in ARM 17.30.629(2)(d); maximum allowable increase above naturally occurring turbidity is 10 NTU.
(5) - No numeric chronic aquatic life standard available--criteria shown represents human health standards in surface water.
(6) - Criteria are temperature and pH-based (see DEQ-7, Note [7]); compared to chronic criterion (CCC), fish early life stages absent.
(7) - Criteria are hardness-based (see DEQ-7, Note [12]).
Shaded cells represent an exceedance of the comparison criteria.

Pearson Creek Stream Sample Analytical Results

Analyte	Units	Montana Numeric Water Quality Criteria (1)	PC-1ST (First Stage Sample Bottle) 3/23/2018	PC-2 (Auto-sampler) 6/21/2018
Physical Parameters				
pH	s.u.	6.5-9.0 (2)		
Conductivity	□mho/cm	500 (3)		
Total Dissolved Solids (TDS) [180]	mg/L			
Total Suspended Solids (TSS)	mg/L		29	1260
Turbidity	NTU	(4)		
Oil & Grease	mg/L			
Common Ions				
Alkalinity (total as $CaCO_3$)	mg/L			
Hardness (total as $CaCO_3$)	mg/L			
Bicarbonate (as HCO_3)	mg/L			
Carbonate (as CO_3)	mg/L			
Calcium	mg/L			
Magnesium	mg/L			
Potassium	mg/L			
Sodium	mg/L			
Chloride	mg/L			
Fluoride	mg/L	4.0 (5)		
Sodium Adsorption Ratio (SAR)		3.0-7.5 (3)		
Sulfate	mg/L			
Nutrients				
Total Nitrogen as N (ammonium + nitrate/nitrite + organic nitrogen)	mg/L			
Total Phosphorous (inorganic + organic)	mg/L			
Nitrogen, Nitrate-Nitrite (as N)	mg/L	10.0 (5)		
Nitrogen, Ammonia (as N)	mg/L	(6)		
Dissolved Metals				
Aluminum	mg/L	0.087		
Arsenic	mg/L			
Boron	mg/L			
Cadmium	mg/L			
Copper	mg/L			
Iron	mg/L			
Lead	mg/L			
Manganese	mg/L			
Nickel	mg/L			
Selenium	mg/L			
Vanadium	mg/L			
Zinc	mg/L			
Total Recoverable Metals				
Aluminum	mg/L			
Arsenic	mg/L	0.15		
Boron	mg/L			
Cadmium	mg/L	(7)		
Copper	mg/L	(7)		
Iron	mg/L	1.0		
Lead	mg/L	(7)		
Manganese	mg/L			
Nickel	mg/L	(7)		
Selenium	mg/L	0.005		
Vanadium	mg/L			
Zinc	mg/L	(7)		

Notes:
s.u. - standard units
μmho/cm - micromhos per centimeter mg/L - milligrams per liter
NTU - Nephelometric turbidity units
-- = not analyzed
ND [0.01] - Indicates analyte was not detected above the laboratory reporting limit (laboratory reporting limit in parentheses). J - Estimated value; analyte was positively detected above the method detection limit but below the laboratory reporting limit.
(1) - Because the surface water monitoring stations are located on undisturbed channels, criteria are presented for comparison only and do not represent water quality limits at Spring Creek Mine. Per ARM 17.30.611(1)(c), onsite streams are classified as C-3 and therefore criteria listed are from DEQ-7 in accordance with ARM 17.30.629(2)(h) and represent an appropriate comparison. Further, comparison criteria represent surface water - chronic aquatic life standards (except where noted) for additional conservativeness.
(2) - See narrative standard in ARM 17.30.629(2)(c)
(3) - See narrative standard in ARM 17.30.670(4)
(4) - See narrative standard in ARM 17.30.629(2)(d); maximum allowable increase above naturally occurring turbidity is 10 NTU.
(5) - No numeric chronic aquatic life standard available--criteria shown represents human health standards in surface water.
(6) - Criteria are temperature and pH-based (see DEQ-7, Note [7]).
(7) - Criteria are hardness-based (see DEQ-7, Note [12]).
Shaded cells represent an exceedance of the comparison criteria.

South Fork Spring Creek Flood Control Reservoir Sample Analytical Results

Analyte	Units	Montana Numeric Water Quality Criteria (1)	South Fork Flood Control Reservoir (Grab)			
			3/2/2018	Field Duplicate FDS1SA18B 3/2/2018	6/21/2018	Field Duplicate FDS2SA18 6/21/2018
Physical Parameters						
pH	s.u.	6.5-9.0 (2)	8.2	8.2	8.4	8.4
Conductivity	□mho/cm	500 (3)	2450	2450	2030	2030
Total Dissolved Solids (TDS) [180]	mg/L		2140	2050	1620	1640
Total Suspended Solids (TSS)	mg/L		25 J-P	12 J-P	2	2
Turbidity	NTU	(4)	6.5 J-P	5 J-P	1.0	1.1
Oil & Grease	mg/L		ND [3.11]	ND [3.11]	ND [3.11]	ND [3.11]
Common Ions						
Alkalinity (total as $CaCO_3$)	mg/L		510	495	418	403
Hardness (total as $CaCO_3$)	mg/L		1290	1260	1050	1030
Bicarbonate (as HCO_3)	mg/L		623	604	477	459
Carbonate (as CO_3)	mg/L		ND [5]	ND [5]	16	16
Calcium	mg/L		176	171	152	149
Magnesium	mg/L		207	202	162	160
Potassium	mg/L		10	10	14	14
Sodium	mg/L		138	132	105	104
Chloride	mg/L		9	10	8	8
Fluoride	mg/L	4.0 (5)	0.4	0.4	0.4	0.4
Sodium Adsorption Ratio (SAR)		3.0-7.5 (3)	1.66	1.62	1.41	1.4
Sulfate	mg/L		1150	1120	847	853
Nutrients						
Total Nitrogen as N (ammonium + nitrate/nitrite + organic nitrogen)	mg/L		0.5, J-B	0.6, J-B	0.8	0.8
Total Phosphorous (inorganic + organic)	mg/L		0.03	0.02	0.02	0.02
Nitrogen, Nitrate-Nitrite (as N)	mg/L	10.0 (5)	0.03	0.03	ND [0.02]	ND [0.02]
Nitrogen, Ammonia (as N)	mg/L	(6)	0.0196J, J-B	0.0292J, J-B	0.08, J-B	0.032J, J-B
Dissolved Metals						
Aluminum	mg/L	0.087	0.0185J	0.0199J	0.00884J	0.008J
Arsenic	mg/L		0.000281J	0.00022J	0.000842J	0.000846J
Boron	mg/L		0.1	0.1	0.09	0.09
Cadmium	mg/L		0.000158J, J-B	0.000179J, J-B	ND [0.0005]	ND [0.0005]
Copper	mg/L		0.000718J	0.000711J	0.000855J	0.000848J
Iron	mg/L		0.0119J	0.00964J	ND [0.02]	ND [0.02]
Lead	mg/L		0.0000495J, J-B	0.0000241J, J-B	0.000132J, J-B	0.000108J, J-B
Manganese	mg/L		0.086	0.079	0.062	0.061
Nickel	mg/L		0.00104J	ND [0.002]	0.00155J	0.002
Selenium	mg/L		0.004	0.003	0.002	0.002
Vanadium	mg/L		0.000917J, J-B	0.000745J, J-B	0.000934J	0.000584J
Zinc	mg/L		ND [0.008]	ND [0.008]	ND [0.008]	ND [0.008]
Total Recoverable Metals						
Aluminum	mg/L		0.22	0.16	0.0376J, J-B	0.0351J, J-B
Arsenic	mg/L	0.15	0.000626J	0.00039J	0.001	0.001
Boron	mg/L		0.12	0.13	0.1	0.14
Cadmium	mg/L	(7)	0.000454J, J-B	0.000498J, J-B	0.000068J	0.0000538J
Copper	mg/L	(7)	0.005	0.002	ND [0.002]	ND [0.002]
Iron	mg/L	1.0	0.42 J-P	0.31 J-P	0.05	0.04
Lead	mg/L	(7)	0.0005, J-B	0.0003, J-B	ND [0.0003]	ND [0.0003]
Manganese	mg/L		0.122	0.112	0.078	0.081
Nickel	mg/L	(7)	0.00153J, J-B	0.00183J, J-B	0.003 J-B	0.002 J-B
Selenium	mg/L	0.005	0.004	0.004	0.002	0.002
Vanadium	mg/L		0.000718J	0.000681J	ND [0.01]	0.000308J
Zinc	mg/L	(7)	0.067 J-P, J-B	0.04 J-P, J-B	ND [0.008]	ND [0.008]

Notes:
s.u. - standard units
µmho/cm - micromhos per centimeter mg/L - milligrams per liter
NTU - Nephelometric turbidity units
-- = not analyzed
ND [0.01] - Indicates analyte was not detected above the laboratory reporting limit (laboratory reporting limit in parentheses). J - Estimated value; analyte was positively detected above the method detection limit but below the laboratory reporting limit. J-B - Analyte detected in associated field blank and sample result is less than 10 times the blank concentration.
J-P - Relative percent difference between primary and field duplicate samples exceeded quality criteria threshold of 25%.
(1) - Because the pond monitoring station in this table represents water from upstream of the mine, criteria are presented for comparison only and do not represent water quality limits at Spring Creek Mine. Per ARM 17.30.611(1)(c), onsite streams are classified as C-3 and therefore criteria listed are from DEQ-7 in accordance with ARM 17.30.629(2)(h) and represent an appropriate comparison. Further, comparison criteria represent surface water - chronic aquatic life standards (except where noted) for additional conservativeness.
(2) - See narrative standard in ARM 17.30.629(2)(c)
(3) - See narrative standard in ARM 17.30.670(4)
(4) - See narrative standard in ARM 17.30.629(2)(d); maximum allowable increase above naturally occurring turbidity is 10 NTU.
(5) - No numeric chronic aquatic life standard available--criteria shown represents human health standards in surface water.
(6) - Criteria are temperature and pH-based (see DEQ-7, Note [7]); compared to chronic criterion (CCC), fish early life stages absent.
(7) - Criteria are hardness-based (see DEQ-7, Note [12]).
Shaded cells represent an exceedance of the comparison criteria.

