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**Appendix A** – Federal Coal Lease EA, MTM 97988, April 2011  

**Appendix B** – Species Recorded or Potentially Occurring in Wildlife Monitoring Area  

**Appendix C** – Comment Response Summary
1.0 INTRODUCTION

Signal Peak Energy, LLC (SPE) owns and operates the Bull Mountains Mine No.1 underground coal mine located in the Bull Mountains of south central Montana (Figure 1.0-1). The mine is located in Musselshell and Yellowstone Counties between the Musselshell and Yellowstone Rivers, approximately 30 miles north of Billings and 20 miles southeast of Roundup, Montana. Coal is mined using longwall mining methods, washed to improve coal quality, and shipped from an onsite railroad loading facility.

On March 19, 2008, SPE filed an application with the Bureau of Land Management (BLM) to lease approximately 2,679.9 acres of Federal coal (MTM 97988) in sections 4, 8, 10, 14, and 22, Township 6 North, Range 27 East, Musselshell County, under the Lease by Application regulations (43 CFR 3425.1) and the Energy Policy and Conservation Act of 2005 (Figure 1.0-2). BLM processed the lease application in accordance with the regulations found at 43 CFR 3425 for Lease by Application (LBA), and evaluated under the following Federal authorities:

- Mineral Leasing Act, 1920 (MLA), as amended;
- National Environmental Policy Act, 1969 (NEPA);
- Federal Coal Leasing Act Amendment, 1976 (FCLAA);
- Surface Mining Control and Reclamation Act, 1977 (SMCRA); and,

The Environmental Assessment (EA) titled Bull Mountains Mine No. 1, Federal Coal Lease MTM 97988, Musselshell County, Montana, EA No. DOI-The BLM-MT-C010-2009-0010-EA (hereafter “Coal Lease EA”) (BLM 2011) was prepared to satisfy the BLM’s requirements under the NEPA. The U.S. Department of the Interior (DOI), Office of Surface Mining Reclamation and Enforcement (OSMRE) was a cooperating agency for the Coal Lease EA, which is attached to this EA as Appendix A. Both the Coal Lease EA and the Federal Mining Plan Modification EA incorporate prior analyses including the Bull Mountains Exchange Final EIS (BLM 1990) and the Bull Mountains Mine No. 1 EIS (MDSL 1992), which analyzed the effects of proposed mining and connected actions. 

The Coal Lease EA analyzed the potential impacts associated with leasing five tracts of Federal coal totaling 2,679.76 acres that would allow the mine to continue producing coal at the current rate instead of ceasing production as recoverable private coal reserves are exhausted. The Coal Lease EA addressed two alternatives, the No Action and the Proposed Action Alternatives. Under the No Action Alternative, current and future mining activities approved by the Montana Department of Environmental Quality (MDEQ) will continue on private lands and appropriate mitigation measures will be implemented to reduce or eliminate effects of mining on the environment. Under the Proposed Action Alternative, the subject federal coal would be mined according to the Life of Mine (LOM) plan and the same mitigation measures that apply to the No Action Alternative would be applied to the lease areas.

1 Italicized text denotes language inserted in either in response to comments received (see Appendix C) or to clarify or update a topic.
On April 15, 2011, based upon a review of the Coal Lease EA, the BLM’s Billings Field Office issued a Finding of No Significant Impact (FONSI) of implementing the proposed leasing action. The FONSI was based on the information contained in the Coal Leasing EA and consideration of the Council on Environmental Quality’s (CEQ) criteria for significance (40 CFR 1508.27). The BLM determined that: 1) the implementation of the Proposed Action would not have significant environmental impacts; 2) the Proposed Action is in conformance with the Billings Resource Management Plan; and 3) the Proposed Action does not constitute a major Federal action having significant effect on the human environment; therefore, an Environmental Impact Statement (EIS) was not required.

The State of Montana has a Federally-approved coal regulatory program (hereafter “Montana State program”) administered by the MDEQ. MDEQ approved the Bull Mountains Mine No. 1 mine permit (C1993017) in 1993 in accordance with Montana Strip and Underground Mine Reclamation Act (MSUMRA). The mining and reclamation methods specified in the permit are consistent with the requirements of the Surface Mine Control and Reclamation Act (SMCRA; 30 USC, Chapter 25) as required by the Montana cooperative agreement with OSMRE (30 CFR 926.30).

On October 4, 2012, MDEQ approved SPE’s application for Amendment 2 to the mine permit to include a portion of the Federal coal lease area and adjacent private lands and coal. On August 2, 2013, the Assistant Secretary, Lands and Mineral Management (ASLM) issued a mining plan approval document authorizing mining of 140 acres of Federal coal lands within the Amendment 2 boundary as described below.

Township 6 North, Range 27 East, PMM, Musselshell County, Montana  
Sec. 8, SW¼ SW¼ and portions* of SE¼ SW¼, N½ SW¼, SW¼ NW¼, and SW¼ SE¼, Containing 140 acres more or less.  
*portions include areas south and west of the Amendment 2 State permit boundary.

On October 5, 2012, SPE submitted an application for Amendment 3 to the mine permit to include the remainder of proposed future mining. MDEQ reviewed the permit application under the Montana State program, the Federal lands program (30 CFR Chapter VII, Subchapter D), and the Montana cooperative agreement (30 CFR 926.30). Pursuant to the Montana State program and the cooperative agreement, MDEQ approved the permit application on October 18, 2013. The current State-approved mine permit boundary (Figure 1.0-2) includes the entire mining plan and LOM area previously analyzed in the Coal Lease EA.

SPE proposes to meet demand for coal and continue mine operations through approximately 2025 by:

1. Securing a Federal mining plan modification authorizing mining of leased Federal coal within the current Bull Mountains Mine No. 1. permit boundary; and,

2. Continuing to mine, process, and ship coal from the mine.
On November 22, 2013, SPE requested approval of a mining plan modification for Federal Lease MTM 97988 that would expand coal development and mining operations at the Bull Mountains Mine No. 1 into the remaining Federal coal lands as described in the Amendment 3 Permit Application Package (PAP). Federal coal lands included in lease MTM 97988 and proposed for mining, but not included in the existing mining plan, are identified below:

**Township 6 North, Range 27 East, PMM, Musselshell County, Montana**

- Sec. 4, lot 1, S½ NE¼, SE¼ NW¼, and S½; 479.76 acres
- Sec. 8, NE¼, NE¼ NW¼, S½ NW¼, and S½; 460.00 acres
- Sec. 10, W½ NE¼, SE¼ NE¼, NW¼, and S½; 600.00 acres
- Sec. 14, SW¼ NE¼, NW¼, and S½; 520.00 acres
- Sec. 22, W½ and SE¼; 480.00 acres

Total 2,539.76 acres

In complying with its responsibilities under NEPA, the OSMRE does not reevaluate potential impacts previously analyzed as part of the Coal Lease EA, which included analysis of all federal coal lands identified in the proposed mining plan modification. Rather, this EA considers potential changes to the extent or nature of those impacts, based on the current mine permit approved by the State program, and new information specific to this action. Because the Coal Lease EA thoroughly described the environmental setting of the Bull Mountains Mine No. 1 LOM area (now the mine permit area) and mining operations, it is incorporated by reference in this EA.

This EA was prepared in accordance with the requirements of NEPA of 1969 and the CEQ regulations implementing NEPA. OSMRE is the lead Federal agency responsible for development of this EA because it has the decision-making authority (i.e., making a recommendation to the ASLM) regarding the proposed mining plan modification under the SMCRA. As such, this EA follows the OSMRE's 516 DM 13, which is the DOI manual guiding the OSMRE's implementation of the NEPA process.

### 1.1 Regulatory Framework and Necessary Authorizations

The OSMRE is responsible for reviewing plans to conduct coal mining and reclamation operations on lands containing leased Federal coal and is the lead agency for this EA. Pursuant to 30 CFR 746, the OSMRE shall prepare and submit to the Secretary of the Interior a decision document recommending approval, disapproval or conditional approval of the proposed mining plan modification. The recommendation shall be based, at a minimum, upon:

- The permit application package (PAP), including the resource recovery and protection plan;
- Information prepared in compliance with NEPA, including this EA;
- Documentation assuring compliance with the applicable requirements of Federal laws, regulations and executive orders other than NEPA;
- Comments and recommendations or concurrence of other Federal agencies and the public;
In a memorandum dated September 13, 2013, the BLM found that maximum economic recovery of the Federal coal would be achieved by mining as described in the PAP and recommended approval of the R2P2.

On October 18, 2013, MDEQ approved the PAP specifying the mining and reclamation methods to be employed in the Amendment 3 permit area (Figure 1.0-2), including the Federal coal lands identified in the proposed mining plan modification.

Upon review of the OSMRE’s recommendation and supporting documentation, including this EA, the Secretary of the Interior will issue a decision document approving, approving with conditions or denying the mining plan modification. Such approval would supplement the prior mining plan approval for Bull Mountains Mine No. 1. Other federal actions are not contemplated in association with the proposed mining plan modification.

1.2 Purpose and Need

On November 22, 2013, following approval of Amendment 3 to the State Permit Area, SPE submitted the mining plan modification to the OSMRE, for review and approval (Proposed Action). The purpose of the Proposed Action is to recommend approval, disapproval, or approval with conditions of the proposed mining plan modification to the ASLM. If approved, the Mining Plan would allow SPE to conduct coal mining and reclamation operations within the coal lease and economically recover Federal, state, and private coal reserves through a logical mining unit.

The proposed mining sequence includes a combination of Federal coal lands and state and private coal reserves. Longwall panel development mining (room and pillar) must be completed well in advance of longwall mining and would cease within approximately six months if the Federal mining plan modification is not approved. Furthermore, underground mining would cease completely within approximately 2.5 years upon completion of Longwall Panel 6 and the Life of Mine plan could not be implemented in its entirety. The state and private coal reserves to the south and east would not be accessible by the proposed longwall mining plan (described in Chapter 2 of this EA). It may appear that a portion of these state and private reserves could be reached by reorientation of the mining plan; however, the accessible coal would not be economically mineable by longwall methods.

Several connected actions are included in the Proposed Action and are discussed in Chapter 2 of this EA including facilities for waste disposal; construction of roads, boreholes and powerlines, installation of ventilation fans, and other disturbances. The Proposed Action is needed to allow the lessee to exercise their right to mine leased Federal coal resources and would extend the life of the mine by 9 years.
1.3 Issues Identification

During review of the mining plan modification and the prior environmental analyses including the most recent Coal Lease EA, the OSMRE determined that further analysis to reflect new information and changes that have occurred since the last analysis is necessary to satisfy NEPA requirements.

1.4 Crosswalk of Resource Areas

Table 1.4-1 identifies the location of resource areas presented in the Coal Lease EA (Appendix A) and lists their location in this EA, where present. Not all resource areas are considered and brought forward for analysis in this EA because the OSMRE determined that their effects had been sufficiently documented in the Coal Lease EA FONSI or that new information would not affect the decision-making process. Information presented in the Coal Lease EA adequately described the affected environment of several resources brought forward for analysis; therefore, those sections of the Coal Lease EA are incorporated into this EA in their entirety and are not reiterated.
Table 1.4-1 Resource areas analyzed.

<table>
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<tr>
<th>Resource Area</th>
<th>Coal Lease Analysis (BLM 2011)</th>
<th>Current Analysis Mining Plan Modification EA</th>
</tr>
</thead>
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<tr>
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<td>X 4.1.1</td>
</tr>
<tr>
<td>Geology, Minerals, and Paleontology</td>
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<td>X 4.1.2</td>
</tr>
<tr>
<td>Air Quality</td>
<td>3.3 4.1.3 4.2.3</td>
<td>X 3.1 4.1.3</td>
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<tr>
<td>Water Resources</td>
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<tr>
<td>Soils</td>
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<td>Wildlife</td>
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<td>X 3.5 4.1.7</td>
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<tr>
<td>Threatened or Endangered Species and Special Status Species</td>
<td>3.8 4.1.8 4.2.8</td>
<td>X 3.6 4.1.8</td>
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<tr>
<td>Ownership and Use of Land</td>
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<td>Cultural Resources</td>
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<tr>
<td>Visual Resources</td>
<td>3.11* 4.1.11 4.2.11</td>
<td>X 4.1.11</td>
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<td>Noise</td>
<td>3.12 4.1.12 4.2.12</td>
<td>X 3.8 4.1.12</td>
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<td>Transportation Facilities</td>
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<td>X 4.1.13</td>
</tr>
<tr>
<td>Hazardous and Solid Waste</td>
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<td>X 4.1.14</td>
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<tr>
<td>Socio-Economics</td>
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<td>X</td>
</tr>
</tbody>
</table>

*Descriptions of the affected environment presented in the Coal Lease EA are adequate to support the analysis in this EA and are not reiterated.
2.0 PROPOSED ACTION & ALTERNATIVES

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

The Proposed Action Alternative and No Action Alternative analyzed in this EA are consistent with the Proposed Action Alternative and No Action Alternative analyzed by the Coal Lease EA, but they have been updated to reflect the following factors:

- Mining and related activities conducted since the Coal Lease EA was prepared have changed the existing environmental condition;
- Onsite operations related to mining have changed since the Coal Lease EA was prepared and other revisions to the mine permit are currently proposed, including a new Waste Disposal Area (WDA); and,
- The mining schedule is updated to reflect the progress of mining to date and current mining rate; and,
- The State-approved mine permit now includes the entire area previously identified as the unpermitted “Life of Mine” (LOM) in the Coal Lease EA.

2.1 Existing Condition

The Coal Lease EA presented a thorough description of the existing condition to support the analysis presented therein. The following updates to the existing condition, including permitted ongoing mining operations, are the most notable since the Coal Lease EA was prepared and are presented to support the analysis in this EA.

2.1.1 Mining Plan and Mining Operations

Underground mining and reclamation activities have continued at Bull Mountains Mine No. 1 since the Coal Lease EA was prepared and the Federal coal lease MTM 97988 was granted. The current mining plan (Figure 1.0-2) identifies the area mined through January 1, 2014, and projects mining until 2025 (approximately 11.5 years). As a result of two amendments and an incidental boundary change, the permit area includes 14,896 acres, but is not substantially different than the LOM area analyzed in the Coal Lease EA. The existing Federal mining plan associated with coal lease MTM 97988 allows mining of 140 acres containing 0.9 million tons of Federal coal. MDEQ holds $11.7 million in a reclamation bond payable to both the State of Montana and the United States.

SPE currently employs 312 people and estimates that 2014 production will be approximately 10.5 million tons. In future years, SPE anticipates mining up to 12 million tons annually and the Montana Air Quality Permit (MQAP #3179-08) permits mining up to 15 million tons of coal per year. Approximately 135 million tons remain to be mined in the mining plan area after January 1, 2014, including the Federal coal identified in Proposed Action. SPE continues to mine using
the continuous (room and pillar) and longwall mining methods described in the Coal Lease EA. The coal processing facility is expected to yield approximately 80 percent clean coal for shipment, with the remaining 20 percent of coal processing waste (CPW) transferred to the existing WDA for final disposal. Based on this ratio, the maximum permitted annual run of mine coal production rate of 15 million tons would yield an approximate maximum of 12 million tons of clean coal for shipment annually. Coal sales are typically spot sales or short-term contracts rather than long-term contracts. In 2014, the majority of coal will be shipped to destinations in the United States (e.g., Ohio), Korea, Japan, and the Netherlands; approximately 5% will be used domestically and 95% will be sent overseas.

### 2.1.2 Surface Facilities Area

The majority of the surface activities related to underground mining occur within the Surface Facilities Area ([Figure 2.1-1](#)). The Surface Facilities Area encompasses 515 acres of existing disturbance and includes the mine portals, run of mine and clean coal stockpiles, coal processing facilities, coal loadout facility and railroad loop, waste disposal area, mine shop and offices, associated surface water control facilities, and associated facilities.

#### Waste Disposal Area

Waste disposal operations are conducted as described in the Coal Lease EA except that SPE revised the mine permit and received a beneficial use determination to allow for addition of fly ash to accelerate drying of the CPW. MDEQ reviewed chemical analysis of the representative fly ash and concluded that the addition of the ash to the CPW would not pose a risk to surface water, groundwater, or other environmental conditions.

#### Coal storage

In 2014, SPE submitted an application to the MDEQ Coal Program and MDEQ Air Program to expand coal stockpile 1A east of the mine office and north of Fattig Creek Road ([Figure 2.1-1](#)). The MAQP was revised to address emissions associated with this stockpile.

### 2.1.3 Other Surface Facilities

Since 2011, SPE has added several facilities not contemplated at the time the Coal Lease EA was prepared. The most notable facilities are identified in this section, all of which are subject to the requirements of the State-approved mine permit (C1993017) (SPE 2014a) which specifies environmental protection measures and reclamation requirements. A total of 43 acres were disturbed through 2013 in association with these surface facilities outside the Surface Facilities Area.

#### Intake Air Portal

This supplemental support facility consists of a highwall, large pad and a single mine intake air entry constructed at the south end of Panel 3 ([Figure 2.1-2](#)) to provide critical ventilation to underground workings. A fan was also installed at the portal to aid in providing required air flow to underground workings. Although the Intake Air Portal may be used for infrequent
Figure 2.1-1
Surface Facilities Area

Bull Mountains Mine No. 1
MISSOULA & YELLOWSTONE COUNTIES, MONTANA

LEGEND

- Existing Coal Waste Disposal Area #1
- Proposed Coal Waste Disposal Area #2
- Rail Loop
- Grid North
- NORTH
access to the underground mine or delivery of equipment and supplies, the Intake Portal is not a primary entry to the underground mine. Delivery of equipment and supplies through the Intake Air Portal is limited to certain occasions when the primary access to the underground mine is adverse. After Longwall Panel 6 is mined out in approximately 2017, it is anticipated that the Intake Air Portal and its associated facilities will no longer be needed and the portal and associated pad will be properly reclaimed.

Supplemental Service Terminals or Large Borehole Pads

Supplemental Service Terminals or Large Borehole Pads are necessary at various locations above the mine entries to provide surface support to underground operations (Figure 2.1-2). These facilities consist of one or multiple boreholes (borehole types described below) from the surface into mine entries. Construction of these terminals or pads provides adequate space or laydown area for equipment and material required in the specified borehole operation. Typical equipment may include, mine pickups, forklift, pumps, trash bins, port-a-potties, high pressure air compressors, electricity and related equipment, generators, bulk rock dust bins, pallets of bagged materials, other necessary support material(s). The surface installations may include either semi-permanent (concrete foundations) for high capacity air compressors, electrical substations, storage hoppers and batch systems, fuel storage, or other necessary equipment.

All large borehole pads in use for extended time periods have detailed designs and mapping approved as a revision to the mine permit prior to construction. The terminals or pads are reclaimed when no longer needed.

One fan is currently installed on a large borehole pad located over the East Mains, just north of Longwall Panel 4 (Figures 2.1-1 and 2.1-2). This fan operates continuously to ventilate the underground mine. Utilizing a fan and ventilation boreholes from the surface into the East Mains eliminates the need to develop additional ventilation “Intake Air” portals on the southern end of the mining plan area.

Boreholes

Borehole construction was not contemplated at the time the Coal Lease EA was prepared. Three types of boreholes are necessary at various surface locations to support the underground workings; (1) emergency breathable air boreholes, (2) utility boreholes, and (3) mitigation boreholes (Figure 2.1-2). All boreholes are installed with casing as required to control surface water and groundwater inflow. All boreholes include caps when not actively injecting or supplying materials into underground workings. When the boreholes are no longer needed, SPE abandons boreholes according to applicable regulations and procedures.

Emergency Breathable Air Boreholes have been constructed at the direction of the Mine Safety and Health Administration (MSHA) to provide breathable air to underground workings in the area previously mined. Breathable air boreholes are no longer typically required by MSHA when other rescue equipment such as rescue chambers is provided at specific underground locations.
Utility Boreholes are constructed to provide operational surface support to the underground workings. This operational support may include injection or supply of pumpable cribbing material, rock dust, communications, electricity, neet oil, concrete, compressed air, or other material or equipment vital to on-going operation. SPE will permit Utility Boreholes through the minor revision process. Typically, Utility Boreholes are approved as part of the entire construction of a Supplemental Service Terminal or a Large Borehole Pad that the borehole(s) are constructed on.

Mitigation Boreholes are constructed to maintain compliance with MSHA ventilation or roof control plans or site specific MSHA plans or in response to underground roof falls. Mitigation boreholes may be constructed for injection or supply of nitrogen or other inert gas, breathable air (if immediate injection is required), concrete (to consolidate roof as part of roof fall mitigation). Mitigation boreholes may also include MSHA directed boreholes for monitoring underground conditions with testing equipment such as air sampling equipment or thermal cameras. These boreholes typically require a developed pad.

Powerlines

Powerlines are currently installed in the mine facilities (Figure 2.1-1) and additional powerlines may be required to operate equipment at future supplemental service terminals or large borehole pads.

Roads

A combination of secondary and tertiary roads will be constructed on the surface above the underground mine area (Figure 2.1-2) to perform mine support operations and access surface facilities. Secondary Roads (typically 20 foot lane width) are used for periodic traffic to mine facilities such as the train loadout, conveyors, substations, well pads, and major borehole pads. SPE will salvage and store a minimum of 6 inches of the first lift soil, where available, during construction of secondary roads outside of the Surface Facilities Area (Figure 2.1-1). Tertiary roads (typically 15 foot wide lane width) are used infrequently in the Surface Facilities Area and for temporary activities in the greater permit area such as installing boreholes, emergency surface support facilities, or reclamation activities. Tertiary roads outside the Surface Facilities Area are temporary and SPE will salvage by windrowing or storing a minimum of 6 inches of the first lift soil where available.

Large borehole pads, boreholes, associated roads and other small surface support facilities will be required with the development of longwall panels. Traffic to the general location of these large borehole pads or other surface support facilities will normally use secondary roads. Tertiary roads will branch off from secondary roads to actual boreholes and surface support facilities. If boreholes can be safely constructed by driving on existing ground, then tertiary roads will not be constructed. Proposed road locations for normal operations have already been approximately planned throughout the entire mining plan area and detailed plans will be submitted to the MDEQ several panels in advance of longwall development for review. All surface disturbances will also be subject to access agreements with surface owner(s).
As mining of Longwall Panel 2 progressed, ventilation and roof control concerns required unanticipated surface activity at the southern end of Longwall Panel 2. Cracks were repaired; and boreholes were constructed for injection of inert gas into the longwall panel. SPE has since successfully revised its mine roof control and mine ventilation since Panel 2 and Panels 3 and 4 did not require a similar surface disturbance. SPE anticipates that surface disturbances similar to that of the southern end of Panel 2 will no longer be necessary; however, a Secondary Road from Old Divide Road to the southern portion of the permit area was permitted to support surface activities related to subsidence repair and borehole installations at the south end of Panel 2, if ever needed (Figure 2.1-2). This road may be extended eastward approximately along the southern portion of the mining plan area if necessary.

2.1.4 Subsidence and Associated Surface Repairs

Subsidence is occurring as anticipated and described in the surface mine permit and Coal Lease EA. Surface monitoring indicates that subsidence is occurring as predicted. The maximum elevation change in Longwall Panels 1 and 2 was 8 to 9 feet, with most areas subsiding less than 6 feet (SPE 2014a). The angle of draw is less than previously estimated and typically does not extend beyond the panel width (SPE 2014a), reducing the area of subsidence relative to that considered in the Coal Lease EA. The most notable surface cracking occurs at the panel ends (in association with the setup and recovery rooms) and on steep slopes. SPE conducted subsidence repair activities totaling 13 acres on the 1,620 acres of surface area above the longwall panels mined through 2013.

Subsidence features generally include minor surface cracks. In local areas, cracks with significant width or scarps may occur. Subsidence features will be reclaimed as necessary to restore the pre-mining land use. Where the disturbance and damage necessary for repair exceed the disruption due to the feature, no repair will be made unless the features are inconsistent with State regulations pertaining to subsidence control (ARM 17.24.911). Although not anticipated, features that substantially disrupt the surface or groundwater hydrologic balance will be addressed. Features such as cracks that concentrate flow and lead to excessive erosion will be corrected. Due to the damage necessary for repair, minor surface cracks (generally less than 6 inches in width) or cracks on slopes greater than 20 percent will not be repaired unless otherwise directed by MDEQ.

Where repairs are to be undertaken, the method will vary according to the specific feature and specific site condition. In general, repairs will salvage and replace topsoil where possible or steps will be taken to avoid the displacement or loss of topsoil into the crack. Cracks with sufficient width and length of up-gradient drainage path will be repaired to prevent excess loss of top soil into the crack. It is expected that heavy equipment will be required for most repairs. The method of repair and type of equipment utilized will be chosen to minimize damage to the land caused by access routes, material storage or incidental activities.

Repair of cracks will generally not begin until mining of the next adjacent panel is complete to ensure full subsidence has occurred. Exceptions may include times where repair is needed to facilitate mining, or where delay has potential to exacerbate erosion or negatively affect water resources. To the extent possible, prior to extensive surface disruption, MDEQ and SPE will
conduct a survey of the surface above the panel to be reclaimed to establish agreement on which features are to be reclaimed and the methods to be used.

The largest subsidence repairs to date occurred at the south end of Panel 2 where the subsiding panel was surrounded on three sides by unmined material. The presence of steep slopes and shallow depths to bedrock above the setup room at the south end of Panel 2 exacerbated the condition. Subsequent to the subsidence, ventilation caused oxidation of minor coal deposits in the subsided zone and prompt surface actions were required to seal the cracks and stop the oxidation. The result of the subsidence, oxidation, crack sealing, and reclamation effort resulted in a larger than anticipated disturbance area at the south end of Panel 2. SPE does not anticipate such features to occur in the future because (a) the ventilation system has been changed from an exhaust system to a forced air system, and (b) Longwall Panels 3 and 4 setup rooms were mined without requiring similar disturbances.

2.1.5 Stipulations and Mitigation Measures

Mitigation measures for the existing Bull Mountains Mine No. 1 approved as permit conditions were summarized in the Coal Lease EA (Appendix A, Table 2.1-1, Permit Stipulations and Approved Mitigation Measures, page 2-15) and further discussed in the context of resource specific impacts (Appendix A, Chapter 4). Additional coal lease stipulations pertaining to cultural resources, paleontological resources, public land survey protection, resource recovery and protection, and multiple mineral development were also presented in the Coal Lease EA (Appendix A, Chapter 4). The mitigation measures and stipulations presented in the Coal Lease EA remain in effect. Mitigation measures necessary to supplement the previously identified measures are discussed in association with anticipated impacts in Chapter 4 of this EA.

2.2 Description of Alternatives

A description of the alternatives analyzed by this EA are included in this section and summarized in Table 2.2-1. Features identified in the description of each alternative are shown on the Mining Plan Map (Figure 1.0-2), Facilities Area Map (Figure 2.1-1), and Surface Disturbance Map (Figure 2.1-2).

2.2.1 No Action Alternative

Under the No Action Alternative, the proposed mining plan modification would not be approved by the ASLM, 2,539.76 acres of Federal coal land and 37.5 million tons of Federal coal and 62.5 million tons of private and state coal would not be mined. The mining term would be shortened approximately 9 years relative to the Proposed Action (Table 2.2-1).

SPE would continue to mine approximately 2.5 years to recover the 35 million tons of coal remaining within the permit area that is economically recoverable without accessing the 2,539.76 acres of Federal coal. Longwall mining would end at the north end of Panel 6 where the presence of Federal coal would prevent development and mining of Panel 7. At the estimated ratio of raw to clean coal, SPE would produce and ship approximately 28 million tons of coal and 7 million tons of CPW would be deposited in the WDA.
### Table 2.2-1. Comparative summary of the No Action and Proposed Action alternatives relative to the existing condition.