Overburden / Burn (Clinker) Groundwater Sample Analytical Results

Analyte	Units	Applicable Water Quality Criteria [(1)]	CL-3	CL-4		CL-7		CL-8		OB-4
			2/28/2018	2/28/2018	7/24/2018	3/27/2018	7/19/2018	2/26/2018	7/18/2018	7/24/2018
Physical Parameters										
pH	s.u.		8.2	8.1	8.1	8.0	8.2	8.3	8.2	8.4
Conductivity	□mho/cm		672	1210	762	3210	3210	850	831	2020
Total Dissolved Solids (TDS) [180]	mg/L		390	770	460	2900	2940	550	570	1290
Common Ions										
Alkalinity (total as CaCO3)	mg/L		111	539	356	469	493	281	275	1060
Hardness (total as CaCO3)	mg/L		241	490	366	1470	1510	351	336	85
Bicarbonate (as HCO3)	mg/L		135	658	435	572	601	343	335	1250
Carbonate (as CO3)	mg/L		ND [5]	ND [5]	ND [5]	ND [5]	ND [5]	ND [5]	ND [5]	23
Calcium	mg/L		42	90	74	175	183	75	72	15
Magnesium	mg/L		33	65	44	251	255	40	38	12
Potassium	mg/L		6	9	8	15	15	8	7	6
Sodium	mg/L		31	71	21	238	257	41	39	506
Chloride	mg/L		5	3	1	11	10	8	7	10
Fluoride	mg/L	4.0	0.7	0.7	0.6	0.7	0.7	1.3	1.3	2.7
Sodium Adsorption Ratio (SAR)			0.9	1.4	0.5	2.7	2.9	1.0	0.9	23.8
Sulfate	mg/L		196	152	66	1600	1540	158	149	76
Nutrients										
Nitrogen, Nitrate-Nitrite (as N)	mg/L	10.0	0.2	0.04	ND [0.02]	1.53	1.37	1.44	1.29	0.22
Nitrogen, Ammonia (as N)	mg/L		0.0556J	0.1	0.29	ND [0.07]	0.0114J	0.0117J	ND [0.07]	0.55
Dissolved Metals										
Aluminum	mg/L		ND [0.05]	0.0204J	0.78	0.0305J	0.0273J	0.0231J	0.0227J	0.1
Arsenic	mg/L	0.01	0.000218J	0.000483J	0.005	0.006	0.005	0.015	0.018	0.000445J
Boron	mg/L		0.12	0.18	0.14	0.17	0.14	0.39	0.39	0.08
Cadmium	mg/L	0.005	0.000131J	0.000087J	0.0006	0.000117J	0.000286J	0.000095J	0.000415J	0.000421J
Copper	mg/L	1.3	ND [0.002]	0.000532J	0.00185J	0.003	0.0015J	0.004	0.000921J	0.00199J
Iron	mg/L		3.23	0.17	3.57	0.0173J	0.0191J	0.09	0.07	0.08
Lead	mg/L	0.015	ND [0.0003]	ND [0.0003]	0.0013	0.0000893J	0.0000474J	ND [0.0003]	0.0000632J	0.000218J
Manganese	mg/L		0.464	0.191	3.03	0.029	0.029	0.009	0.012	0.059
Nickel	mg/L	0.1	ND [0.002]	0.008	0.022	0.002	0.0017J	0.002	0.003	0.005
Selenium	mg/L	0.05	0.00064J	0.000275J	0.000656J	0.009	0.008	0.006	0.008	0.000138J
Vanadium	mg/L		0.000879J	0.00191J	0.00552J	0.07	0.06	0.3	0.37	0.000428J
Zinc	mg/L	2.0	ND [0.008]	0.00737J	0.00356J	ND [0.008]	ND [0.008]	0.00606J	0.00393J	0.018

Notes:
s.u. - standard units
μmho/cm - micromhos per centimeter mg/L -
milligrams per liter
ND [0.01] - Indicates analyte was not detected above the laboratory reporting limit (laboratory reporting limit in parentheses). J -
Estimated value; analyte was positively detected above the method detection limit but below the laboratory reporting limit.
(1) - Unless otherwise noted, criteria listed are Groundwater - Human Health Standards from *Circular DEQ-7, Montana Department of Environmental Quality, updated October 2012.*
Shaded cells indicate an exceedance of the applicable criteria.

Anderson-Dietz Coal Groundwater Sample Analytical Results

Analyte	Units	Applicable Water Quality Criteria (1)	2107-80		403WA		404W		504AQ		507AQ		508AQ	
			3/28/2018	7/19/2018	3/23/2018	7/20/2018	3/28/2018	7/19/2018	2/27/2018	7/18/2018	2/26/2018	7/18/2018	2/26/2018	7/18/2018
Physical Parameters														
pH	s.u.		8.2	8.2	8.4	8.4	8.3	8.4	8.2	8.2	8.3	8.3	8.3	8.3
Conductivity	□mho/cm		4280	4230	2450	2650	3090	3040	1210	1210	975	1010	2500	2810
Total Dissolved Solids (TDS) [180]	mg/L		3680	3510	1690	1800	2170	2060	820	840	720	720	1960	1980
Common Ions														
Alkalinity (total as CaCO3)	mg/L		581	578	694	705	972	1040	370	388	276	256	1160	1210
Hardness (total as CaCO3)	mg/L		1220	1280	302	360	246	251	499	500	376	358	379	369
Bicarbonate (as HCO3)	mg/L		709	705	822	822	1170	1220	451	474	330	310	1380	1480
Carbonate (as CO3)	mg/L		ND [5]	ND [5]	12	18	9	27	ND [5]	ND [5]	3J	1J	14	ND [5]
Calcium	mg/L		193	203	50	60	38	39	104	103	72	67	48	46
Magnesium	mg/L		181	189	43	51	37	38	58	59	48	46	63	62
Potassium	mg/L		34	33	9	10	11	10	13	13	12	11	21	21
Sodium	mg/L		614	611	507	545	639	691	59	65	74	79	585	606
Chloride	mg/L		12	11	5	5	11	10	54	54	19	13	15	16
Fluoride	mg/L	4.0	0.7	0.8	1.5	1.3	1.1	1.1	0.9	0.8	1.2	1.2	1.1	1.0
Sodium Adsorption Ratio (SAR)			7.6	7.4	12.7	12.5	17.7	19.0	1.1	1.3	1.7	1.8	13.1	13.7
Sulfate	mg/L		1980	1840	600	678	679	606	201	197	246	243	420	412
Nutrients														
Nitrogen, Nitrate-Nitrite (as N)	mg/L	10.0	0.28	0.47	ND [0.02]	0.01J	ND [0.02]	ND [0.02]	0.04	0.02	0.04	0.09	ND [0.02]	ND [0.02]
Nitrogen, Ammonia (as N)	mg/L		ND [0.07]	0.0253J	2.72	2.43	1.70	1.48	0.0418J	0.0153J	0.0447J	0.0081J	0.61	0.54
Dissolved Metals														
Aluminum	mg/L		0.0419J	0.0486J	0.0159J	0.0437J	0.0235J	0.019J	0.0424J	0.0391J	0.08	0.0145J	0.0335J	0.0367J
Arsenic	mg/L	0.01	0.000464J	0.001	0.000217J	0.000267J	0.000769J	0.000694J	0.005	0.005	0.008	0.009	0.000415J	0.000626J
Boron	mg/L		0.47	0.34	0.12	0.09	0.15	0.09	0.16	0.2	0.16	0.16	0.25	0.25
Cadmium	mg/L	0.005	0.000208J	0.0005	0.000378J	0.000292J	0.000107J	0.000232J	0.000108J	0.000465J	0.000256J	0.000407J	0.000185J	0.0019
Copper	mg/L	1.3	0.003	0.000667J	0.000209J	ND [0.002]	ND [0.002]	0.004	0.000444J	ND [0.002]	0.00151J	ND [0.002]	0.000809J	0.042
Iron	mg/L		0.00797J	0.02	0.34	0.08	1.25	0.04	0.006J	0.00441J	0.03	0.00522J	0.23	0.27
Lead	mg/L	0.015	ND [0.0003]	0.00000792J	0.000144J	0.00011J	ND [0.0003]	0.0000806J	ND [0.0003]	ND [0.0003]	0.000128J	ND [0.0003]	ND [0.0003]	0.0036
Manganese	mg/L		0.00254J	0.011	0.01	0.016	0.048	0.042	0.022	0.011	0.00333J	0.006	0.026	0.025
Nickel	mg/L	0.1	0.005	0.000984J	ND [0.002]	0.002	0.003	0.00111J	0.00136J	0.003	0.005	ND [0.002]	0.003	ND [0.002]
Selenium	mg/L	0.05	0.000204J	0.000389J	0.000615J	ND [0.001]	0.000152J	ND [0.001]	0.000407J	0.000396J	0.000438J	0.000517J	0.000834J	0.000383J
Vanadium	mg/L		0.00295J	0.01	0.000497J	ND [0.01]	0.000851J	0.00264J	0.02	0.03	0.03	0.04	0.00119J	ND [0.01]
Zinc	mg/L	2.0	0.00335J	0.00243J	0.01	0.00167J	ND [0.008]	ND [0.008]	0.00359J	0.00476J	0.0029J	ND [0.008]	ND [0.008]	ND [0.008]

Notes:

s.u. - standard units

µmho/cm - micromhos per centimeter mg/L -
milligrams per liter

ND [0.01] - Indicates analyte was not detected above the laboratory reporting limit (laboratory reporting limit in parentheses). J - Estimated value; analyte was positively detected above the method detection limit but below the laboratory reporting limit. J-B - Analyte detected in associated field blank and sample result is less than 10 times the blank concentration.