<table>
<thead>
<tr>
<th>Condition Evaluated</th>
<th>Units</th>
<th>Existing Condition&lt;sup&gt;1&lt;/sup&gt;</th>
<th>Additional&lt;sup&gt;2&lt;/sup&gt;</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal to be mined</td>
<td>million tons</td>
<td>35</td>
<td>135</td>
<td>100</td>
</tr>
<tr>
<td>Federal coal to be mined</td>
<td>million tons</td>
<td>0.9</td>
<td>38.4</td>
<td>37.5</td>
</tr>
<tr>
<td>Federal coal lands to be mined</td>
<td>acres</td>
<td>140</td>
<td>2,679.76</td>
<td>2,539.76</td>
</tr>
<tr>
<td>Remaining mining term</td>
<td>years</td>
<td>2.5</td>
<td>11.5</td>
<td>9</td>
</tr>
<tr>
<td>Surface Facilities Area</td>
<td>acres</td>
<td>515</td>
<td>67</td>
<td>356</td>
</tr>
<tr>
<td>Intake Air Portal</td>
<td>acres</td>
<td>8</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Subsidence Repairs</td>
<td>acres</td>
<td>13</td>
<td>7</td>
<td>26</td>
</tr>
<tr>
<td>Borehole Pads</td>
<td>number</td>
<td>14</td>
<td>8</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>acres</td>
<td>17</td>
<td>5</td>
<td>21</td>
</tr>
<tr>
<td>Roads (Outside Surface Facilities Area)</td>
<td>miles</td>
<td>5.1</td>
<td>11.2</td>
<td>24.4</td>
</tr>
<tr>
<td></td>
<td>acres</td>
<td>18</td>
<td>30</td>
<td>72</td>
</tr>
<tr>
<td>Total Disturbance</td>
<td>acres</td>
<td>571</td>
<td>109</td>
<td>475</td>
</tr>
</tbody>
</table>

<sup>1</sup> – Existing condition as of January 1, 2014. Estimates related to future mining tons and acres do not include a comparison of tons or acres mined to date.

<sup>2</sup> – Estimated additional (future) quantities after January 1, 2014.

Mining and associated operations would disturb an estimated 109 additional acres in association with surface facilities and subsidence repairs (Table 2.2-1), most of which (approximately 67 acres) would be in the vicinity of the existing WDA. Preliminary locations of boreholes and associated pads (Figure 2.1-2) are identified in the mine permit, but the actual locations would depend on site conditions, surface access agreements, and are subject to change. All future boreholes and associated pads and roads would be permitted as a revision to the State mine permit. New powerlines would originate along existing transmission routes and connect to the borehole facilities. SPE anticipates that very few boreholes would require power; therefore few new lines would be constructed. However, a new powerline is anticipated along the north end of the mine panels to power a ventilation fan installed on one or more large borehole pads over the East Mains.

### 2.2.2 Proposed Action Alternative

The Proposed Action Alternative would authorize SPE to conduct coal mining on approximately 2,679.76 acres of Federal coal lands, including the 140 acres previously approved. In connection with Federal coal mining, SPE would continue to mine the adjacent private and state coal. Mining would continue 9 more years and 100 million more tons of coal would be recovered relative to the No Action Alternative. At the anticipated ratio of raw to clean coal, SPE would produce and ship 80 million more tons of clean coal than would be shipped under the No Action Alternative. In addition to the mining of adjacent private and state coal, other actions that would be conducted in association with the Proposed Action (i.e., connected actions) are described below.
Chapter 2 – Proposed Action & Alternatives

**Waste Disposal**

Approximately 20 million tons of CPW would be generated as a result of the Proposed Action Alternative, relative to the No Action Alternative. The additional volume of CPW would require construction of proposed WDA #2 encompassing approximately 289 acres south and east of Fattig Creek Road in the Surface Facilities Area (Figure 2.1-1). A proposed major revision to the mine permit including the design and operation plan for WDA #2 was submitted to MDEQ on August 15, 2014. The proposed WDA #2 is considered connected to the Proposed Action in this EA.

As proposed, WDA #2 would be constructed, operated, and reclaimed in a manner comparable to the existing WDA. Surface water control facilities would be constructed and soil and other suitable cover materials would be stockpiled prior to placing CPW. CPW would be transferred from the coal processing facilities via conveyor over Fattig Creek Road where it would be handled in the same manner as the existing WDA. Equipment would access WDA #2 from the existing WDA via an at-grade crossing of Fattig Creek Road. CPW would eventually fill the basin in which WDA #2 is constructed. At the conclusion of mining, the WDA would be covered with the stockpiled soil and cover material and the associated disturbances would be reclaimed to a combination of grazing land, wildlife habitat, and pastureland consistent with the pre-mine land uses.

**Other Facilities and Disturbances**

Relative to the No Action Alternative, an estimated 21 additional borehole pads and 13.2 miles of roads may be constructed (Figure 2.1-2), resulting in an estimated 58 acres of disturbance. The borehole and road locations (Figure 2.1-2) are preliminary and SPE anticipates that some of the features may not be required, potentially resulting in as little as 20 acres of disturbance in association with these features.

Preliminary locations of boreholes and associated pads (Figure 2.1-2) are identified in the mine permit, but the actual locations would depend on site conditions, surface access agreements, and are subject to change. All future boreholes and associated pads and roads would be permitted as a revision to the State mine permit.

As mining progresses to the east, SPE anticipates that the ventilation fan (or a new fan) would be moved and installed at two additional large pad locations above the East Mains. While the locations are not known at this time, additional transmission lines would likely be required to some of the borehole pads to power ventilation fans on borehole pads. New powerlines would originate along existing transmission routes and connect to the borehole facilities. SPE anticipates that very few boreholes would require power; therefore few new lines would be constructed. However, a new powerline is anticipated along the north end of the mine panels to power a ventilation fan installed on one or two additional large borehole pads over the East Mains.

Relative to the No Action Alternative, approximately 19 additional acres are expected to be disturbed in association with subsidence repairs, most of which would occur near the panel ends.
2.2.3 Alternatives Considered but Eliminated

OSMRE contemplated alternative scenarios to the approval or denial of the mining plan modification. However, OSMRE's decision is limited to approving, approving with conditions or denying the mining plan modification. OSMRE concluded that there are no reasonable alternatives other than the Proposed Action and No Action Alternatives that would meet the agency’s purpose and need.
Chapter 3 – Affected Environment

3.0 AFFECTED ENVIRONMENT

This chapter discusses the existing conditions of the physical, biological, cultural, and human resources that could be affected by implementation of the alternatives described in Chapter 2 as they relate to the approval of the Federal mining plan modification for the Bull Mountains Mine No. 1. Aspects of the affected environment described in this chapter relate to the issues presented in Chapter 2. For the purpose of this analysis, the Project Area is considered the Bull Mountains Mine No. 1 Permit Area (containing the five Federal coal lease tracts) and a surrounding one mile buffer. Elements of the environment specified by statute, regulation, Executive Order, or the Standards for Public Land Health are described and analyzed in this section except where the Coal Lease EA previously concluded they were not present.

Where baseline information presented in the Coal Lease EA has not substantively changed it is incorporated by reference; a crosswalk between the Coal Lease EA and this EA is presented in Table 1.4-1. More recent information pertaining to the baseline and existing condition is presented in this chapter, where available. Unless otherwise noted, the baseline condition described in the Coal Lease EA (Appendix A) has not substantively changed, no new data are available, or the condition has only been minimally affected as a result of current mining operations and further presentation of information would not affect the decision-making process.

3.1 Air Quality

3.1.1 Air Quality-Particulate Matter

The current Montana Air Quality Permit (MAQP) for Bull Mountains Mine No. 1 (MAQP # 3179-08, issued February 11, 2014) (SPE 2014b) includes the current mine permit and states that coal production from the facility shall be limited to 15 million tons during any rolling 12-month time period for the primary phase of the coal mining operation (ARM 17.8.749).

According to SPE’s most recent MQAP application (SPE 2014b), the mine is categorized as a minor source of air pollution under the Title V permitting program, whereas the facility does not have the potential to emit more than 100 tons per year (tpy) of any pollutant, excluding fugitive emissions. Regulated air pollutants emitted from associated coal extraction and processing activities include particulate matter (PM) from fugitive dust, and gaseous and fine particulates from non-road and underground engine exhaust.

The primary sources of fugitive PM are material handling and storage, vehicle traffic on unpaved roads, and wind-blown dust from exposed areas. PM species include total particulate (PM_{10}), particulate matter with aerodynamic diameter less than 10 microns (PM_{10}), and fine particulate matter with aerodynamic diameter less than 2.5 microns (PM_{2.5}). Criteria gaseous pollutants generated from fuel combustion in engines and boiler heaters include carbon monoxide (CO), nitrogen oxides (NOx), hydrocarbons (THC) that include volatile organic compounds (VOC) and hazardous air pollutants (HAP), sulfur dioxide (SO_{2}), carbon dioxide (CO_{2}) and fine PM. Subsequent ozone generation occurs from diurnal photochemical reaction of NOx and VOC compounds present in ambient air.
A majority of the gaseous emissions are generated from non-road engine tailpipe exhaust from mobile heavy equipment (haul trucks, dozers, etc.), which are excluded from air quality permitting under Montana’s regulations. The combined potential emissions of gaseous criteria pollutants from regulated stationary and portable combustion sources are at minor source levels. Combined actual emissions of regulated and excluded gaseous emissions (mobile equipment) would otherwise be considered at minor source levels as well. As a minor source of gaseous emissions, no significant impacts to air quality are expected from these emitted pollutants.

The Air Quality Analysis prepared by MDEQ (Kuenzli Undated) notes that the greatest impact to air quality results from the dispersal of particulates generated by friction and turbulence from mobile heavy equipment operation, employed in the transfer of coal and waste material (aboveground and underground), and subsequent wind transport. Pursuant to air permit conditions, SPE has been required to operate three PM$_{10}$ ambient air quality monitors ($S_1$, $S_{1A}$ and $S_2$) since completion of the development phase of mining operations and progression into the primary production phase (>1.3 million tpy). A single upwind monitor is set on the north-northwest boundary and co-located downwind monitors are located on the southern periphery of the mine. Additional findings from the Air Quality Analysis prepared by MDEQ are excerpted below.

Monitoring during the period of 2010-2013 demonstrated that ambient concentrations of PM$_{10}$ were within established short-term (24-hour) and long term (annual) National Ambient Air Quality Standards (NAAQS) and Montana Ambient Air Quality Standards (MAAQS) presented in Table 3.1-1. During this period a single exceedance of the ambient standards was reported. This incident provides the highest 24-hour average PM$_{10}$ concentration recorded from any individual station during the active monitoring period. This exceedance occurred on June 26, 2012, with a recorded concentration of 159 micrograms per cubic meter ($\mu$g/m$^3$). Both the previous and current short-term NAAQS/MAAQS allow for a single exceedance per year. The next highest 24-hour average concentration reported from any individual station during the 2010-2013 monitoring period was 88 $\mu$g/m$^3$, recorded on May 10, 2013.

It should be noted that onsite meteorological data and flagged exceptional monitoring events indicate a high probability that both monitored high 24-hour values referenced above were highly impacted by off-site contributions of PM$_{10}$. The second-highest values reported from the referenced monitors and years are respectively, 70$\mu$g/m$^3$ (2012) and 29$\mu$g/m$^3$ (2013). In turn, the highest single year annual mean PM$_{10}$ concentration recorded from any individual monitoring during the 2010-2013 period was 12.5 $\mu$g/m$^3$. The highest 3-year annual average from any one monitor was 10.7 $\mu$g/m$^3$. In accordance with the MAQP, ambient air monitoring for the SPE will remain in effect for the measurement of PM$_{10}$ indefinitely.

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1 Montana's air permitting program is a component of the State Implementation Plan approved by U.S. Environmental Protection Agency under the 1990 Clean Air Act.
Table 3.1-1. Established National and Montana air quality standards for PM10 and PM2.5.

<table>
<thead>
<tr>
<th>Standards</th>
<th>PM&lt;sub&gt;10&lt;/sub&gt;</th>
<th>PM&lt;sub&gt;2.5&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>24-Hour</td>
<td>Annual</td>
</tr>
<tr>
<td>MAAQS</td>
<td>150 μg/m³</td>
<td>50 μg/m³</td>
</tr>
<tr>
<td>NAAQS</td>
<td>150 μg/m³</td>
<td>Revoked</td>
</tr>
</tbody>
</table>

In addition to the ongoing monitoring performed by SPE, pre-production baseline concentration monitoring was performed from 1989 to 1991 for the Bull Mountains Mine No. 1 operated by Mountain, Inc., which was permitted to operate from 1992 to 1997. Comparison of current and historic monitoring data indicates PM<sub>10</sub> concentrations are not noticeably higher than the baseline pre-monitoring concentrations recorded from 1989 through 1991. The highest reported 24-hour average PM<sub>10</sub> value was 53 μg/m³, with a high annual average concentration of 9 μg/m³. Although historic values may not be specifically representative of present day off-site PM<sub>10</sub> contributions, this comparison does demonstrate that significant air quality degradation has not occurred as a result of mining and further validates the presence of notable off-site PM<sub>10</sub> contributions. During the pre-monitoring period particulate matter formation was likely the result of re-entrained road dust from unpaved roadways and wind transport of dust. Present primary and secondary public road configurations are not substantially different than road networks which existed during the pre-monitoring period.

In consideration of PM<sub>2.5</sub>, the MDEQ evaluated current PM<sub>10</sub> monitoring data and derived PM<sub>2.5</sub> ambient concentrations from the application of PM<sub>2.5</sub> to PM<sub>10</sub> ratios. Several EPA referenced emission factors are available from test programs aimed to establish this correlation. Generally accepted estimates from such initiatives consistently present emission fractions of PM<sub>2.5</sub> at a range of 0.1 to 0.15 for unpaved roadways and 0.15 to 0.2 for wind erosion from industrial and construction sites. No specific data is available for western coal mines, particularly underground mines; however, emission factors were developed from sources with similar characteristics, including large open cut aggregate mines and large-scale construction projects with considerations toward unpaved fugitive emissions from heavy haul trucks.

Application of the highest PM<sub>2.5</sub> to PM<sub>10</sub> ratio referenced (0.2 PM<sub>2.5</sub> → PM<sub>10</sub>), in conjunction with the highest observed 24-hour and annual average PM<sub>10</sub> concentrations from the previously mentioned monitoring data, including the high exceptional events, indicates projected PM<sub>2.5</sub> ambient design concentrations are below the prescribed NAAQS (no PM<sub>2.5</sub> MAAQS exist). The PM<sub>2.5</sub> NAAQS design values account for the 98th percentile 24-hour concentration, averaged over 3 years, where the annual value accounts for the derived arithmetic mean averaged over 3 years (40 CFR 50, Appendix N). Extrapolation of PM<sub>2.5</sub> values employing both the design value referenced method, as well as the worst case high-first-high (H1H) 24-hour average and highest annual mean provide estimated values below the respective NAAQS. Consequently resultant PM<sub>2.5</sub> emissions are not expected to exceed ambient air standards or significantly impact air quality.