(1) - Unless otherwise noted, criteria listed are Groundwater - Human Health Standards from *Circular DEQ-7, Montana Department of Environmental Quality, updated October 2012.*

Shaded cells indicate an exceedance of the applicable criteria.

Anderson-Dietz Coal Groundwater Sample Analytical Results (Continued)

Analyte	Units	Applicable Water Quality Criteria (1)	509AQ		AD-4		AD-6		AD-7		AD-9		AD-14	
			2/26/2018	7/18/2018	4/11/2018	7/23/2018	3/27/2018	7/20/2018	3/27/2018	7/20/2018	2/26/2018	7/19/2018	3/28/2018	7/19/2018
Physical Parameters														
pH	s.u.		8.2	8.1	8.2	8.2	8.4	8.6	9.0	8.9	8.1	8.2	7.9	8.0
Conductivity	□mho/cm		1180	1230	1420	1460	3430	3590	1800	1780	2530	2620	7760	8280
Total Dissolved Solids (TDS) [180]	mg/L		820	850	950	970	2360	2470	1130	1110	2180	2220	7640	8320
Common Ions														
Alkalinity (total as CaCO3)	mg/L		335	320	390	405	870	860	969	971	451	434	511	517
Hardness (total as CaCO3)	mg/L		476	480	297	285	32	31	11	12	1170	1210	2570	2770
Bicarbonate (as HCO3)	mg/L		409	390	476	494	1020	977	983	1030	551	530	623	631
Carbonate (as CO3)	mg/L		ND [5]	ND [5]	ND [5]	ND [5]	21	36	98	78	ND [5]	ND [5]	ND [5]	ND [5]
Calcium	mg/L		85	85	65	62	7	7	2	3	140	143	360	376
Magnesium	mg/L		64	65	33	32	4	3	1	1	200	206	405	446
Potassium	mg/L		12	12	18	18	9	8	5	5	17	17	48	49
Sodium	mg/L		75	80	204	240	806	835	463	473	178	187	1080	1010
Chloride	mg/L		61	58	4	4	5	6	3	3	8	8	31	33
Fluoride	mg/L	4.0	1.0	1.0	0.1	0.2	1.7	1.8	1.9	2.0	0.7	0.7	0.5	0.5
Sodium Adsorption Ratio (SAR)			1.5	1.6	5.2	6.2	61.9	65.2	59.6	59.9	2.3	2.3	9.3	8.4
Sulfate	mg/L		246	243	344	352	939	942	40	46	1150	1120	4600	4470
Nutrients														
Nitrogen, Nitrate-Nitrite (as N)	mg/L	10.0	ND [0.02]	ND [0.02]	0.11	0.011J	ND [0.02]	ND [0.02]	ND [0.02]	ND [0.02]	ND [0.02]	ND [0.02]	ND [0.02]	0.03
Nitrogen, Ammonia (as N)	mg/L		0.0274J	0.0186J	2.49	2.85	2.71	2.22	1.62	1.49	0.033J, J-B	0.0591J	8.26	8.82
Dissolved Metals														
Aluminum	mg/L		0.0199J	0.0142J	0.0197J	0.0259J	0.00458J	0.00701J	0.0194J	0.0118J	0.0211J	0.017J	0.11	0.11
Arsenic	mg/L	0.01	0.006	0.007	0.000094J	0.000663J	ND [0.001]	0.0001J	0.00013J	0.000133J	0.004	0.004	0.0000831J	0.000654J
Boron	mg/L		0.09	0.09	0.09	0.1 J-B	0.09	0.04	0.05	0.05	0.13	0.14	1.16	0.7
Cadmium	mg/L	0.005	0.000131J	0.00044J	0.000124J	0.000137J, J-B	0.000132J	0.0003J	0.000187J	0.000259J	0.000179J, J-B	0.0003J	0.000189J	0.0014
Copper	mg/L	1.3	0.000227J	ND [0.002]	0.00144J	ND [0.002]	ND [0.002]	ND [0.002]	0.000147J	ND [0.002]	0.000136J, J-B	ND [0.002]	ND [0.002]	ND [0.002]
Iron	mg/L		0.34	0.29	0.05	0.62	2.87	2.01	0.06	0.08	0.09	0.09	4.12	2.14
Lead	mg/L	0.015	ND [0.0003]	ND [0.0003]	ND [0.0003]	0.000161J	0.00000851J	0.0000102J	0.000249J	0.0000445J	ND [0.0003]	0.0000482J	ND [0.0003]	0.0006
Manganese	mg/L		0.019	0.018	0.073	0.098	0.025	0.027	0.01	0.006	0.042	0.046	0.112	0.119
Nickel	mg/L	0.1	0.002	0.00179J	0.00094J	0.004	ND [0.002]	ND [0.002]	ND [0.002]	ND [0.002]	0.00133J	0.003	0.009	ND [0.002]
Selenium	mg/L	0.05	ND [0.001]	ND [0.001]	ND [0.001]	0.000192J	0.000331J	0.000368J	0.005	0.007	0.000254J	ND [0.001]	0.00034J	0.000415J
Vanadium	mg/L		0.00109J	0.00135J	0.000501J	0.000139J	0.000529J	0.00058J	0.000515J	0.000153J	0.00116J	0.00182J	0.00115J	0.00492J
Zinc	mg/L	2.0	ND [0.008]	ND [0.008]	0.012	0.00659J	ND [0.008]	ND [0.008]	0.02	0.016	ND [0.008]	0.00288J	ND [0.008]	ND [0.008]

Notes:
s.u. - standard units
µmho/cm - micromhos per centimeter mg/L -
milligrams per liter
ND [0.01] - Indicates analyte was not detected above the laboratory reporting limit (laboratory reporting limit in parentheses). J - Estimated value; analyte was positively detected above the method detection limit but below the laboratory reporting limit. J-B - Analyte detected in associated field blank and sample result is less than 10 times the blank concentration.
(1) - Unless otherwise noted, criteria listed are Groundwater - Human Health Standards from *Circular DEQ-7, Montana Department of Environmental Quality, updated October 2012.*
Shaded cells indicate an exceedance of the applicable criteria.

Anderson-Dietz Coal Groundwater Sample Analytical Results (Continued)

Analyte	Units	Applicable Water Quality Criteria (1)	AD-15			AD-16		AD-17		AD-18		CBM02-3DC	
			2/26/2018	Field Duplicate FD15A18A 2/26/2018	7/23/2018	3/27/2018	7/20/2018	4/11/2018	7/19/2018	2/26/2018	7/19/2018	2/28/2018	7/24/2018
Physical Parameters													
pH	s.u.		8.3	8.3	8.4	8.3	8.4	8.6	8.5	8.2	8.3	8.7	8.8
Conductivity	□mho/cm		845	844	856	4650	4710	1940	1900	2170	2200	1220	1260
Total Dissolved Solids (TDS) [180]	mg/L		590	580	580	3340	3360	1230	1040	1810	1820	780	800
Common Ions													
Alkalinity (total as CaCO3)	mg/L		171	171	176	862	870	1110	1070	382	383	640	640
Hardness (total as CaCO3)	mg/L		324	324	326	108	109	25	30	963	981	29	30
Bicarbonate (as HCO3)	mg/L		206	208	211	1030	1030	1240	1230	466	467	672	706
Carbonate (as CO3)	mg/L		1J	ND [5]	2J	11	15	51	36	ND [5]	ND [5]	54	37
Calcium	mg/L		48	48	46	25	25	6	7	119	121	7	7
Magnesium	mg/L		50	50	51	11	11	3	3	162	165	3	3
Potassium	mg/L		9	10	9	13	11	6	4	16	16	4	4
Sodium	mg/L		50	49	48	1100	1100	507	509	148	149	315	315
Chloride	mg/L		4	6	4	21	21	6	6	7	7	3	4
Fluoride	mg/L	4.0	1.3	1.2	1.3	2.8	2.7	2.1	1.9	0.7	0.8	2.2	2.1
Sodium Adsorption Ratio (SAR)			1.2	1.2	1.2	46.2	46.0	43.8	40.3	2.1	2.1	25.4	25.0
Sulfate	mg/L		261	261	258	1600	1560	21	20	944	905	58	55
Nutrients													
Nitrogen, Nitrate-Nitrite (as N)	mg/L	10.0	1.04	1.04	0.97	1.00	2.23	0.04	ND [0.02]	0.22	0.22	ND [0.02]	ND [0.02]
Nitrogen, Ammonia (as N)	mg/L		ND [0.07]	ND [0.07]	0.0216J, J-B	0.22	0.0211J	1.50	1.71	0.0078J, J-B	0.012J	0.59	0.72
Dissolved Metals													
Aluminum	mg/L		0.0147J	0.0134J	0.0153J	0.07	0.0445J	0.27	0.26	0.019J	0.0165J	0.31	0.17
Arsenic	mg/L	0.01	0.008	0.008	0.009	0.0000831J	0.000374J	0.001	0.001	0.006	0.006	0.00068J	0.001
Boron	mg/L		0.18	0.18	0.18 J-B	0.1	0.07	0.07	0.06	0.13	0.13	0.05	0.08
Cadmium	mg/L	0.005	0.000089J, J-B	0.000094J, J-B	0.000101J, J-B	0.000229J	0.0007	0.000101J	0.000236J	0.000107J, J-B	0.000295J	0.000134J	0.000448J
Copper	mg/L	1.3	0.00144J, J-B	0.00123J, J-B	0.000729J	0.00182J	0.000278J	0.00115J	0.000568J	0.00031J, J-B	0.000684J	0.006	0.00125J
Iron	mg/L		0.000851J	0.00146J	0.00246J	0.03	0.02	0.26	0.59	0.17	0.11	0.51	0.11
Lead	mg/L	0.015	ND [0.0003]	ND [0.0003]	0.0000655J	ND [0.0003]	0.00013J	0.0003	0.0011	ND [0.0003]	0.0000261J	0.0005	0.000153J
Manganese	mg/L		0.000948J	0.000977J	0.00092J	0.039	0.00315J	0.033	0.038	0.025	0.017	0.011	0.006
Nickel	mg/L	0.1	ND [0.002]	ND [0.002]	0.00196J	ND [0.002]	0.003	0.002	ND [0.002]	0.002	ND [0.002]	0.013	0.008
Selenium	mg/L	0.05	0.004	0.004	0.005	0.000535J	0.000348J	ND [0.001]	ND [0.001]	0.001	0.001	0.000179J	0.000143J
Vanadium	mg/L		0.1	0.09	0.11	0.000793J	0.000511J	0.00116J	0.00219J	0.1	0.11	0.00118J	0.000919J
Zinc	mg/L	2.0	0.00234J	0.00291J	ND [0.008]	ND [0.008]	ND [0.008]	ND [0.008]	ND [0.008]	ND [0.008]	0.00254J	0.00776J	ND [0.008]

Notes:
s.u. - standard units
µmho/cm - micromhos per centimeter mg/L -
milligrams per liter
ND [0.01] - Indicates analyte was not detected above the laboratory reporting limit (laboratory reporting limit in parentheses). J - Estimated value; analyte was positively detected above the method detection limit but below the laboratory reporting limit. J-B - Analyte detected in associated field blank and sample result is less than 10 times the blank concentration.
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Shaded cells indicate an exceedance of the applicable criteria.

Interburden/Underburden Groundwater Sample Analytical Results

Analyte	Units	Applicable Water Quality Criteria	81-115-		UB-2	
			2/26/2018	7/18/2018	4/11/2018	7/23/2018
Physical Parameters						
pH	s.u.		8.5	8.6	8.9	8.9
Conductivity	□mho/c		1610	1820	2060	2070
Total Dissolved Solids (TDS) [180]	mg/L		1090	1200	1380	1380
Common Ions						
Alkalinity (total as CaCO3)	mg/L		791	794	254	293
Hardness (total as CaCO3)	mg/L		30	34	62	63
Bicarbonate (as HCO3)	mg/L		914	905	266	318
Carbonate (as CO3)	mg/L		26	32	22	19
Calcium	mg/L		8	8	11	12
Magnesium	mg/L		3	3	8	8
Potassium	mg/L		6	6	9	8
Sodium	mg/L		430	456	442	459
Chloride	mg/L		15	14	5	5
Fluoride	mg/L	4.0	4.5	4.6	2.3	2.4
Sodium Adsorption Ratio (SAR)			34.5	34.1	24.5	25.1
Sulfate	mg/L		114	157	697	701
Nutrient						
Nitrogen, Nitrate-Nitrite (as N)	mg/L	10.0	0.09	0.05	ND [0.02]	ND [0.02]
Nitrogen, Ammonia (as N)	mg/L		1.26	1.31	2.52	2.62
Dissolved Metals						
Aluminum	mg/L		0.1	0.06	0.0113J	0.0364J
Arsenic	mg/L	0.01	0.000238J	0.000245J	0.000258J	0.000318J
Boron	mg/L		0.05	0.06	0.3	0.34
Cadmium	mg/L	0.005	0.000184J	0.000423J	0.000182J	0.000113J, J-B
Copper	mg/L	1.3	0.003	0.000848J	0.000354J	0.00175J
Iron	mg/L		0.38	0.04	0.08	0.26
Lead	mg/L	0.015	0.0000893J	0.0000682J	0.000037J	0.0004
Manganese	mg/L		0.018	0.011	0.008	0.015
Nickel	mg/L	0.1	0.000834J	0.00159J	0.00197J	0.00186J
Selenium	mg/L	0.05	ND [0.001]	ND [0.001]	0.001	0.000182J
Vanadium	mg/L		0.000789J	0.000171J	0.000819J	0.00123J
Zinc	mg/L	2.0	ND [0.008]	0.00394J	0.009	0.035

Notes:
s.u. - standard units
µmho/cm - micromhos per centimeter mg/L - milligrams per liter
ND [0.01] - Indicates analyte was not detected above the laboratory reporting limit (laboratory reporting limit in parentheses). J - Estimated value; analyte was positively detected above the method detection limit but below the laboratory reporting limit. J-B - Analyte detected in associated field blank and sample result is less than 10 times the blank concentration.
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Shaded cells indicate an exceedance of the applicable criteria.

Canyon Coal Groundwater Sample Analytical Results

Analyte	Units	Applicable Water Quality Criteria [(1)]	CBM02-3CC		CN-1A			CN-5			CN-7	
			2/28/2018	7/24/2018	2/27/2018	7/23/2018	Field Duplicate FD2SA18B 7/23/2018	2/26/2018	7/18/2018	Field Duplicate FD2SA18A 7/18/2018	2/26/2018	7/18/2018
Physical Parameters												
pH	s.u.		12.5	12.4	8.5	8.6	8.6	8.5	8.5	8.5	8.5	8.6
Conductivity	□mho/cm		7180	6360	1620	1640	1640	1950	1970	1970	1780	1790
Total Dissolved Solids (TDS) [180]	mg/L		1420	1370	1040	1030	1030	1280	1320	1320	1110	1140
Common Ions												
Alkalinity (total as CaCO3)	mg/L		1610	1550	554	548	545	614	634	615	1050	1000
Hardness (total as CaCO3)	mg/L		823	796	14	14	14	16	16	16	18	16
Bicarbonate (as HCO3)	mg/L		ND [5]	ND [5]	645	627	624	710	735	712	1200	1130
Carbonate (as CO3)	mg/L		40	54	15	20	20	19	19	19	40	43
Calcium	mg/L		330	319	4	4	4	4	4	4	4	4
Magnesium	mg/L		ND [1]	0.0319J	1	1	1	1	1	1	2	1
Potassium	mg/L		18	18	4	4	4	5	4	5	6	5
Sodium	mg/L		323	329	402	403	400	488	456	493	475	475
Chloride	mg/L		62	65	3	3	3	6	6	6	14	7
Fluoride	mg/L	4.0	0.3	0.3	2.8	2.9	2.8	4.0	4.0	3.8	4.6	5.0
Sodium Adsorption Ratio (SAR)			4.9	5.1	47.6	46.9	46.2	53.2	50.4	54.3	48.8	52.4
Sulfate	mg/L		6	1	269	265	264	367	359	359	7	3
Nutrients												
Nitrogen, Nitrate-Nitrite (as N)	mg/L	10.0	ND [0.02]	ND [0.02]	ND [0.02]	ND [0.02]	ND [0.02]	ND [0.02]	ND [0.02]	ND [0.02]	ND [0.02]	ND [0.02]
Nitrogen, Ammonia (as N)	mg/L		2.71	2.52	1.12	1.05	1.02	1.23	1.13	1.19	1.6	1.54
Dissolved Metals												
Aluminum	mg/L		0.56	0.51	0.00976J	ND [0.05]	0.00479J	0.06	0.0294J	0.0278J	2.81	0.18
Arsenic	mg/L	0.01	0.000337J	0.000425J	ND [0.001]	ND [0.001]	0.0000792J	0.000138J	0.000268J	0.000261J	0.0004J	0.000279J
Boron	mg/L		0.04	0.06	0.03	0.06 J-B	0.05 J-B	0.05	0.06	0.06	0.06	0.06
Cadmium	mg/L	0.005	0.000278J	0.001	0.000075J	0.000089J, J-B	0.000104J, J-B	0.000089J	0.000435J	0.000422J	0.000066J, J-B	0.000395J
Copper	mg/L	1.3	0.01	0.005	0.00121J	ND [0.002]	0.000765J	0.00187J	ND [0.002]	ND [0.002]	0.000642J, J-B	ND [0.002]
Iron	mg/L		0.0192J	0.0173J	0.03	0.02	0.03	0.07	0.05	0.05	1.14	0.14
Lead	mg/L	0.015	0.0029	0.0006	ND [0.0003]	0.0000226J	0.0000351J	ND [0.0003]	0.0000678J	0.00000564J	0.0018	0.001
Manganese	mg/L		ND [0.005]	0.000863J	0.00322J	0.00368J	0.0047J	0.005	0.005	0.00482J	0.017	0.005
Nickel	mg/L	0.1	0.000814J	0.007	0.00122J	0.002	0.0016J	0.00144J	ND [0.002]	ND [0.002]	0.00121J	ND [0.002]
Selenium	mg/L	0.05	0.000385J	0.000331J	ND [0.001]	0.000136J	ND [0.001]	ND [0.001]	0.000212J	0.000164J	ND [0.001]	ND [0.001]
Vanadium	mg/L		0.000576J	0.000955J	0.000401J	0.000336J	0.000518J	0.000878J	0.00136J	0.0012J	0.0021J	ND [0.01]
Zinc	mg/L	2.0	ND [0.008]	ND [0.008]	0.00411J	ND [0.008]	ND [0.008]	ND [0.008]	ND [0.008]	ND [0.008]	ND [0.008]	ND [0.008]