Tables 3.1-2 and 3.1-3 are excerpted from the Air Quality Analysis (Kuenzli Undated) and summarize the evaluation of available ambient PM<sub>10</sub> monitoring results reviewed, as well as,
predicted PM$_{2.5}$ concentrations, updating the PM$_{10}$ monitoring information provided in Table 3.3-3 Baseline Particulate Data for the Surface Facilities Area found in the Coal Lease EA.

<table>
<thead>
<tr>
<th>Sampler ID</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM$_{10}$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24-hr Value</td>
<td>33</td>
<td>37</td>
<td>27</td>
<td>48</td>
</tr>
<tr>
<td>24-hr DV</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>HTH 24-hr Value</td>
<td>33</td>
<td>37</td>
<td>27</td>
<td>48</td>
</tr>
<tr>
<td>HTH 24-hr Average</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>PM$_{2.5}$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24-hr Value</td>
<td>6.6</td>
<td>7.4</td>
<td>5.4</td>
<td>9.6</td>
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<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>HTH 24-hr Value</td>
<td>6.6</td>
<td>7.4</td>
<td>5.4</td>
<td>9.6</td>
</tr>
<tr>
<td>HTH 24-hr Average</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

1 - PM$_{2.5}$ Equivalent basis PM$_{2.5}$ to PM$_{10}$ ratio = 0.2
2 - 24-hour 98% Value based on PM$_{2.5}$ Creditable Samples - Table 1; 40 CFR Part 50 Appendix N
3 - 24-hour PM$_{2.5}$ NAAQS Design Value (DV), Procedures and Equations, Section 4.5; 40 CFR Part 50 App. N (Equation 4)
4 - 3-year averaging period

Table 3.1-3. Annual PM$_{2.5}$ evaluation from Air Quality Analysis (Kuenzli Undated).

<table>
<thead>
<tr>
<th>Sampler ID</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM$_{10}$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual Average</td>
<td>10.2</td>
<td>9.2</td>
<td>9.4</td>
<td>10.5</td>
</tr>
<tr>
<td>Annual Mean</td>
<td>10.6</td>
<td>9.4</td>
<td>10</td>
<td>10.4</td>
</tr>
<tr>
<td>Annual DV</td>
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<td>--</td>
</tr>
<tr>
<td>PM$_{2.5}$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual Average</td>
<td>2.0</td>
<td>1.8</td>
<td>1.9</td>
<td>2.1</td>
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<td>2.1</td>
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<tr>
<td>Annual DV</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

1 - PM$_{2.5}$ Equivalent basis PM$_{2.5}$ to PM$_{10}$ ratio = 0.2
2 - Annual average PM$_{2.5}$ value - 4.4; 40 CFR Part 50 Appendix N (Equation 1 & 2)
3 - 3-year averaging period
4 - Annual mean PM$_{2.5}$ NAAQS Design Value (DV) - Section 4.4; 40 CFR Part 50 Appendix N (Equation 3)

Although ambient air monitoring demonstrates MAQQS/NAAQS compliance at actual mine activity rates and resultant emissions, the potential exists for increased air quality degradation from higher productions rates. The current MAQP limits annual coal production from the Bull Mountain Mine No. 1 to a maximum of 15 million tons per year (tpy). While ambient air monitoring does not demonstrate compliance at the maximum permitted capacity of the mine, sufficient evidence suggests that operation at a maximum production level will not result in a significant increase in ambient particulate concentrations.
3.1.2 Greenhouse Gases/Climate Change

Though the terms “global warming” and “climate change” are often used interchangeably, they are two distinct concepts as described in the sections below. The text presented below comes primarily from the Coal Lease EA; the CO₂ emissions have been updated for this EA in order to transmit the most current data available. The EPA recently released the Overview of Greenhouse Gases and Sources of Emissions (EPA 2014a). Key findings from the 1990-2012 U.S. inventory include:

- In 2012, U.S. greenhouse gas emissions totaled 6,526 million metric tons of carbon dioxide equivalents.
- U.S. emissions decreased by 3.4 percent from 2011 to 2012. Recent trends can be attributed to multiple factors including reduced emissions from electricity generation, improvements in fuel efficiency in vehicles with reductions in miles traveled, and year-to-year changes in the prevailing weather.
- Greenhouse gas emissions in 2012 were 10 percent below 2005 levels.

Background

Global Warming

The term “global warming” refers to the observed increase in the average global temperature of the atmosphere near the Earth's surface and in the troposphere (US CCSP 2009 in Coal Lease EA). Through complex interactions on a global scale, the emissions of greenhouse gasses (GHGs), along with other climate-influencing environmental factors, cause a net warming of the atmosphere. GHGs include carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), water vapor, ozone and several other gasses. These are called “greenhouse gasses” because, when released into the atmosphere, they impede the escape of reflected solar radiation and heat from the Earth's surface back into space. In this way, the accumulation of GHGs in the atmosphere exerts a “greenhouse effect” on the earth’s temperature. GHG emissions can be anthropogenic (human-made) or naturally occurring (e.g., volcanic activity). Other than GHG emissions, factors that contribute to global warming include aerosols, changes in land use, and variations in cloud cover and solar radiation which affect the absorption, scattering, and emissions of radiation within the atmosphere and at the Earth's surface. Though the average global temperature has increased almost 2°F over the past century, temperatures have not changed evenly from region to region. Because temperature is a part of climate, the phenomenon of global warming is both an element of and a driving force behind climate change (IPCC 2007 in Coal Lease EA).

Climate Change

Climate is defined as the average course or condition of the weather at a place usually over a period of years as exhibited by temperature, wind velocity, and precipitation (Merriam-Webster 2014). The term “climate change” refers to a substantial and persistent change in the mean state of global or regional climate or its variability, usually occurring over decades or longer (US CCSP 2009 in Coal Lease EA). Climate change occurs in response to changes in various aspects of Earth's environment, including, but not limited to, global warming, regular
changes in earth’s orbit around the sun, and plate tectonics (IPCC 2007 in Coal Lease EA). These climatic changes, while impacts in and of themselves, can affect other aspects of the environment including desert distribution, sea level, species distribution, species survivability, ocean salinity, availability of fresh water, and disease vectors. These effects can vary from region to region over time; some agricultural regions may become more arid while others become wetter; some mountainous areas may experience greater summer precipitation, yet have their snowpack disappear in the future (IPCC 2004 in Coal Lease EA). Thus, the causes and effects of climate change can be depicted as a four step chain of events: GHG emissions/climate drivers → global warming → climate change → environmental effects. First, GHGs are emitted and other events occur which contribute to climate change in the form of global warming. Second, climate change contributes to environmental effects around the globe.

**Greenhouse Gas Emissions**

An inventory of GHG emission sources tied to mining of the Federal coal lease includes both gasoline- and diesel-powered machinery and vehicles, mobile sources, as well as underground and stationary sources including machinery and equipment used in mining and preparing the coal for shipment. There are no other noted sources of combustion at the mine facility. Annual CO₂ emissions from mobile sources are projected to be 12,496 tons. Annual combustion emissions were recently estimated at 7,257 tons from underground sources and 1,052 tons from stationary sources (Table 4 in SPE 2014b) as converted to metric tons in Table 3.1-4 below.

**Table 3.1-4.** Estimated direct carbon dioxide emissions in 2013 at Bull Mountains Mine No. 1.  

<table>
<thead>
<tr>
<th>Emission source</th>
<th>CO₂ emissions (tons)</th>
<th>CO₂ emissions (metric tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile sources</td>
<td>12,496</td>
<td>11,336</td>
</tr>
<tr>
<td>Underground sources*</td>
<td>7,257</td>
<td>6,583</td>
</tr>
<tr>
<td>Stationary sources*</td>
<td>1,052</td>
<td>954</td>
</tr>
<tr>
<td>Combustion Totals</td>
<td>20,805</td>
<td>18,873</td>
</tr>
</tbody>
</table>

*SPE 2014b, Table 4

Based on SPE 2014b, the combined direct emissions of GHGs from vehicles, equipment, mine ventilation, and coal preparation expressed as CO₂-equivalent was calculated to be 20,805 tons (18,873 metric tons), an order of magnitude greater than reported in the Coal Lease EA. The large increase in emissions is explained by an increase in the amount of coal mined (255,000 tons in 2008 compared to 12,208,000 tons mined in 2013).

In addition to the direct emissions generated at the Bull Mountains Mine No. 1, nearly all coal mining and handling operations at the mine are powered by electricity, and GHG emissions associated with electric generation are calculated for those operations. IML estimates that the CO₂-equivalent of electric generation is 64,489 tons (58,503 metric tons) in 2013 (Table 4 in SPE. 2014b).

In 2014, SPE (Weber, D. 2014a) expects that coal will be sold and transported to purchasers in South Korea (3.1 million tons) and Japan (2.5 million tons) via the Robert Banks Terminal in British Columbia, Canada; the Netherlands (2.5 million tons) via Duluth, Minnesota and Quebec
City, Canada; Ohio (0.4 million tons). This is an estimate because SPE does not own or control the coal commodity once it leaves the mine site. Future coal sales and destinations may or may not reflect 2014 values or destinations and are subject to change due to market conditions.

GHG emissions are generated when rail or vessel engines combust fuel during travel. GHG emissions associated with transport were estimated by using an EPA guidance document (EPA 2014b). The assessment assumed 8.5 million tons of clean (washed) coal shipped approximately 3,516 rail miles and 14,046 vessel miles annually. Using the EPA calculation and emission factors, and based on ton miles traveled, approximately 549,112 metric tons of CO₂-equivalent is calculated (Smith, R. 2014a).

The amount of CO₂ emitted during the combustion of fossil fuels varies according to the carbon content and heating value of the fuel used (EIA 2009 in Coal Lease EA). IML estimates that 15,826,804 metric tons of CO₂ will result from the combustion of 8.5 million tons of shipped coal at coal-fired electric generating stations based on the factors presented in Table 3.1-5 and using the following equation:

\[
\text{CO}_2 = \text{Coal tons/yr} \times \% \text{ carbon} \times \frac{44}{12} \times 0.9072/1 \text{ ton}
\]

**Table 3.1-5.** Summary of estimated annual CO₂-equivalent emissions associated with combustion of coal shipped from Bull Mountains Mine No. 1 in 2014.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>As shipped heating value (Btu/lb)</td>
<td>10,000 Btu</td>
</tr>
<tr>
<td>As shipped carbon content</td>
<td>56%</td>
</tr>
<tr>
<td>Total shipped (short tons/yr)</td>
<td>8.5 million</td>
</tr>
<tr>
<td>Total carbon shipped (short tons/yr)</td>
<td>4.8 million</td>
</tr>
<tr>
<td>CO₂ from coal combustion (short tons/yr)</td>
<td>17.4 million</td>
</tr>
<tr>
<td>CO₂ from coal combustion (metric tons/yr)</td>
<td>15.8 million</td>
</tr>
</tbody>
</table>

Source: Smith, R. 2014b

Estimated CO₂-equivalent emissions in 2014 are summarized in Table 3.1-6.

**Table 3.1-6.** Estimated annual CO₂-equivalent emissions associated with an annual mining rate of 12 million tons of raw coal (8.5 million tons clean coal), from Bull Mountains Mine No. 1 in 2014.

<table>
<thead>
<tr>
<th>Source</th>
<th>CO₂-Equivalent Emissions (million metric tons)</th>
<th>Percent of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct CO₂ emissions</td>
<td>0.02</td>
<td>0.12</td>
</tr>
<tr>
<td>Electrical Use</td>
<td>0.06</td>
<td>0.21</td>
</tr>
<tr>
<td>Transport</td>
<td>0.5</td>
<td>3.05</td>
</tr>
<tr>
<td>Combustion of Shipped Coal</td>
<td>15.8</td>
<td>96.34</td>
</tr>
<tr>
<td>Total</td>
<td>16.4</td>
<td></td>
</tr>
</tbody>
</table>

Black carbon is also emitted by sources at the mine. Black carbon, a component of soot, is a byproduct of incomplete combustion and stays in the atmosphere for days or weeks (as compared to CO₂ which can have a life time of 100 years). Black carbon reduces albedo and absorbs heats which can contribute to radiative heating. Soot can also heat the air around it.
Black carbon can also contribute to visibility impairment over the short term. Because black carbon has a short life time it can have warming effects regionally (IPCC 2007 in Coal Lease EA). There is a strong possibility that black carbon is the second leading cause of global warming after CO₂ and that reducing black carbon is the fastest way to reducing global warming (IPCC 2007 in Coal Lease EA). The US emits about 6.1 percent of the globally-emitted fossil fuel and biofuel from black carbon. The main source in the US is, by contribution, non-road vehicles, on-road vehicles, stack emission and fugitive sources.

Black carbon from burning diesel fuel can be controlled. Diesel particulate filters (DPFs) are a proven, off-the-shelf technology that can reduce black carbon emissions by 90 percent or more (Clean Air Task Force 2009 in Coal Lease EA). However, the addition of a trap can decrease mileage and slightly increase CO₂ emissions (IPCC 2007 in Coal Lease EA). Black carbon can be estimated from diesel fuel consumption. Based on an emission rate of 1.2 grams of black carbon per gallon of diesel fuel (Clean Air Task Force 2009 in Coal Lease EA) and 1,115,000 gallons consumed at the mine in 2013, black carbon emission is calculated at 1,338,000 grams or 1.47 tons.

There is no detectable methane liberated from the coal seam of the Bull Mountains. In contrast to many of the thicker coal seams of the Fort Union Formation in the Powder River Basin to the east and south, the Mammoth coal seam of the Bull Mountains has a relatively low content of coalbed methane. The underground workings in the Mammoth coal seam are monitored for methane to ensure mine safety. While trace readings of methane have been occasionally detected over the past two decades, the methane content has historically been zero (Ochsner, R. 2014).