Notes:
s.u. - standard units
μmho/cm - micromhos per centimeter mg/L -
milligrams per liter
ND [0.01] - Indicates analyte was not detected above the laboratory reporting limit (laboratory reporting limit in parentheses). J -
Estimated value; analyte was positively detected above the method detection limit but below the laboratory reporting limit. J-B - Analyte
detected in associated field blank and sample result is less than 10 times the blank concentration.
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Reclaimed Spoils Groundwater Sample Analytical Results

Analyte	Units	Applicable Water Quality Criteria (1)	SP-1		SP-2			SP-3		SP-4		SP-6		SP-7	
			2/26/2018	7/18/2018	2/27/2018	Field Duplicate FD1SA18B 2/27/2018	7/20/2018	2/26/2018	7/20/2018	3/2/2018	7/20/2018	3/2/2018	7/19/2018	2/26/2018	7/18/2018
Physical Parameters															
pH	s.u.		8.1	8.0	7.6	7.8	7.9	8.1	8.0	7.7	7.8	7.9	8.1	7.9	8.0
Conductivity	□mho/cm		4940	5290	6250	6270	6160	6120	6430	4720	4390	6490	5350	9460	10400
Total Dissolved Solids (TDS) [180]	mg/L		4060	3920	5940	5920	5390	4900	4600	3930	3620	5300	3870	8520	8480
Common Ions															
Alkalinity (total as CaCO3)	mg/L		1620	1620	1160	1180	1200	2040	1980	575	600	1380	1030	3070	3070
Hardness (total as CaCO3)	mg/L		570	586	2480	2400	2480	394	410	1300	898	1090	769	979	972
Bicarbonate (as HCO3)	mg/L		1980	1980	1420	1440	1470	2490	2420	702	732	1680	1260	3750	3750
Carbonate (as CO3)	mg/L		ND [5]	ND [5]	ND [5]	ND [5]	ND [5]	ND [5]	ND [5]	ND [5]	ND [5]	ND [5]	ND [5]	ND [5]	ND [5]
Calcium	mg/L		96	98	397	383	391	91	95	193	140	227	163	95	91
Magnesium	mg/L		81	83	362	351	367	41	42	199	133	127	88	180	181
Potassium	mg/L		22	19	24	23	24	20	20	18	13	24	27	31	32
Sodium	mg/L		1210	1050	822	759	778	1450	1560	837	693	1190	1080	2420	2510
Chloride	mg/L		39	37	14	15	13	20	16	17	15	49	53	136	144
Fluoride	mg/L	4.0	0.7	0.7	0.6	0.6	0.5	0.5	0.4	0.7	0.5	0.3	0.3	0.8	0.7
Sodium Adsorption Ratio (SAR)			22.1	18.9	7.2	6.7	6.8	31.9	33.5	10.1	10	15.7	16.9	33.6	35
Sulfate	mg/L		1420	1360	3160	3130	2970	1760	1680	2260	1830	2410	1830	3010	2920
Nutrients															
Nitrogen, Nitrate-Nitrite (as N)	mg/L	10.0	ND [0.02]	ND [0.02]	ND [0.02]	ND [0.02]	ND [0.02]	ND [0.02]	ND [0.02]	ND [0.02]	ND [0.02]	0.04	ND [0.02]	ND [0.02]	ND [0.02]
Nitrogen, Ammonia (as N)	mg/L		4.96	4.89	7.02	6.8	6.57	4.2	3.98	0.91	0.8	7.28	6.52	3.8	4.01
Dissolved Metals															
Aluminum	mg/L		0.0264J	0.013J	0.1	0.11	0.1	0.5	0.08	0.07	0.06	0.0285J	0.07	0.12	0.08
Arsenic	mg/L	0.01	0.003	0.004	0.001	0.000898J	0.001	0.002	0.002	0.000799J	0.000601J	0.000562J	0.000833J	0.004	0.004
Boron	mg/L		0.16	0.17	0.07	0.06	0.09	0.06	0.34	0.13	0.14	0.06	0.05	0.1	0.12
Cadmium	mg/L	0.005	0.000145J	0.0008	0.000227J	0.000146J	0.0006	0.000185J	0.0006	0.000407J	0.0006	0.0006	0.0006	0.0008	0.0043
Copper	mg/L	1.3	0.00133J	ND [0.002]	ND [0.002]	ND [0.002]	ND [0.002]	0.000523J	ND [0.002]	0.000594J	ND [0.002]	0.004	0.000774J	ND [0.002]	ND [0.002]
Iron	mg/L		1.44	1.08	3.59	3.59	2.22	0.53	0.22	3.03	1.05	0.03	0.12	3.11	2.92
Lead	mg/L	0.015	ND [0.0003]	0.00000642J	ND [0.0003]	ND [0.0003]	0.0000706J	0.000046J	0.000207J	0.000275J	0.0000366J	0.0005	0.000244J	ND [0.0003]	0.0028
Manganese	mg/L		0.178	0.125	0.292	0.294	0.326	0.108	0.082	0.55	0.312	0.091	0.066	0.711	0.69
Nickel	mg/L	0.1	0.014	0.004	ND [0.002]	ND [0.002]	0.007	ND [0.002]	0.003	ND [0.002]	0.004	ND [0.002]	ND [0.002]	0.011	ND [0.002]
Selenium	mg/L	0.05	ND [0.001]	0.000192J	0.000556J	0.000422J	0.000364J	ND [0.001]	0.000224J	0.000307J	0.000273J	0.000857J	0.000539J	ND [0.001]	0.001
Vanadium	mg/L		0.00195J	0.00089J	0.00171J	0.00146J	ND [0.01]	0.00264J	0.00124J	0.00137J	0.000139J	0.00143J	0.000312J	0.005J	0.000104J
Zinc	mg/L	2.0	0.01	ND [0.008]	ND [0.008]	ND [0.008]	ND [0.008]	ND [0.008]	ND [0.008]	ND [0.008]	ND [0.008]	ND [0.008]	0.00476J	0.413	ND [0.008]

Notes:
s.u. - standard units
µmho/cm - micromhos per centimeter mg/L - milligrams per liter
ND [0.01] - Indicates analyte was not detected above the laboratory reporting limit (laboratory reporting limit in parentheses). J - Estimated value; analyte was positively detected above the method detection limit but below the laboratory reporting limit.
(1) - Unless otherwise noted, criteria listed are Groundwater - Human Health Standards from *Circular DEQ-7, Montana Department of Environmental Quality, updated October 2012.*
Shaded cells indicate an exceedance of the applicable criteria.

APPENDIX D

SPRING CREEK MINE OBSERVED WILDLIFE SPECIES LIST

SPRING CREEK MINE OBSERVED WILDLIFE SPECIES LIST

	Historical Occurrence in Annual Monitoring Area (1994-2013)	2014-2015	2016	2017	2018
MAMMALS					
SHREWS					
Sorex species *Sorex* spp.	Once	--	--	--	--
Merriam's shrew[1] *Sorex merriami*	Never	--	--	--	--
Preble's shrew[1]	Never	--	--	--	--
BATS					
Myotis species* *Myotis spp.*	Regularly	X[2]	X[2]	--	--
Big brown bat* *Eptesicus fuscus*	Regularly	X	X	--	--
Spotted bat[1]* *Euderma maculatum*	Occasionally	X	X	--	--
Eastern red bat[1] *Lasiurus borealis*	Unknown	--	--	--	--
Hoary bat[1]* *Lasiurus cinereus*	Regularly	X	X	--	--
Little brown myotis[1]* *Myotis lucifugus*	Regularly	X	X	--	--
Silver-haired bat* *Lasionycteris noctivagans*	Regularly	X	X	--	--
Western small-footed myotis* *Myotis ciliolabrum*	Regularly	X	X	--	--
Long-eared myotis* *Myotis evotis*	Regularly	X	X	--	--
Fringed myotis[1]* *Myotis thysanodes*	Occasionally	X	X	--	--
Townsend's big-eared bat[1] *Corynorhinus townsendii*	Unknown	--	--	--	--
HARES AND RABBITS					
Cottontail species* *Sylvilagus spp.*	Regularly	X	X	X	X
White-tailed jackrabbit* *Lepus townsendii*	Occasionally	--	--	--	X
RODENTS & SQUIRRELS					
Least chipmunk* *Tamias minimus*	Often	--	X	X	X
Yellow-bellied marmot* *Marmota flaviventris*	Infrequently	--	--	X	X

	Historical Occurrence in Annual Monitoring Area (1994-2013)	2014-2015	2016	2017	2018
Thirteen-lined ground squirrel *Spermophilus tridecemlineatus*	Occasionally	--	--	--	--
Black-tailed prairie dog[1]* Cynomys ludovicianus	Regularly	X	X	X	X
Northern pocket gopher[4] *Thomomys talpoides*	Regularly	X	X	--	X
Olive-backed pocket mouse *Perognathus fasciatus*	Rarely	--	--	--	--
Ord's kangaroo rat* *Dipodomys ordii*	Infrequently	--	X	--	X
Beaver[3] *Castor canadensis*	Rarely	--	--	--	--
Plains harvest mouse *Reithrodontomys montanus*	Once[5]	--	--	--	--
Western harvest mouse *Reithrodontomys megalotis*	Rarely	--	--	--	--
Deer mouse* *Peromyscus maniculatus*	Regularly	X	--	--	X
Northern grasshopper mouse *Onychomys leucogaster*	Infrequently	--	--	--	--
Bushy-tailed woodrat* *Neotoma cinerea*	Occasionally	--	X	--	X
Prairie vole* *Microtus ochrogaster*	Occasionally	X	--	--	--
Muskrat *Ondatra zibethicus*	Rarely	--	--	--	--
Porcupine *Erethizon dorsatum*	Regularly	X	X	X	--
CARNIVORES					
Coyote* *Canis latrans*	Regularly	X	X	X	X
Red fox* *Vulpes vulpes*	Infrequently	X	--	--	--
Raccoon[3] *Procyon lotor*	Infrequently	--	--	--	--
Mink *Mustela vison*	Once	--	--	--	--
Striped skunk *Mephitis*	Rarely	--	--	--	--
Badger* *Taxidea taxus*	Occasionally	X	X	--	--

	Historical Occurrence in Annual Monitoring Area (1994-2013)	2014-2015	2016	2017	2018
Mountain lion* *Puma concolor*	Once	X	--	--	--
Bobcat* *Lynx rufus*	Infrequently	--	X	--	--
Black bear* *Ursus americanus*	Rarely	--	X	--	X
UNGULATES					
Mule deer* *Odocoileus hemionus*	Regularly	X	X	X	X
White-tailed deer *Odocoileus virginianus*	Frequently	--	--	--	--
Pronghorn* *Antilocapra americana*	Regularly	X	X	X	X
Elk* *Cervus canadensis*	Rarely	--	--	--	--
BIRDS					
LOONS AND GREBES					
Pied-billed grebe* *podilymbus podiceps*	Infrequently	X	--	--	--
Eared grebe* *podiceps nigricollis*	Rarely	--	--	--	--
Western grebe* *Aechmophorus occidentalis*	Twice	--	--	--	--
PELICANS					
American white pelican* *Pelecanus erythrothynchos*	Rarely	X	X	--	--
CORMORANTS					
Double-crested cormorant* *Phalacrocorax auritus*	Occasionally	X	X	--	--
BITTERNS, HERONS, AND IBISES					
Great blue heron[1]* *Ardea herodias*	Regularly	X	X	X	X
GEESE AND DUCKS					
Canada goose* *Branta canadensis*	Regularly	X	X	X	X
Green-winged teal* *Anas crecca*	Regularly	--	--	--	X
Mallard* *Anas platyrhynchos*	Regularly	X	X	X	X
Northern pintail* *Anas acuta*	Rarely	X	--	--	--

	Historical Occurrence in Annual Monitoring Area (1994-2013)	2014-2015	2016	2017	2018
Blue-winged teal* *Anas discors*	Occasionally	X	--	--	X
Cinnamon teal* *Anas cyanoptera*	Twice	--	--	--	--
Northern shoveler* *Anas clypeata*	Regularly	X	X	--	--
Gadwall* *Anas strepera*	Regularly	X	X	--	--
American wigeon* *Anas americana*	Regularly	X	X	--	X
Redhead* *Aythya americana*	Infrequently	--	--	--	--
Ring-necked duck* *Aythya collaris*	Occasionally	X	--	--	--
Greater scaup* *Aythya marila*	Once	--	--	--	--
Lesser scaup* *Aythya affinis*	Infrequently	X	--	--	--
Ruddy Duck* *Oxyura jamaicensis*	Once	X	--	--	--
Common goldeneye* *Bucephala clangula*	Twice	--	--	--	--
Bufflehead* *Bucephala albeola*	Rarely	--	--	--	--
Hooded merganser* *Lophodytes cucullatus*	Twice	--	--	--	--
Common merganser* *Mergus merganser*	Rarely	--	--	--	--
DIURNAL RAPTORS					
Turkey vulture* *Cathartes aura*	Regularly	X	X	--	X
Osprey* *Pandion haliaetus*	Regularly	X	X	X	X
Bald eagle* *Haliaeetus leucocephalus*	Infrequently	X	X	--	--
Golden eagle[1]* *Aquila chrysaetos*	Regularly	X	X	X	X
Northern harrier* *Circus cyaneus*	Regularly	X	X	X	X
Sharp-shinned hawk* *Accipiter striatus*	Twice	--	--	--	--

	Historical Occurrence in Annual Monitoring Area (1994-2013)	2014-2015	2016	2017	2018
Cooper's hawk* *Accipiter cooperii*	Infrequently	--	--	X	X
Northern goshawk[1]* *Accipiter gentilis*	Once	--	--	--	--
Swainson's hawk* *Buteo swainsoni*	Rarely	--	--	--	--
Red-tailed hawk* *Buteo jamaicensis*	Regularly	X	X	X	X
Ferruginous hawk* *Buteo regalis*	Rarely	--	--	--	X
Rough-legged hawk* *Buteo lagopus*	Seasonally	--	--	X	X
American kestrel* *Falco sparverius*	Regularly	X	X	X	X
Merlin* *Falco columbarius*	Once	--	--	--	--
Prairie falcon* *Falco mexicanus*	Frequently	X	X	X	X
Peregrine falcon[1]* *Falco peregrinus*	Rarely	--	--	X	--
COOTS AND RAILS					
American coot* *Fulica americana*	Occasionally	X	X	--	X
Sora* *Porzana carolina*	Once	--	--	--	X
Sandhill crane* *Grus canadensis*	Infrequently	--	--	--	--
GALLINACEOUS BIRDS					
Gray partridge* *Perdix perdix*	Occasionally	X	X	--	--
Ring-necked pheasant* *Phasianus colchicus*	Infrequently	--	--	--	--
Ruffed grouse* *Bonasa umbellus*	Twice	--	--	--	--
Greater sage-grouse[1]* *Centrocercus urophasianus*	Occasionally	X	X	--	--
Sharp-tailed grouse* *Tympanuchus phasianellus*	Regularly	X	X	X	X
Wild turkey* *Meleagris gallopavo*	Occasionally	--	--	--	X

	Historical Occurrence in Annual Monitoring Area (1994-2013)	2014-2015	2016	2017	2018
SHOREBIRDS, AVOCETS, GULLS, AND TERNS					
Killdeer* *Charadrius vociferus*	Regularly	X	X	X	X
Mountain plover *Charadrius montanus*	Never	--	--	--	--
American avocet* *Retrocurvirostra americana*	Infrequently	X	--	--	--
Lesser yellowlegs* *Tringa flavipes*	Rarely	--	--	--	--
Greater yellowleg*s *Tringa melanoleuca*	Rarely	--	--	--	--
Solitary sandpiper* *Tringa solitaria*	Rarely	--	--	--	--
Willet* *Catoptrophorus semipalmatus*	Rarely	--	--	--	--
Spotted sandpiper* *Actitis macularia*	Regularly	X	X	X	X
Upland sandpiper* *Bartramia longicauda*	Regularly	X	--	X	X
Western sandpiper* *Calidris mauri*	Once	--	--	--	X
Long-billed curlew[1]* *Numenius americanus*	Rarely	--	X	X	X
Marbled godwit* *Limosa fedoa*	Once	--	--	--	--
Wilson's snipe* *Gallinago delicata*	Infrequently	--	--	--	--
Wilson's phalarope* *Phalaropus tricolor*	Infrequently	--	--	--	--
Ring-billed gull* *Larus delawarensis*	Twice	--	--	--	--
Franklin's Gull* *Larus pipixcan*	Once	--	--	--	--
PIGEONS AND DOVES					
Rock pigeon* *Columba livia*	Regularly	X	X	X	X
Mourning dove* *Zenaida macroura*	Regularly	X	X	X	X
OWLS					
Great horned owl* *Bubo virginianus*	Regularly	X	X	X	X
Burrowing owl[1]* *Athene cunicularia*	Regularly	X	X	--	X