There is no development of coalbed methane as a marketable commodity in this area and the Bull Mountains Mine has not had to develop extensive methane drainage strategies for mine safety. The mine employs basic mine ventilation systems through the longwall operations and development entries. The principal function of the ventilation fans is to provide fresh air for safe mining operations, not to vent methane. These operations do not require the gob vents and methane drainage vents that are typically found at many underground coal mines in other regions. Based on this information, methane from the mine does not substantially contribute to GHG emissions.

### 3.2 Water Resources

Hydrologic monitoring, including precipitation monitoring, has continued at Bull Mountains Mine No. 1 since the Coal Lease EA was prepared in 2010. Precipitation in 2011 (particularly in May and June) was considerably above normal, increasing spring and stream flow rates, increasing water levels in wells, and causing several ponds to discharge. Subsequent years’ precipitation patterns has been closer to long-term averages and the effects of the 2011 precipitation have diminished, allowing hydrologic conditions to more closely reflect the historical monitoring record.

While hydrologic conditions continue to vary in response to variable precipitation patterns, the baseline hydrologic condition in areas unaffected by mining is consistent with that previously
presented in the Coal Lease EA. Based on recent monitoring records through October 2013 (Catena Consulting, LLC and Nicklin Earth and Water, Inc. 2013), the end of the most recent annual hydrologic reporting period, springs, streams and ponds have not been substantially affected by mining to-date. In contrast, mining effects are observed in the SPE groundwater monitoring of wells in the Permit Area (Figure 3.2-1).

3.2.1 Groundwater

For discussion purposes, the monitored groundwater system is divided into four hydrogeologic units, including alluvium, overburden, mammoth coal, and underburden, as summarized in this section. A thorough discussion of the stratigraphy of the Bull Mountains Mine No. 1 geology, including aquifers and overburden intervals, and baseline hydrologic conditions is presented in the Coal Lease EA. Monitoring wells near the permit boundary are shown in Figure 3.2-1.

Alluvium

- A majority of the alluvial monitoring wells are typically dry and this is especially so prior to 2011. In summary, there is no evidence that dewatering associated with mining of the Mammoth coal has affected water levels in the alluvial deposits in the Bull Mountain Mine No. 1 vicinity for data extending from inception of mining in 2003 into 2014.
- Groundwater levels in several wells were observed to increase beginning in approximately 2010 with the most significant increase occurring in association with the May 2011 significant precipitation/runoff events. For instance, a few alluvial monitoring wells have shown increases higher than 23 feet. Since 2011, water levels in most alluvial wells have attenuated toward pre-2011 levels, though several wells still exhibit elevated water levels compared to pre-2011. Other factors likely contributing to temporally increased water levels in the Rehder Creek alluvium include ponding in a gravel pit, use of spreader dikes, ponding at road embankments, etc.
- Alluvial wells have not exhibited any evidence of water quality responses, or trends, which can be associated with mining. All alluvial wells containing groundwater showed increases in total dissolved solids (TDS), chloride, sulfate, and other inorganic parameters in 2011. This response was observed both within, and outside of, the mine permit boundary. This response is likely due to the abnormally high precipitation that occurred in 2011. In effect, significant recharge through previously unsaturated media likely led to dissolution of inorganic constituents and resulted in the observed concentration increases. During 2012 and 2013, the concentrations of inorganics in most alluvial wells either decreased or remained stable when compared to 2011.

Overburden

- Overburden wells screened in shallow intervals (1 through 4) have not exhibited responses to mining activity to date.
- Five overburden monitoring wells screened in overburden interval 5 have shown a drawdown response to mining. These wells are located above, or very near, portions of the mine that have been long-wall mined.
Bull Mountains Mine No. 1
MUSSELSHELL COUNTY, MONTANA

Figure 3.2-1: Federal Mineplan EA
Monitoring Wells
• Overburden interval 5 is significant as it contains a massive sandstone layer located above the Rock Mesa coal bed. It is likely that the fractured zone from long-wall mining subsidence extended up into this sandstone. The net result is that vertical permeability increased in this sandstone, which in turn, led to increased leakage downward into the underlying fractured zone and fragmented zone. Thus, a localized cone-of-depression has been documented in overburden interval 5.

• At the time this analysis was prepared, there is no evidence of mine-related water quality transitions in overburden wells at or near the mine. There have been changes in water quality in overburden wells, but those changes, as in the case of alluvial wells, are associated with the anomalous precipitation event of 2011. In effect, this increased precipitation led to above average recharge, which in turn led to increased dissolution of minerals in the unsaturated zone that were transported into the saturated zone. The net effect is that saturated portions of some nearer surface overburden wells exhibited increased concentrations of various inorganics, including increases in total dissolved solids. Such changes have been observed both within and far outside any active mining, and, in effect, confirm those changes are not mining related.

_Mammoth coal_

• Water levels in the vicinity of mining have declined in response to mine dewatering in the Mammoth coal. The maximum interpreted/extrapolated drawdown is projected as about 40 feet in the north central portion of the mine (Figure 3.2-2).

• The maximum observed drawdown outside the LOM boundary is at observation well BMP003 (Figure 3.2-2). BMP3 is about 500 feet north of the LOM boundary or about 0.4 mile from the nearest active mining (East Main road). The magnitude of drawdown at BMP003 presently exceeds 20 feet. It is likely that the magnitude of this drawdown has been influenced (reduced) by recharge associated with the above average precipitation/runoff/ recharge that occurred in 2011.

• Water quality data show that the most dominant anion in Mammoth coal groundwater is sulfate, whereas sodium is the most dominant cation. This is consistent with the general geochemistry of the groundwater in the area as described by Slagle et al. (1986). The average specific conductivity of water produced by Mammoth coal wells is higher relative to the alluvial and overburden hydrogeologic units. About one-half of the site Mammoth coal wells produce Class II water, while the other one-half produce Class III water. There are no persistent trends upward or downward in water quality since data collection began.

• No exceedances of MDEQ-7 numeric water quality standards were observed for any of the Mammoth coal wells through the data collection period from 2003 through 2013. In summary, based upon groundwater quality data, there is no evidence of any mining related impacts to Mammoth coal groundwater in the vicinity of the Bull Mountains Mine No. 1.
Figure 3.2-2
Interpretative Drawdown, Feet
Mammoth Coal [From October 2004 to 2013]
Bull Mountains Mine No. 1

Note: Wells showing water level increases or historically dry not used for drawdown projection purposes.
Underburden

- Water levels in the vicinity of mining have declined in response to mine dewatering in upper portions of the underburden (Figure 3.2-3). The most significant drawdowns have been observed in the northern central portions of the mine area.
- Groundwater levels at BMP006, which is located outside the permit boundary and to the northeast of current mining activity, is interpreted to have shown a drawdown by early 2014 of about 8 feet.
- Groundwater levels in lower portions of the underburden (deep underburden consisting of a massive sandstone) monitored by BMP121 have not been affected by mining to date. More recently, two additional deep underburden monitoring wells, BMP128 and BMP129, were installed to provide more insights about this deep underburden sandstone. This deep underburden is hydraulically separated from mined Mammoth coal by over 300 feet of low permeability strata.
- For the upper underburden groundwater, the most dominant anion is sulfate, whereas, sodium and magnesium are the most dominant cations. As was the case for the alluvial wells, the highest sulfate concentrations exist near the western permit boundary. There have been no persistent trends in groundwater quality in the upper underburden. Based upon groundwater quality data collected to date, there is no evidence of any mining related impacts to upper underburden groundwater quality in the vicinity of the Bull Mountains Mine No. 1.
- One stock water well, a deep underburden well, was centered over (in the path of) a long-wall panel, prompting SPE to abandon the well prior to mining through and to drill a replacement well into the same aquifer.
- The mine recorded average sump discharges from August through December 2013 were 286 gallons per minute (gpm). From January through early August 2014, average recorded sump discharges were 348 gpm. Note that some portion of this discharge includes contributions of Madison well water introduced into the mine for coal processing purposes. Hence, actual flow associated with seepage from the Mammoth coal and adjacent strata is less than the total recorded sump discharges. While Madison Well water exceeds human health standards, the water is not used for human consumption and the PHC concluded that any changes to water quality attributable to the presence of Madison Well water “would be inconsequential and too small to detect analytically” (SPE 2014a).

3.2.2 Springs

Mining has progressed beneath several springs. The following are observations to date (SPE 2014a; Catena and Nicklin 2013) with regard to these springs:

- With the exception of one spring 17185 (Figure 3.2-4), which may have responded to mining/subsidence, there has been no discernable response of spring flows associated with long-wall mining/subsidence. Spring 17185 showed a brief cessation in flow as long-wall mining passed underneath but commenced flowing at normal rates within two weeks. This suggests that strata bounding/underlying this spring “resealed” after subsidence.
Figure 3.2-4
Springs - Permit Vicinity
Bull Mountains Mine No. 1

Date: 9/24/2014
• Based upon water quality data collected to date, there is no evidence in transitions in water quality in springs associated with mining activity.

3.2.3 Hydrologic Conditions Surrounding the Existing WDA

Recent monitoring (Catena Consulting, LLC and Nicklin Earth and Water, Inc. 2013) does not indicate any effects of the existing WDA on groundwater quality or quantity. There are two reasons for this. First, the permeability of the strata beneath this WDA is very low; therefore, recharge into these strata is very limited. Secondly, the mixture of waste material placed in this WDA is highly compacted during placement resulting in very low vertical permeability. The net effect is that infiltration of inorganics through this compacted mixture is extremely limited as well.

Ephemeral runoff from the WDA is detained in the down-gradient pond and discharge is approved and regulated by MDEQ under an existing Montana Pollutant Discharge Elimination System (MPDES) permit. WDA Sediment Pond 1 is the sediment control structure permitted to treat and discharge any and all runoff from the WDA. Since construction of the WDA and associated sediment pond, there have been several discharge events. All these discharges are a result of significant precipitation events or to facilitate pond sediment cleanout in preparation for significant precipitation events.

SPE’s MDPES permit has numerous general requirements as well as monthly reporting requirements to MDEQ. The nature of the sampling requirements depends upon whether the discharge is precipitation/runoff related or otherwise. Documented discharges were observed in the following years (analytical results general summary in parentheses):

• 2011 - 3 discharge events
  o May (pH effluent limit exceeded, no other parameter exceedances)
  o June (pH effluent limit exceeded, no other parameter exceedances)
  o July (total suspended solid [TSS] effluent limit exceeded, no other parameter exceedances)

• 2013 - 5 discharges
  o May (TSS effluent limit exceeded, no other parameter exceedances)
  o June (no effluent parameter exceedances)
  o August (no effluent parameter exceedances)
  o October (no effluent parameter exceedances)
  o November (no effluent parameter exceedances)

• 2014 – 1 discharge
  o August (no effluent parameter exceedances - precipitation runoff event greater than 10 year/24 hour runoff)

No discharges occurred in 2012 or in years prior to 2011.

More recently, beginning in May 2013, whole effluent toxicity (WET) testing has been conducted on WDA effluent. This test is used to assess if there is acute toxicity to freshwater invertebrate, *Ceriodaphnia* or to fathead minnows. No significant aquatic toxicity to either *Ceriodaphnia* or to fathead minnows has been observed in WDA effluent using the WET test.
Unplanned discharges have only occurred as a result of rare large precipitation events, such as the one that occurred in May 2011 and resulted in flood conditions throughout Musselshell County. During this precipitation event, the WDA pond spillway suddenly eroded while discharging. In response, the storage capacity of the pond was increased and the pond spillway was strengthened with a concrete footer and gabion baskets to ensure the spillway is not eroded during future discharges.

Another series of major (rare) precipitation events occurred during May 2013 and August 2014, which resulted in discharge. Even though some flow did exit the ponds during the aforementioned events, the relative flow contribution from the catchment is very small compared to flow down Rehder Creek as a whole. Hence, the water quality for such events is dominated by the quality in the receiving ephemeral drainage, Rehder Creek.

**3.2.4 Waters of the U.S., including Wetlands**

A determination has not been made as to whether water courses or wetlands occurring within the permit area are jurisdictional under Section 404 of the Clean Water Act (CWA). If jurisdictional waters of the U.S. are present, such features are most likely to occur along drainage channels and would include connected wetlands. Historically flowing channel segments and sites exhibiting wetland characteristics are primarily found in association with monitored springs and ponds and occur in the area that would be affected by the proposed action.

Most of the sites that would satisfy the criteria for wetlands under the CWA are expected to occur at springs and ponds and downgradient positions receiving water from these hydrologic features. Although formal wetland delineations have not been completed, ponds and springs are included in the approved hydrology monitoring program (SPE 2014c). Additionally, hydrophytic vegetation monitoring conducted by SPE evaluates the vegetative conditions at many sites that are wetlands (see Section 3.4).

**3.3 Soil**

A soil survey was completed for the proposed location of WDA #2 and associated facilities since the Coal Lease EA was prepared. The survey mapped soil types in the proposed disturbance area and identified the salvage depths for topsoil, subsoil, and other deeper suitable materials (SPE 2014d). No other new soil data was collected since the Coal Lease EA was prepared.

Map units in the WDA #2 survey area are dominated by the Cabba, Macar, Doney, Shambo, and Straw soil series. Salvage depths in the survey area transition from rock outcrops (no salvage) and shallow soils (<20 inches) on ridges, hilltops, and convex slopes to moderately-deep (20-40 inches) and deep (40-60+ inches) soils on lower hillslopes, swales, concave slopes, and valley bottoms. A description of map units follows.

**Cabba Loam**

The Cabba Loam map units are primarily comprised of shallow, loamy, typic ustorthents located on ridges and hillslopes. Doney (moderately-deep inceptisols) and Barvon (moderately-deep mollisols) occur in this unit in swales and transitions to lower slopes.
Chapter 3 – Affected Environment

**Macar Loam**
The Macar Loam map units are primarily comprised of deep, fine-loamy, typic haplustepts located on toe-slopes, swales, and valley bottoms. The shallower Doney soil is present where the map units transition to higher elevations and ridges and the mollic Shambo soil is present where the map units transition to more gentle slopes and depositional.