	Historical Occurrence in Annual Monitoring Area (1994-2013)	2014-2015	2016	2017	2018
Short-eared owl* *Asio flammeus*	Rarely	--	--	--	X
NIGHTJARS					
Common nighthawk* *Chordeiles minor*	Regularly	X	X	--	X
Common poorwill* *Phalaenoptilus nuttallii*	Rarely	--	--	--	--
WOODPECKERS					
Lewis' woodpecker[1]* *Melanerpes lewis*	Infrequently	--	--	--	--
Red-headed woodpecker* *Melanerpes erythrocephalus*	Infrequently	--	--	--	--
Hairy woodpecker* *Picoides villosus*	Infrequently	--	--	--	--
Downy woodpecker* *Picoides pubescens*	Occasionally	--	--	--	--
Northern flicker* *Colaptes auratus*	Regularly	X	X	X	X
FLYCATCHERS					
Western wood-pewee* *Contopus sordidulus*	Occasionally	X	X	X	--
Hammond's flycatcher* *Empidonax hammondii*	Rarely	X	--	--	--
Dusky flycatcher* *Empidonax oberholseri*	Once	--	--	--	--
Say's phoebe* *Sayornis saya*	Regularly	X	X	X	X
Western kingbird* *Tyrannus verticalis*	Regularly	X	X	X	X
Eastern kingbird* *Tyrannus tryannus*	Regularly	X	X	X	X
Cassin's kingbird* *Tyrannus vociferans*	Twice	--	--	--	--
LARKS					
Horned lark* *Eremophila alpestris*	Regularly	X	X	X	X
SWALLOWS					
Tree swallow* *Tachycineta bicolor*	Once	--	--	--	--
Violet-green swallow* *Tachycineta thalassina*	Regularly	X	X	--	--

	Historical Occurrence in Annual Monitoring Area (1994-2013)	2014-2015	2016	2017	2018
Cliff swallow* *Hirundo pyrrhonota*	Regularly	X	X	X	X
Barn swallow* *Hirundo rustica*	Regularly	X	X	X	X
Bank swallow* *Riparia riparia*	Once	--	--	--	--
BUNTINGS					
Lazuli bunting* *Passerina amoena*	Infrequently	--	--	--	--
JAYS, CROWS, and MAGPIES					
Gray jay* *Perisoreus canadensis*	Once	--	--	--	--
Pinyon jay[1]* *Gymnorhinus cyanocephalus*	Occasionally	X	--	--	--
Scrub Jay* *Aphelocoma coerulescens*	Twice	--	--	--	--
Clark's nutcracker[1]* *Nucifraga columbiana*	Rarely	--	--	--	--
Black-billed magpie* *Pica hudsonia*	Regularly	X	X	X	X
American crow* *Corvus brachyrhynchos*	Regularly	X	X	X	X
Common raven* *Corvus corax*	Occasionally	X	X	X	X
CHICKADEES					
Black-capped chickadee* *Parus atricapillus*	Regularly	X	X	X	X
NUTHATCHES					
Red-breasted nuthatch* *Sitta canadensis*	Occasionally	--	--	--	--
White-breasted nuthatch* *Sitta carolinensis*	Occasionally	--	--	X	--
WRENS					
Rock wren* *Salpinctes obsoletus*	Regularly	X	X	X	X
House wren* *Troglodytes aedon*	Often	X	--	--	--
Bewick's wren *Thryomanes bewickii*	Once	--	--	--	--

	Historical Occurrence in Annual Monitoring Area (1994-2013)	2014-2015	2016	2017	2018
CHATS					
Yellow-breasted chat* *Icteria virens*	Regularly	--	--	--	--
LONGSPURS AND SNOW BUNTINGS					
Chestnut-collared Longspur[1] *Calcarius ornatus*	Never	--	--	--	--
KINGLETS, GNATCATCHERS, AND THRUSHES					
Veery[1] *Catharus fuscescens*	Never	--	--	--	--
Ruby-crowned kinglet* *Regulus calendula*	Once	--	--	--	--
Blue-gray gnatcatcher* *Polioptila nigriceps*	Once	--	--	--	--
Mountain bluebird* *Sialia currocoides*	Regularly	X	X	X	X
Townsend's solitaire* *Myadestes townsendi*	Occasionally	--	X	X	--
American robin* *Turdus migratorius*	Regularly	X	X	X	X
MIMIC THRUSHES					
Sage thrasher[1]* *Oreoscoptes montanus*	Rarely	--	--	--	--
Brown thrasher* *Toxostoma rufum*	Twice	X	X	--	X
Gray Catbird* *Dumetella carolinensis*	Infrequently	--	--	--	--
PIPITS					
American Pipit* *Anthus rubescens*	Once	--	--	--	--
Sprague's Pipit *Anthus spragueii*	Never	--	--	--	--
SHRIKES					
Loggerhead shrike[1]* *Lanius ludovicianus*	Regularly	X	X	X	X
STARLINGS					
European starling* Strunus vulgaris	Regularly	--	X	X	X
VIREOS					
Plumbeous vireo* *Vireo plumbeus*	Rarely	X	--	--	--

	Historical Occurrence in Annual Monitoring Area (1994-2013)	2014-2015	2016	2017	2018
WARBLERS					
Orange-crowned warbler* *Oreothlypis celata*	Once	--	--	--	--
Yellow warbler* *Setophaga petechia*	Regularly	X	X	X	X
American redstart* *Setophaga ruticilla*	Infrequently	--	--	X	--
Magnolia warbler* *Setophaga magnolia*	Once	--	--	--	--
Yellow-rumped warbler* *Setophaga coronata*	Regularly	X	X	X	--
Black-and-white warbler* *Mniotilta varia*	Once	--	--	--	--
Common yellowthroat* *Geothlypis trichas*	Once	--	--	--	--
SPARROWS AND TOWHEES					
Green-tailed towhee[1]* *Pipilo chlorurus*	Once	--	--	--	--
Spotted towhee* *Pipilo maculatus*	Regularly	X	X	X	--
Chipping sparrow* *Spizella passerina*	Regularly	X	X	X	X
Brewer's sparrow[1]* *Spizella breweri*	Regularly	X	X	X	X
Vesper sparrow* *Ppooecetes gramineus*	Regularly	X	X	X	X
Lark sparrow* *Chondestes grammacus*	Regularly	X	X	X	X
Lark bunting* *Calamospiza melanocorys*	Regularly	X	X	X	X
Savannah sparrow* *Passerculus sandwichensis*	Once	--	--	--	--
Grasshopper sparrow* *Ammodramus savannarum*	Occasionally	X	--	X	X
Song sparrow* *Melospiza melodia*	Once	--	--	--	--
White-crowned sparrow* *Zonotrichia leucophrys*	Occasionally	X	X	--	--
Dark-eyed junco* *Junco hyemalis*	Occasionally	--	--	--	X

	Historical Occurrence in Annual Monitoring Area (1994-2013)	2014-2015	2016	2017	2018
BLACKBIRDS, MEADOWLARKS, AND ORIOLES					
Red-winged blackbird* *Agelaius phoneniceus*	Regularly	X	X	X	X
Western meadowlark* *Sturnella neglecta*	Regularly	X	X	X	X
Bobolink[1] *Dolichonyx oryzivorus*	Never	--	--	--	--
Yellow-headed blackbird* *Xanthocephalus xanthocephalus*	Infrequently	--	--	--	--
Brewer's blackbird* *Euphagus cyanocephalus*	Regularly	X	X	X	X
Common grackle* *Quiscalus quiscula*	Occasionally	--	X	X	X
Brown-headed cowbird* *Molothrus ater*	Occasionally	X	X	X	X
Bullock's oriole* *Icterus bullockii*	Occasionally	X	X	--	X
FINCHES					
Red crossbill* *Loxia curvirostra*	Infrequently	--	--	X	--
Pine siskin* *Carduelis pinus*	Infrequently	--	--	--	--
American goldfinch* *Carduelis tristis*	Occasionally	X	X	X	X
Cassin's finch[1] *Haemorhous cassinii*	Never	--	--	--	--
WEAVER FINCHES					
House sparrow* *Passer domesticus*	Twice	--	--	--	--
CUCKOOS					
Yellow-billed cuckoo[1] *Coccyzus americanus*	Never	--	--	--	--
Black-billed cuckoo[1] *Coccyzus erythropthalmus*	Never	--	--	--	--
AMPHIBIANS AND REPTILES					
SALAMANDERS					
Western tiger salamander* *Ambystoma mavortium*	Rarely	--	--	--	--

	Historical Occurrence in Annual Monitoring Area (1994-2013)	2014-2015	2016	2017	2018
TRUE TOADS					
Plains spadefoot* *Spea bombifrons*	Infrequently	--	--	--	--
Great Plains toad[1]* *Bufo cognatus*	Infrequently	--	--	--	--
Woodhouse's toad* *Bufo woodhousei*	Occasionally	X	X	--	--
TREE FROGS					
Boreal chorus frog* *Pseudacris triseriata*	Regularly	X	X	X	X
TRUE FROGS					
Northern leopard frog* *Rana pipiens*	Occasionally	--	--	X	--
TURTLES					
Painted turtle* *Chrysemys picta*	Occasionally	--	--	--	X
Snapping turtle[1]* *Chelydra serpentina*	Rarely	--	--	--	--
Spiny softshell[1] *Apalone spinifera*	Never	--	--	--	--
SPINY LIZARDS					
Common sagebrush lizard* *Sceloporus graciosus*	Infrequently	--	--	--	--
Greater short-horned lizard[1,3]* *Phrynosoma hernandesi*	Rarely	--	X	--	--
COLUBRID SNAKES					
North American racer* *Coluber constrictor*	Twice	--	--	--	--
Plains hog-nosed snake[1] *Heterodon nasicus*	Never	--	--	--	--
Western milksnake[1] *Lampropeltis gentilis*	Never	--	--	--	--
Gophersnake (Bullsnake)* *Pituophis melanoleucas*	Rarely	X	--	--	--
Common garter snake* *Thamnophis sirtalis*	Rarely	--	--	--	--
Wandering garter snake* *Thamnophis elegans*	Occasionally	--	--	--	--