**Macar-Doney Loam Complex**
The Macar-Doney complex units are primarily comprised of deep and moderately-deep, fine-loamy, typic haplustepts located in upland positions. Units are located in upland positions transitional between toe-slopes/valleys and steep hillslopes.

**Macar-Doney-Cabba Loam Complex**
The Macar-Doney-Cabba complex is the most extensive map unit in the survey area. This map unit is located on upland slopes and ridges of varying aspects. The map unit typically includes ridge tops and the transition to mid-slope positions and is comprised primarily of convex slopes. The lower slopes and occasional swales may include the Macar soil, to a limited extent. Small areas of rock outcrop also occur on the steepest slopes and ridge crests.

**Shambo Loam**
The Shambo Loam map unit comprised of deep to very deep, fine-loamy, typic haplustolls is located in valley bottoms and swales where alluvial deposits have accumulated to notable depths. The shallower Barvon (moderately deep mollisols) and Macar (deep inceptisols) also occur in this unit to a limited extent.

**Shambo-Straw Loam Complex**
The Shambo-Straw complex occurs in the upgradient portions of the main drainage bottoms. These narrow map units are comprised of alluvial deposits with thick and dark topsoil (Lift 1) underlain by thick subsoil (Lift 2). This map unit is the most productive of the survey area, but is not suitable for farming due to the narrow width and adjacent steep, confining slopes.

**Rock Outcrop**
As the name suggests, the Rock Outcrop map unit is dominated by exposed bedrock (typically sandstone, but also thin-breaks areas). The presence of the large rocks precludes salvage in most areas, although some materials may be opportunistically salvaged and select rocks may be used as wildlife enhancement features in reclamation.

**Disturbances**
Existing disturbances include the historical location of Fattig Creek Road, mine facilities, the Johnson House and associated farmstead. While some materials may be opportunistically salvaged from historical disturbances and used as subsoil, if needed, the materials are expected to be of marginal quality relative to other undisturbed and reclaimed soils in the survey area. No salvage is proposed in this map unit.
Due to the limited quantity of topsoil and subsoil available for salvage relative to the four-foot cover requirement, other suitable materials consisting of unconsolidated or weakly consolidated weathered bedrock underlying subsoil will be utilized as a topsoil substitute. Samples collected from the WDA #2 survey area suggest that the soil materials will be suitable for use in reclamation following mixing during salvage, stockpiling, and replacement.

The soil balance prepared for the WDA #2 footprint, including salvage of topsoil, subsoil, and deeper suitable materials indicated cover materials available for salvage exceed the volume required to replace four feet on the WDA #2.

### 3.4 Vegetation

Existing vegetation conditions described in the Coal Lease EA are generally unchanged, except where mining activity has resulted in disturbances. A total of 571 acres was disturbed through the end of 2013, a portion of which has been reclaimed. As required by the State-approved mine permit, SPE (2014a) conducts contemporaneous reclamation after facilities are no longer needed. Reclamation practices include revegetating disturbances with species adapted to the area, compatible with surrounding vegetation communities, and capable of supporting the postmine land use.

SPE conducts monitoring of hydrophytic vegetation communities along 62 transects at 37 sites associated with spring discharge points, riparian areas, and associated wetlands in the mine permit area. The purpose of the monitoring is to establish a record of site conditions prior to mining for future comparison after mining to assess potential mine effects. Data collected since the Coal Lease EA was prepared includes annual photographs of fixed transects and periodic semi-quantitative community descriptions (Catena 2011a, 2012a, 2013a, 2014a).

Four noxious weeds have been identified in the permit area since the Coal Lease EA was prepared, including spotted knapweed, hound's tongue, Canada thistle, and leafy spurge. SPE controls noxious weeds on company-owned private surface. SPE also controls noxious weeds on other surface in the permit area where noxious weeds can reasonably be attributed to activities of SPE. Other surface owners are responsible for noxious weed control elsewhere in the mine permit. SPE controls noxious weeds with herbicide in accordance with Weed Management Plans approved by the Yellowstone County Weed District and Musselshell County Weed District (SPE 2014e, 2014f).

No other vegetation inventories have been completed at the mine since the Coal Lease EA was prepared.

### 3.5 Wildlife

Annual wildlife monitoring has been completed each year since the Coal Lease EA was prepared in 2010. Appendix B presents a list wildlife species and the year or survey period during which they have been observed in the mine vicinity. The list includes species that are expected to occur in the area, but have not yet been documented. Annual reports completed since the Coal Lease EA was completed (Catena 2011b, 2012b, 2013b, 2014b) also identify the
location of discovered raptor nests and leks (Figure 2.1-2). Annual wildlife monitoring conducted in accordance with mine permit requirements (SPE 2014a) includes surveys for raptor nests and leks each spring.

### 3.6 Threatened, Endangered, and Special Status Species

No species listed, proposed for listing, or candidates for listing under the Endangered Species Act (ESA) have been observed in the mine area during the historical surveys. The Coal Lease EA previously found that while black-footed ferret (*Mustela urophasianus*) and Whooping crane (*Centrocercus urophasianus*) have potential habitat in Musselshell and Yellowstone Counties, it is not expected that either species would occur in the Federal coal lease tracts. Sprague’s pipit (*Anthus spragueii*), a grassland bird, was recently added as candidate for listing under the ESA and red knot (*Calidris contutus*) was recently listed as threatened. Sprague’s pipit and red knot may occur in the counties affected by the Proposed Action, but the OSMRE reviewed the available habitat and species information and concluded (OSMRE 2013, 2015) that Sprague’s pipit and red knot are not likely to be present on lands affected by mining.

Greater sage-grouse (*Centrocercus urophasianus*) may occur in the mine permit area or vicinity, but has not been observed during historical monitoring (1989-2013), which included spring lek surveys (Catena 2014b). The nearest known historical lek locations (MFWP 2013) are over eight miles from the area that would be affected by the Proposed Action (MFWP 2013). Southern portions of the mine permit area is within “general” habitat for greater-sage grouse and the nearest core area is approximately 15 miles north of the Permit Boundary (MFWP 2015). Sage-grouse core areas are defined as habitats associated with 1) Montana’s highest densities of sage-grouse (25 percent quartile), based on male counts and/or 2) sage-grouse lek complexes and associated habitat important to sage-grouse distribution. The “general” habitat mapping for sage-grouse indicates that the Proposed Action Area and areas to the south, east and west are “occupied habitat,” indicating that “area is occupied by sage grouse some time during the year and is considered important for the existence of sage grouse.

The Governor recently issued an Executive Order, No. 10-2014, concerning conservation of sage-grouse habitat (Montana Office of the Governor 2014). The EO defines suitable habitat as being “within the mapped occupied range of sage grouse.” The description of suitable habitat indicates there is generally five percent or greater canopy cover of sagebrush; or that sagebrush canopy cover may be less than five percent when complimented by other shrubs suitable for sage grouse cover requirements, and in moist meadows containing forbs for brood-rearing within 300 yards of suitable sagebrush cover. Introduced species such as alfalfa may be important on these sites where native forbs are not available.

Habitat mapping of the mine area in 2007 show the vicinity of Dunn Mountain, including the general habitat in the area that would be affected by the Proposed Action, as being dominated by ponderosa pine forest and savanna, interspersed with small patches of grassland (Westech 2009). There were no mapped patches of shrublands, including sagebrush, in those sections. Silver sagebrush, skunkbrush sumac, western snowberry, occur in the understory and openings ponderosa pine savanna, grasslands, and areas where the forest canopy has been opened by fire. Historically, it does not appear that there was suitable habitat for sage-grouse in the vicinity of the Proposed Action. This is substantiated by the fact that there are no reported observations of sage-grouse within the Mine Permit Area between 1989 and 2013 (Catena 2014b).
In the event that any listed threatened or endangered species are found in the permit area, State regulations (ARM 17.24.751) require SPE to promptly report the discovery to MDEQ and the U.S. Fish and Wildlife Service to ensure mining operations do not adversely affect the species.

### 3.7 Cultural Resources

Cultural Resource studies conducted within the permit area since 2010 are listed in Table 3.7-1. The surveys identified 88 sites and 17 isolated finds. Although none of the sites are recommended as eligible for the National Register of Historic Places (NRHP), a survey recommended that three sites located in Section 28, T6N R27E (24YL1046, 24YL1047, and 24YL1055) with large and unusual cairns be considered unevaluated in terms of NRHP criteria (GCM Services, Inc. 2012). Because of the difficulty of evaluating these cairn sites, which would involve their controlled destruction, the GCM Services report recommended that they be avoided by any future disturbance activities until the nature and character of the sites can be determined. One site may require additional testing prior to disturbance associated with WDA #2.

### Table 3.7-1. Cultural resource investigations, 2010 - 2014

<table>
<thead>
<tr>
<th>CRABS No.</th>
<th>Project</th>
<th>Type</th>
<th>Author</th>
<th>Year</th>
<th>Sections</th>
</tr>
</thead>
<tbody>
<tr>
<td>ML 6 31885</td>
<td>Panel 1, Bull Mtn. Mine</td>
<td>Class III</td>
<td>GCM Services, Inc.</td>
<td>2010</td>
<td>Various</td>
</tr>
<tr>
<td>YL 6</td>
<td>Intake Air Portal</td>
<td>Class III</td>
<td>Ethnoscience</td>
<td>2010</td>
<td>4</td>
</tr>
<tr>
<td>ML 2</td>
<td>Amendment 2, Bull Mtn. Mine</td>
<td>Class III</td>
<td>GCM Services, Inc.</td>
<td>2011</td>
<td>Various</td>
</tr>
<tr>
<td></td>
<td>South Panel Rd Corridor South Dunn</td>
<td>Class III</td>
<td>GCM Services, Inc.</td>
<td>2012</td>
<td>Various</td>
</tr>
<tr>
<td>ML 53</td>
<td>SPE 2013 West Exploration Area</td>
<td>Class III</td>
<td>Aaberg</td>
<td>2014*</td>
<td>Various</td>
</tr>
<tr>
<td></td>
<td>Panel 6 thru Panel 10, Bull Mtn. Mine</td>
<td>Class III</td>
<td>Ferguson</td>
<td>2014*</td>
<td>Various</td>
</tr>
</tbody>
</table>

* Class III inventory completed, but not reported.

### 3.8 Noise

Sound levels in the mining area are affected by ongoing mine operations. The Coal Lease EA reported heavy equipment operation noise levels of ranging from 72 to 95 dBA near the preparation facility to an ambient noise level of about 35 to 40 dBA. While the ambient condition in the vicinity of the Surface Facilities Area has not been measured, it is expected to be comparable to that discussed in the Coal Lease EA. The noise level in the Surface Facilities Area is generally continuous, but varies depending on the extent of activity, while conditions outside of the Surface Facilities Area have a combination of intermittent and continuous effects on sound levels.

Vehicles typically have short-term effects, while construction equipment may work in an area for hours to days. In the vicinity of most drillhole pads, the duration may be longer (days or
weeks). The noise level varies by the receptor location, but may be comparable to the Surface Facilities Area in the immediate vicinity of the equipment. The existing ventilation fan over the East Mains, just north of Longwall Panel 4, generates approximately 103dBA of noise measured in close proximity, which is reduced to 75dBA at the fence of the pad approximately 150 feet away (Weber, D. 2014b).
4.0 ENVIRONMENTAL CONSEQUENCES

This chapter discusses the potential impacts of the alternatives described in Chapter 2. This chapter is organized by alternative and then by the affected resource in the same order as they are described in Chapter 3. Cumulative impacts are also discussed in this chapter.

The Proposed Action would approve the amended Federal mining plan modification to mine coal in the approved Federal coal lease area and the underground mine would continue its operations in the LOM area in accordance with the State-approved mine permit. Access to the Federal coal lease areas and the private and state coal reserves to the south and east of the Federal coal lease areas would allow mining to continue for approximately nine additional years. New mine facilities, associated surface disturbances, and subsidence repairs would be required in connection with the Proposed Action.

Under the No Action Alternative, the mining plan modification for the Federal coal would not be approved. Currently approved mining operations would continue approximately 2.5 years, until mining reaches the Federal coal lease areas at the north end of Longwall Panel 6.

The direct, indirect, and cumulative effects of the Proposed Action and No Action Alternatives are comparable to those described in the Coal Lease EA, except as noted herein. In addition to addressing the specific issues identified in Chapter 1, the updated analysis reflects changes to the mining operations presented in Chapter 2 and an updated description of the affected environment presented in Chapter 3, which has been affected by mining since the Coal Lease EA was approved.

4.1 Effects from Proposed Action Alternative

This section describes the effects of the Proposed Action and connected activities.

4.1.1 Topography and Physiography

Under the Proposed Alternative, mining would continue, resulting in continued CPW generation and subsidence. CPW would be transferred to the existing WDA and proposed WDA #2, eventually filling the basins in which they are located and permanently affecting the topography in those areas. The filled basins would have a relatively level top surface, sloped for drainage, and steeper toe slope. In accordance with State regulations (ARM 17.24.924), the topography of the WDA #2 structure would be suitable for post-mining land uses without any depressions or impoundments (e.g., ponds) on the completed structure. The final configuration would also minimize erosion and achieve other performance standards limiting overall effects to topography and physiography.

Borehole pads and other surface facilities required to support mining throughout the permit area would require temporary alteration of topography to facilitate access and construction. These facilities would be reclaimed following mining unless otherwise approved by MDEQ as features compatible with the post-mine land use. Subsidence features requiring repair would also be reclaimed. These features would be graded and blended with surrounding topography.
during reclamation, potentially resulting in permanent, but minor and localized effects, on topography. SPE would employ mitigation measures in accordance with the requirements of the surface mine permit.

Subsidence would continue in all areas undermined by long-wall mining methods as previously discussed in the Coal Lease EA.

4.1.2 Geology, Mineral Resources, and Paleontology

Mining would continue as described in the Coal Lease EA, resulting in removal of 135 million tons of coal in the entire mining area, including 37.5 million tons of Federal coal subject to approval of the mining plan modification.

While no specific paleontological resources are known to occur in the mine permit area, the Coal Lease EA concluded that the area is expected to yield plant and invertebrate remains; vertebrate remains are less-likely to be encountered. Paleontological resources occurring in areas of surface disturbances, including 6.9 acres of potential Federal surface disturbance (Figure 2.1-2), could be impacted in association with the Proposed Action. Stipulation to the coal lease (see Appendix A, Appendix A, Section 15a) requires SPE to report paleontological resources discovered during construction and suspend activity, thereby reducing potential effects to paleontological resources.