	Historical Occurrence in Annual Monitoring Area (1994-2013)	2014-2015	2016	2017	2018
PIT VIPERS					
Prairie rattlesnake* *Crotalus viridis*	Occasionally	--	X	X	--
FISH					
Yellowstone Cutthroat Trout[1] *Oncorhynchus clarkii bouvieri*	Never	--	--	--	--
Sauger[1] *Sander canadensis*	Never	--	--	--	--

[1] Animals on the Montana Natural Heritage Program Species of Concern List, updated September 25, 2018
[2] Based on updated analysis of results from detection equipment previously located at SCM, per Montana Natural Heritage Program
[3] Species name for the greater short-horned lizard was changed from *douglassi* to *hernandesi* in 2010 per MDEQ guidance from MNHP.
[4] Based on physical evidence (e.g., tracks, diggings, chewing marks, etc.)
[5] Based on an examination of preserved specimens by Dr. Paul Hendricks (Montana Natural Heritage Program, Missoula, MT) the plains harvest mouse was retracted from the list of observed species for 2000. The occurrence of that species in 1995 is questionable.
* Observed in the SCM permit area.

Federally Listed Threatened and Endangered Species and Species with the potential to Occur in the Study Area (Determined Using USFWS IPaC System)

Species	Status	In Range (Yes/No)	Habitat Present (Yes/No)	Affects Determination (brief rationale)
Black-footed ferret *Mustela nigripes*	E/Exp*	Yes	Yes	May affect, not likely to adversely affect. See discussion, section 4.10.4.1

* E/Exp: Endangered/Experimental population-Non-Essential, C: Candidate

APPENDIX E

CULTURAL RESOURCE MANAGEMENT
INSIDE SMP C1979012

Site ID from Plate 7 **SMP** (Current NHRP Sites **Bold** & Shaded; Mitigated **Bold** only)	Pit Area	Planned Disturbance Date (estimated 1,200' offset from coal block)	Actual Disturbance Date	Additional Investigation Required (Yes or No)	Mitigation Required** (Yes or No)	Summary of Mitigation Efforts	Mitigation (Year Planned or Completed)
2524	1 WEST	2013	2013	N	N/A	N/A	N/A
2525	1 WEST	N/A	N/A	N	N/A	N/A	N/A
2526	1 WEST	2021		N	N/A	N/A	N/A
2527	1 SOUTH	N/A	N/A	N	N/A	N/A	N/A
2532	1 WEST	2014	2014	N	N/A	N/A	N/A
24BG3384	2 WEST	2016	2016	N	N	N/A	N/A
24BG3385	2 EAST	2019		N	N	N/A	N/A
24BG3386	2 EAST	2019		N	N	N/A	N/A
24BG3393	2 EAST	2023		N	N	N/A	N/A
24BG3397	2 EAST	2023		N	N	N/A	N/A
24BH573	4 SOUTH	2019		N	N	N/A	N/A
24BH1048	**1 WEST**	**N/A**	**N/A**	**N**	**Y**	**Completed in 1992 by GCM**	**N/A**
24BH1059	4 SOUTH	2026		N	N	N/A	N/A
24BH1068	**1 EAST**	**Future**	**N/A**	**N**	**N**	**Within Future LBA II Area**	**N/A**
24BH1583	2 WEST	N/A	N/A	N	N/A	N/A	N/A
24BH1589	**2 WEST**	**2019**		**N**	**Y**	**Mitigated; authorized disturb 2-24-**	**2013**
24BH1591	2 SOUTH	2023		Y	N	DNRC Requested testing in '18. Tested, not significant. DNRC ltr 6-6-18 not an eligible site.	2018
24BH1593	2 SOUTH	2021		N	N/A	2010 SHPO Not eligible; Recorded as 3407 & 3409 by GCM	N/A
24BH1598	**4 WEST**	**2019**	**2018**	**N**	**Y**	**Mitigated; authorized disturb 10-16-**	**2018**
24BH1599	4 SOUTH	2019		N	N	N/A	N/A
24BH1600	4 SOUTH	2012	2013	N	N	N/A	N/A
24BH1614	RR Corr	N/A	N/A	N	N/A	N/A	N/A
24BH1619	1 WEST	N/A	N/A	N	N/A	N/A	N/A
24BH1734	4 NORTH	N/A	N/A	N	N/A	N/A	N/A
24BH1735	**4 NORTH**	**N/A**	**N/A**	**N**	**N**	**NW of Rock Art, Will Not be**	**N/A**
24BH1736	**4 NORTH**	**N/A**	**N/A**	**N**	**N**	**Boundary Rev. 3-13-17 SHPO Approved. Revised site boundary will not be**	**2017**
24BH1737	**4 NORTH**	**2016**	**2016**	**N**	**Y**	**Completed SHPO Approved 7-30-**	**2012-13**
24BH1738	4 NORTH	2019		N	N/A	N/A	N/A
24BH1739	**4 NORTH**	**2019**		**N**	**Y**	**Field Mitigation Complete, authorized to disturb 1-23-19**	**2018**
24BH1740	4 NORTH	2019		N	N/A	No Longer Eligible by SHPO 3-13-17	N/A
24BH1741	4 NORTH	N/A	N/A	N	N/A	N/A	N/A
24BH1742	4 NORTH	2018	2018	N	N	N/A	N/A
24BH1743	4 NORTH	2018	2018	N	N	N/A	N/A
24BH1744	4 NORTH	2016	2016	N	N	N/A	N/A
24BH1745	4 NORTH	2012	2013	N	N	N/A	N/A
24BH1747	4 NORTH	N/A	N/A	N	N/A	N/A	N/A
24BH1748	**4 NORTH**	**2019**		**N**	**Y**	**Field Mitigation Complete, authorized to disturb 10-27-18**	**2016**
24BH1749	4 NORTH	2016	2016	N	N	N/A	N/A
24BH2003	2 EAST	N/A	N/A	N	N/A	N/A	N/A
24BH2008	6 EAST	N/A	N/A	N	N/A	N/A	N/A
24BH2010	6 EAST	N/A	N/A	N	N/A	N/A	N/A
24BH2253	4 SOUTH	N/A	N/A	N	N/A	N/A	N/A
24BH2254	**4 SOUTH**	**2014**	**2014**	**N**	**Y**	**Completed in 2002 by GCM**	**2002**
24BH2255	4 NORTH	N/A	N/A	N	N/A	N/A	N/A
24BH2317	TRR	2015	2015	Y	N	DNRC & SHPO Approval 3-16-15	2015
24BH2318	4 SOUTH	N/A	N/A	N	N/A	N/A	N/A
24BH2319	4 SOUTH	N/A	N/A	N	N/A	N/A	N/A
24BH2320	4 SOUTH	2015	2015	N	N	N/A	N/A
24BH2516	**1 WEST**	**N/A**	**N/A**	**N**	**Y**	**#1: Annual Photos on going, will not be disturbed**	**N/A**
24BH2521	**1 WEST**	**N/A**	**N/A**	**N**	**Y**	**Completed in 1992 by GCM**	**N/A**
24BH2529	**1 WEST**	**N/A**	**N/A**	**N**	**Y**	**Completed in 1992 by GCM**	**N/A**
24BH2530	1 EAST	2025		N	N	Additional Field Testing '15, rpt. to BLM	N/A
24BH2531	1 EAST	2014	2014	N	N	Additional Field Testing '15, rpt. to BLM	N/A
24BH2533	1 EAST	2025		N	N	N/A	N/A
24BH2534	1 EAST	2025		N	N	N/A	N/A
24BH2841	4 NORTH	N/A	N/A	N	N/A	N/A	N/A

Site ID from Plate 7 SMP (Current NHRP Sites **Bold** & Shaded; Mitigated **Bold** only)	**Pit Area**	**Planned Disturbance Date** (estimated 1,200' offset from coal block)	**Actual Disturbance Date**	**Additional Investigation Required (Yes or No)**	**Mitigation Required** (Yes or No)**	**Summary of Mitigation Efforts**	**Mitigation (Year Planned or Completed)**
24BH2842	4 NORTH	N/A	N/A	N	N/A	N/A	N/A
24BH2869	4 WEST	N/A	N/A	N	N/A	N/A	N/A
24BH3079	2 EAST	N/A	N/A	N	N/A	N/A	N/A

* Mitigation includes only data recovery; see Permit Volume 1 Section 303 - Addendum 303R- Appendix D; mitigation completed in 2012 and 2013.

** Sites require mitigation efforts as required by a lease commitment or as required in Appendix G-G4 of the baseline investigation. All sites in *italics* will be disturbed with the approval of mining the TR1 Major permit revision or future leases; disturbance not currently permitted