4.1.3 Air Quality

Particulate Matter

Under the Proposed Action, SPE estimates that the life of mine would be extended for approximately 11.5 years, nine more than the No Action Alternative. Under the Proposed Action, potential effects to particulate matter emissions would continue in the surface facilities area, in the Federal lease area and elsewhere in the mine permit area. The observed negligible effects associated with permitted sources would continue for the life of mining. Contemporaneous reclamation would ensure that boreholes, subsidence features, and other surface disturbances above mining are reclaimed in a timely manner. As such, no change to the nature, quantity and characteristics (including release points and dispersion attributes) of pollutants released by current mining activities is expected in association with continued coal removal. Further the mining plan modification would not violate any condition or limitation of the existing MAQP and emissions of regulated pollutants are accounted for within the existing MAQP and emission inventory as described in Section 3.1.1.

Mining of the leased coal would contribute to the generation of fugitive dust at the surface facility complex from coal handling, unit train loading, wind erosion of coal and other material stockpiles, and vehicle traffic on unpaved roads and surfaces. The relative location, numbers, and types of most emission sources would not change from current permitted operations. However, SPE would require construction of WDA #2. The rate of coal production and overall emissions associated with equipment operations would not change substantially during the transition of disposal from the existing WDA to WDA #2. The additional disturbance footprint and associated emissions would require modification of the MAQP prior to operation of WDA.
#2 and SPE would be required to conduct operations in a manner that ensures compliance with the MAQP requirements. The MAQP revision would address the time when both facilities are operational during the initial construction of WDA #2 and prior to closure and reclamation of WDA #1.

Based on these considerations, the Proposed Action is not expected to present further degradation to the ambient air quality in the area. Musselshell County is considered attainment/unclassifiable for all MAAQS and NAAQS, and is designated a Class II Area under the Federal Clean Air Act (CAA) Title I, Part C, Prevention of Significant Deterioration (PSD) of Air Quality. The closest designated Class I areas are the Northern Cheyenne Indian Reservation located approximately 125 kilometers (km) to the southeast and the UL Bend National Wildlife Refuge located approximately 136 km to the northeast.

Greenhouse Gases/Climate Change

GHGs are not currently regulated, but there is a consensus in the international community that global climate change is occurring and that it should be addressed in governmental decision making, including policies affected by GHG emissions.

Under the Proposed Action, SPE estimates that mining would continue approximately 11.5 years (nine more than the No Action Alternative) and 135 million tons of coal would be mined (100 million tons more than the No Action Alternative). The average and maximum annual coal production rates are expected to be 11.7 and 15 million tons, respectively. Under the Proposed Action, GHG emissions would continue at the surface facilities via mobile sources and underground via underground and stationary sources in the Federal lease area. Mining of the Federal coal lease would enable mining operations to continue through these portions of the Mammoth coal seam. Operations at the surface facility complex would be ongoing during the mining operations. The surface facilities complex is currently operating under a valid MAQP, which would be modified as necessary to address any changes to proposed operations during the future mining period. Although WDA #2 and support facilities described in Chapter 2 would be constructed in association with the proposed action, the numbers, and types of most GHG emission sources are not anticipated to substantially change from current permitted operations.

The combined annual CO₂ equivalent emissions resulting from mine operations, coal transport and combustion (23.16 million metric tons) would continue for an additional nine years beyond the condition resulting in the No Action Alternative (11.5 years total). While the maximum annual emissions would remain the same and reflect 15 million ton limit specified in the MQAP, due to the limited total coal availability in the permit area, either the actual average production would be less or the years of mining would be decreased.
Table 4.1.3-1. Estimated annual CO₂-equivalent emissions associated with an annual mining rate of 15 million tons of raw coal (12 million tons clean coal), 2014.

<table>
<thead>
<tr>
<th>Source</th>
<th>CO₂-Equivalent Emissions (million metric tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct CO₂ emissions</td>
<td>0.02</td>
</tr>
<tr>
<td>Indirect Electrical Use</td>
<td>0.06</td>
</tr>
<tr>
<td>Transport</td>
<td>0.78</td>
</tr>
<tr>
<td>Combustion of Shipped Coal</td>
<td>22.3</td>
</tr>
<tr>
<td>Total</td>
<td>23.16</td>
</tr>
</tbody>
</table>

Source: SPE 2014a; Smith, R. 2014a

Current and historical measurements of methane from the mine are at or below detection limits; however, it is possible that minor amounts of methane would be emitted as the mine progresses (Weber, D. 2014b).

Although total emissions resulting from mining, processing, transporting and burning are quantifiable, it is not possible to accurately assess the effects of a specific amount of CO₂-equivalent emissions on global warming and climate change (CEQ 2010). EPA (2014a) estimates that 6,526 million metric tons of CO₂ equivalent were emitted from all sources in the United States in 2012. It is reasonable to assume that the impact of CO₂-equivalent emissions from annual operation of the Bull Mountains Mine No. 1 on climate change would be approximately 0.35 percent of the total U.S. emissions.

4.1.4 Water Resources

Predicted hydrologic impacts of mining are presented in the statement of probable hydrologic consequences presented in the mine permit (SPE 2014a) and further evaluated in MDEQ’s cumulative hydrologic impact assessment (MDEQ 2013). The ongoing hydrologic monitoring program approved by MDEQ as part of the mine permit is designed to identify impacts to wells, springs, streams, and ponds, which may differ from predictions. The mine permit specifies mitigation measures to be employed to address mining related hydrologic impacts in a manner consistent with applicable regulations. The information in this section updates expected impacts to water quantity and quality based on monitoring and modeling completed since the Coal Lease EA was prepared. Additional information pertaining to hydrologic impacts, particularly water quality impacts, and mitigation are presented in the Coal Lease EA. Most observations to date yield results that are in reasonable conformance to projections made in Section 4.2.4 of the Coal Lease EA. The main exception relates to projected drawdown in the Mammoth coal and upper underburden from mine dewatering (Appendix A, Section 4.2.4.1). That section of the Coal Lease EA is superseded by modeling efforts set forth in the current mine permit (SPE 2014c) and discussed in this section.
**Expected Groundwater Impacts**

**Alluvium**

Based upon alluvial monitoring observations to date, as discussed in Section 3.2, it is projected that mining would not impact alluvial groundwater either in terms of water quantity or water quality.

**Overburden**

Based upon the observations to date, as discussed in Section 3.2, it is projected that the primary impacts to saturated zones present in the overburden would be in the fragmented and fractured zones for strata in subsidence zones. Interpretations indicate that this fractured zone extends into the sandstone above the Rock Mesa coal (in overburden interval 5). Given that multilayered sequences of claystones, siltstones, shale and sandstone are present throughout the overburden section, lower permeability strata fractures would likely “reseal” following subsidence so that effects to relatively shallower overburden intervals would be less likely to be affected and negligible impacts are expected. Based upon observations to date, any impacts to shallower overburden groundwater levels, if they occur, are projected to be short-term. Impacts to the deeper overburden portions that are within the fragmented/fractured zones are projected to be long-term.

**Mammoth Coal and Underburden**

Two new groundwater models (Transient Mine Models 1 and 2) have been developed using US Geological Survey’s (USGS) MODFLOW software (SPE 2014a, 2014c). Both of the above models were calibrated to existing water level data in each of the following hydrogeologic units, as described below:

- Overburden wells [OB-5] (Transient Model 1 only);
- Mammoth coal (Transient Model 1 only);
- Upper underburden (Transient models 1 and 2); and,
- Deeper underburden (Transient Model 2 only).

These models supersede the prior model discussed in the Coal Lease EA (Appendix A, Section 4.2.4.1, pages 4-13 through 4-21). There are three primary reasons they were developed:

- They allow projecting the groundwater system response over time during the mining process. This could not be done with the prior modeling effort.
- The prior modeling effort led to under-prediction of drawdown outside the mine mainly to the north/northwest of the mine.
- Evaluating the relative significance of mining on a deeper underburden aquifer was not feasible using the prior model. This can now be performed with the model updates.
Transient Mine Model 1 (SPE 2014a) is a three-dimensional model which represents strata extending from the overburden to the upper underburden. This groundwater model focuses on quantitative water level changes in the Mammoth coal and the upper underburden as they are affected by mining. It also provides simulation results which allow prediction of flows in response to such mining. Key predictions of this model include:

- Maximum drawdown in the Mammoth coal and upper underburden at the end of the permit mining is projected to be up to 90 feet within the permit boundary (Figure 4.1-1).
- The cone of depression and magnitude of drawdown outside the permit boundary is predicted to be greater to the north/northwest of the permit boundary. The maximum drawdown outside and immediately adjacent/northwest of the mine is projected as about 50 feet at the end of the permit. This drawdown would decrease progressively with distance from the mine. The extent of the cone of depression and drawdown magnitude is projected to be much more limited (ranging from less than 5 feet to just over 20 feet) outside the permit boundary to the east, south and west (Figure 4.1-1).
- Following the cessation of mining, water levels would begin to recover. The nature of this recovery would depend upon the behavior of the constructed gate roads following mining. If these gate roads remain generally intact for an extended time after mining, the tendency would be for greater mine pooling in northern portions of the mine. If these gate roads collapse soon after mining, the mine pooling would be less. Figures 4.1-2 and 4.1-3 provide results of two model scenarios of projected groundwater levels 50 years after mining. Figure 4.1-2 assumes that the gate roads remain generally intact. Figure 4.1-3 presumes that the gate roads would collapse approximately following mining. At present, the gate roads are generally remaining intact in mined out portions of the mine. Figures 4.1-4 and 4.1-5 respectively provide projections of residual drawdown for Scenarios 1 and 2. For either scenario, residual drawdown within the permit boundary is projected with portions of the Mammoth coal remaining unsaturated into the foreseeable future. It is noted that if the gate roads remain intact, simulation results presented in Figure 4.1-5 project that groundwater levels would actually increase relative to baseline groundwater levels both within, and just outside of, northern portions of the permit boundary.
- The predicted average long-term dewatering rate for the mine operating to the end of the permit is approximately 160 gpm. The maximum dewatering flow into mine gob and gate roads associated with dewatering the Mammoth coal and adjacent strata was projected as approximately 280 gpm.

Transient Mine Model 2 (SPE 2014c) is a three-dimensional model which focuses on the underburden strata especially on the deep underburden sandstone. The model provides a tool for evaluating the hydraulic capacity of this deep underburden sandstone to serve existing uses and any potential mitigation needs, if they arise, as a result of mining. The model predicts that the maximum drawdown at the end of mining in the deep underburden sandstone is projected as 3 feet.
This scenario assumes gate roads are crushed following mining.

Units indicated are in Montana NAD 83, State-Plane, Feet

Date: 09/19/14

Simulated Water Levels, Layers 4 and 5
Scenario 1 - 50 Years after End of Mining
Bull Mountain Mine No. 1 Model

Figure 4.1-2
This scenario assumes gate roads remain intact following mining.
This scenario assumes gate roads are crushed following mining.

Simulated Drawdown, Layers 4 and 5
Scenario 1 - 50 Years after End of Mining
Bull Mountain Mine No. 1 Model

Units indicated are in Montana NAD 83, State-Plane, Feet. Drawdown in Feet.

Date: 10/08/14

d:\SP-PHC\Fig_4.1-4.cvx
This scenario assumes gate roads remain intact following mining.

Predicts

Increases in Water Levels North of LOM

Simulated Boundary
Saturated/Unsaturated
Mammoth Coal

Model Layer 4 (represents Mammoth Coal)

2235000 2240000 2245000 2250000 2255000 2260000 2265000 2270000 2275000 2280000

Model Layer 5 (represents Upper Underburden)

2235000 2240000 2245000 2250000 2255000 2260000 2265000 2270000 2275000 2280000

Units indicated are in Montana NAD 83, State-Plane, Feet. Drawdown in Feet.

Date: 10/08/14

Simulated Drawdown, Layers 4 and 5
Scenario 2 - 50 Years after End of Mining
Bull Mountain Mine No. 1 Model

Figure 4.1-5
Expected Spring Impacts

The interpreted source of overburden groundwater contributions to mine gob and gate roads after long-wall mining/subsidence is the massive sandstone above the Rock Mesa coal. It is likely that the fractured zone extended into this sandstone. Assuming that this behavior continues as the mining progresses forward, in terms of the effects to springs, this would indicate that any springs sourced by this sandstone are at greater risk of impacts than are springs located in relatively higher portions of the overburden strata. The degree of fracturing decreases with increased height above the long-wall mined coal. This is a likely explanation as to why relatively shallower springs in overburden strata well above longwall mining have not been adversely affected by mining subsidence to date.

The most likely springs to be affected by mine subsidence are sourced by the sandstone above the Rock Mesa coal (OB-5). This sandstone is in a relatively lower portion of OB-5. Effects to shallower springs are likely to decrease with elevation above this sandstone. Based upon the geologic section and outcrop mapping, lower OB-5 sourced springs listed below either lie within, or very near, coal lease sections (Figure 3.2-4):

- 52455 (downgradient from Section 4)
- 53575 (Section 10)
- 53195 (downgradient from Sections 10 and 14)
- 53285 (downgradient from Section 14)

The likelihood that other springs in shallower overburden strata could be affected is much less and decreases with distance progressing upwardly from the lower portions of OB-5. It is projected that the fracturing decreases with height, and there are numerous intervening siltstone and claystone layers as well. Based on observations to-date, these siltstones and claystone layers are more likely to reseal when compared to the sandstone above the Rock Mesa coal. The most likely effect to impacted springs would be a reduction in discharge rates, which could persist in the long-term and potentially require mitigation, as noted below and in the Coal Lease EA.

Expected Surface Water Impacts

Surface water flow at the mine occurs in response to rainfall and snowmelt events and, to a lesser and more localized extent, as a result of spring discharge. In general, a majority of stream channels situated within the permit boundary are normally dry and flow only in response to substantial rainfall and runoff events. Some very limited ponding in stream reaches may occur if ridges develop, but the storage associated with that ponding, if it occurs, would be minimal. Hence, measurable effects to channel flows from runoff events are considered highly unlikely in the future and have not been observed to be effected after completed mining in Longwall Panels 1 through 3.

There are limited (short) intermittent channel reaches that depend upon spring discharges for flow. Such reaches would only be affected if the source spring(s) are affected by mining subsidence. Again, the likelihood of such effects is projected to decrease as stratigraphic
distance increases above the lower OB-5 sandstone. Presently, it is interpreted that there are no intermittent spring-sourced stream reaches within the BLM coal leases sections that are sourced by the lower OB-5 sandstone.

Ponds in the mining area may be affected by subsidence, potentially resulting in leakage. However, observations suggest that surface cracking is less evident in valley bottoms where gentle slopes and unconsolidated surficial materials allow soil to displace and cover underlying fractured rock.

**Expected Hydrology Effects of WDA #2**

The hydrologic effects of WDA #2 are anticipated to be very similar to what is occurring with the existing WDA, for the following reasons:

- Groundwater monitoring has been performed to date in the vicinity of WDA #2. The shallow strata lying beneath or immediately adjacent to this WDA tend to be unsaturated. The construction of this WDA is projected to yield similar hydraulic parameters that exist for the existing WDA. In essence, vertical permeability in the WDA #2 deposits would be extremely low as a result of the nature of the substrate placed and the degree of compaction that is applied. Hence, groundwater quality impacts are not expected as a result of the lack of saturation and the extremely low permeability, underlying water-bearing units should not see water quality impacts.
- There are no springs within the proposed WDA #2 footprint; therefore, no impacts to springs or associated wetlands are projected.
- Detention of storm-water and snowmelt runoff during temporal runoff events would occur in WDA #2. The proposed WDA #2 disturbance area (289 acres) constitutes about 2 percent of the Rehder Creek basin (approximately 14,800 acres). Effects to surface water flows would likely not be discernible relative to the flows of the stream as a whole.
- There is some possibility of surface water quality effects for flows leaving the WDAs. However, because of the overall limited size of this catchment compared to the Rehder Creek drainage as a whole, such water quality changes, if they do occur, would likely not be discernible in the receiving waters. SPE would be required to obtain a discharge permit under the MPDES, which would further ensure hydrologic control structures associated with WDA #2 are designed, constructed, and operated in a manner protective of the receiving stream. As part of the permitting process, the State program would require a grading and hydrologic control plan that ensures long-term stability of flow paths without unnecessary detainment of water in the WDA #2 area.

**Potential Future Mitigation Requirements**

SMCRA, MSUMRA, and attendant Montana regulations (ARM 17.24.768) require replacement of water supplies used for domestic, agricultural, industrial, or other legitimate uses if such supply has been affected by contamination, diminution, or interruption as a result of mining operations. Impacts to wells, springs, streams, and ponds would potentially occur and be
mitigated in accordance with the mine permit. The mitigation requirements are consistent with those described in the Coal Lease EA, except as noted in this section.

There is the potential that some domestic or stock water wells would require replacement. It is anticipated that these involve wells that would be mined out. There is also a limited possibility that drawdown caused by mine dewatering could reduce the static water column in some wells. The latter possibility is limited to wells that tap the Mammoth coal, overburden or upper underburden. If such a well, or wells, were affected by mining, the most appropriate mitigation means is to tap the deep underburden sandstone, which is deemed a reliable source of groundwater in the immediate vicinity of the mine. If wells are adversely impacted they would be replaced with replacement wells completed in the deep underburden sandstone, which has ample water available for replacement purposes, as described in the mine permit (SPE 2014a).

Some springs may also be adversely affected by mining and the subsequent mining subsidence. The mine permit (SPE 2014a) includes plans for spring impact analysis, impact detection and mitigation in accordance with regulatory requirements. If a given spring is affected to the degree that it cannot meet the use that existed prior to mining, then mitigation would be implemented. The two most practical means of mitigation for spring flows are (in order of priority) spring redevelopment (e.g., repair) or construction of a replacement water source. If spring redevelopment proves to be infeasible, then the water supply mitigation method would most likely be to drill a well and construct a water distribution system (i.e., pipeline and storage tanks) whereby impacts to more than one spring may be mitigated by a single well feeding multiple water tanks. Wells would most likely be drilled into the deep underburden sandstone, although the mine pool and overburden aquifers may also provide adequate water. The rate of flow from such a water supply well(s) would be constrained by State law pertaining to water rights, likely precluding pumping for direct discharge down channel in the manner comparable to spring discharge. Other methods described in the Coal Lease EA would remain available for mitigation of spring impacts.

Intermittent stream reach flows dependent upon spring flow sources may be affected by mining and may require repair or replacement. The mitigation measures described in the Coal Lease EA would be implemented to repair or replace damaged water sources except that options to replace springs with continuously pumping and discharging wells are limited by State law. Depending on the site and degree of impact to spring discharge, some channel segments may not exhibit intermittent or perennial flow after mining. However, all water sources necessary to support the post-mine land uses would be replaced in accordance with applicable regulations.

**Waters of the U.S., including Wetlands**

As noted in Chapter 3, formal determinations of jurisdiction under the CWA have not been made. The mine permit (SPE 2014a) specifies methods for handling hydric soil and revegetating

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2 The mine is located in the Musselshell River Basin, which is closed to new appropriations (MCA 85-2-343).
non-jurisdictional wetlands. The permit also states that prior to constructing within jurisdictional waters, SPE would consult with MDEQ, obtain appropriate permits from the U.S. Army Corps of Engineers and revise the mine permit, as necessary, to specifically address the associated construction activity. Such requirements would apply to surface disturbance for roads, drill pads, WDA #2 construction, and subsidence repairs. While waters of the U.S., including wetlands, may occur within the areas disturbed in association with the Proposed Action, existing regulations and permit conditions would require impact avoidance or mitigation (e.g., replacement or reclamation) of any construction-related impacts to waters of the U.S., including wetlands. State regulations and permitting administered by the Corps would ensure that impacts would be short-term.

4.1.5 Soil

Future disturbance in association with the Proposed Action Alternative would be approximately 475 acres, 364 acres more than the No Action Alternative. These disturbances would directly affect soil and be additive to the existing mine disturbance. All soil management activities would occur as specified in the State-approved mine permit. Soil suitable and necessary for use in reclamation would be salvaged by windrowing or stockpiling as an initial step in construction. Approved conservation and best management practices would help preserve soil conditions, limit wind and water erosion, and maintain suitability of soil for use in reclamation.

Soil and other suitable geologic material within the WDA #2 footprint would be subject to specific salvage and replacement conditions specified in the mine permit, following state approval. Regulations require that 4 feet of suitable cover material be placed over the CPW to protect the environment, including soil resources. SPE's WDA #2 soil survey and reclamation plan (SPE 2014d) estimates that adequate volume is available to satisfy this requirement.

Following final grading of surface disturbances, soil would be replaced and promptly revegetated in accordance with reclamation methods specified in the State-approved mine permit, further reducing potential for degradation or soil loss due to erosion. With the exception of the Surface Facilities Area that has specific replacement depths suited for specific reclamation types, most graded areas would receive soil salvaged from within the same footprint distributed at depths similar to those which existed prior to mining effects. Replaced soil may have more homogenous textures and may also exhibit more near-surface coarse fragments as a result of salvage, stockpiling, and handling, but these materials are expected to support the desired vegetation communities and the approved post-mine land uses.

4.1.6 Vegetation

Few of the hydrophytic monitoring points have been undermined to date and no site-specific conclusions have been reached regarding potential mining impacts to the vegetation communities. The expected effects to vegetation due to subsidence are discussed in the Coal Lease EA.

Mining activities conducted in association with the Proposed Action Alternative would directly affect vegetation through surface disturbance of estimated 475 additional acres (364 acres more than the No Action Alternative) comprised of historically burned ponderosa pine stands (43
percent), grassland (36 percent), ponderosa pine savannah and forest (12 percent), agricultural
lands (7 percent), and shrub grassland (2 percent), and breaks-complexes (<1 percent).
Removal of vegetation would temporarily eliminate associated livestock forage and wildlife
habitat provided by the vegetative cover.

In accordance with the State-approved mine permit, facilities would be removed when they are
no longer needed and disturbances would be promptly reclaimed and revegetated. Following
final grading and soil replacement, disturbed areas would be promptly seeded with seed mixes
identified in the State-approved mine permit. The approved seed mixes are selected to be
compatible with surrounding vegetation types and support the approved post-mine land uses.
Reclaimed native plant communities can be expected to exhibit less overall diversity and
possibly less woody plant density (depending on the community) in the short-term. In the long-
term, reclamation requirements and associated bonding would ensure that vegetation
communities support the desired post-mine land use at least to the extent capable prior to
mining.

Direct and indirect effects to vegetation would include the continued spread of noxious and
invasive species known to occur in the permit area, and potentially new species. Vehicles and
mine equipment would likely continue to spread noxious weeds along roadways, mine facilities,
and associated construction sites. Seeds may be also spread to these areas as a result of
livestock, wildlife, and other natural processes. State regulations (ARM 17.24.716) and the mine
permit (SPE 2014a) require SPE to control noxious weeds on all disturbed and reclaimed areas
and the noxious weed control plans (SPE 2014e, 2014f) specify controls on non-disturbed
portions of the permit area. While implementation of weed control measures reduces the
spread of noxious and invasive weeds, these species are well-adapted to establish in disturbed
areas and could spread to native areas adjacent to disturbances and persist following mining,
although they would be prevented from spreading to an extent that would substantially affect
land uses.

4.1.7 Wildlife

Local wildlife populations are and would continue to be directly affected by ongoing mining
activities. These impacts are both relatively short term (occurring during mining and
reclamation operations) and long-term (occurring after mining concludes and habitats are
successfully reclaimed). Direct effects include road kills by mine-related traffic; restrictions to
animal movement due to activity, noise, disturbance, and habitat fragmentation; and
displacement due to avoidance of mining activities and associated habitat loss and modification.
Species that are less mobile (e.g., amphibians, reptiles, small mammals, nesting birds) may suffer
direct mortality due to construction activities (e.g., ground clearing), particularly if such
construction occurs at seasons when they are most vulnerable (e.g., nesting season).

Species that are sensitive to human noise and presence may be displaced from adjacent habitats
that are not directly affected by project activities. Displaced animals may be incorporated into
adjacent populations. Depending on variables such as species behavior, density, and habitat
quality, adjacent populations may experience increased inter-and intra-specific competition,
increased energy expenditure, increased mortality, decreased reproductive rates, or other
compensatory or additive responses.
Indirect impacts to wildlife may occur due to the effects of subsidence and changes to vegetative communities in association with disturbances and reclamation. These effects are expected to be short-term to the extent reclamation practices successfully reclaim or replace the habitats required for wildlife. Long-term effects may occur due to changes to vegetation community composition and structure; permanent improvements to roads; or changes to water quality, quantity, and distribution. Wildlife may also experience long-term indirect effects due to noxious weed infestations and associated changes to habitats, to the extent they occur.

Under the Proposed Action Alternative, wildlife present in the mine permit area and immediate vicinity (Appendix B) would be affected by subsidence in the manner described in the Coal Lease EA and would also be affected by surface disturbances, new facilities (e.g., boreholes and roads), and associated mining activities in the manner stated above. Existing and proposed disturbances would directly affect a variety of habitats, although historically burned pine (43 percent) and grassland communities (39 percent) would comprise the majority (79 percent) of the potential disturbance footprint. Most surface activities would occur in the existing Surface Facilities Area. New surface disturbances outside of the Surface Facilities Area (approximately 119 acres) would occupy less than 1 percent of the 14,896-acre permit area, would not experience continuous use (except for the ventilation fan), and would be reclaimed promptly following discontinued use or activity, in accordance with the State-approved mine permit.

The ventilation fan would operate continuously, resulting in noise generation in the vicinity of the East Mains. The location of the ventilation fan would move eastward one or two times as mining progresses. Wildlife sensitive to noise likely would avoid the vicinity of the fan installations.

Many of the bird species identified in Appendix B nest in the Permit Area and may be directly affected to the extent that new disturbances occur during the nesting season or mining activities occur in such proximity that breeding or nesting is disrupted. Several raptor nests identified during surveys conducted between 2009 and 2013 (Catena 2014b) occur in relatively close proximity (within 500 feet) to proposed roads and other facilities (Figure 2.1-2) and other undiscovered nests are likely present in the Permit Area, including newly constructed nests.

The Proposed Action is not expected to substantially adversely affect eagles and take is not anticipated. Golden eagle nests have not been recorded in the Permit Area during historical monitoring (1989 to 2013; [Catena 2014b]), but they are present during the breeding and nesting season and may nest in the mine plan area in future years. It is possible that golden eagles nesting outside of the wildlife survey area may forage over the permit area or non-territorial eagles (floaters) forage through the area. Bald eagles migrate or may forage seasonally through the Permit Area and have been observed during winter months. Bald eagles typically nest adjacent to large bodies of water (Buehler 2000) and suitable nesting habitat is not present. The nearest bald eagle nests are at least 20 km north of the Project Area, along the Musselshell River (MTNHP 2013).

Pocket gopher and ground-squirrel colonies are present in the Permit Area and vicinity, but prairie dog colonies are not known to occur within the Permit Area or surrounding one-mile area. While both eagle species are observed seasonally, past and current monitoring suggest the Project Area is not an area of concentrated use and there are no known important eagle use areas that would be affected by the Proposed Action. Montana mining regulations require SPE to report bald or golden eagle roost sites,
seasonal concentration area, or breeding territory to MDEQ and USFWS to ensure mining activities do not result in take.

Sharp-tailed grouse leks are also present in the area, but not all are currently active. Lekking activities may be disrupted by disturbance and associated activities in the vicinity of leks, particularly at the lek adjacent to the proposed WDA #2.

Most of the direct effects of mining activities, including habitat loss, would be limited to the vicinity of proposed disturbances, although surface traffic related to such actions as environmental monitoring potentially affect wildlife elsewhere in the Permit Area and any effects would continue for some period of time even after mining ceases. Most indirect effects likely would be limited to the area undermined or reclaimed in association with surface disturbances, and the immediate vicinity.

The State-approved mine permit and associated mining regulations specify mitigation measures for wildlife, including minimization of disturbance, reclamation of habitats and raptor-safe powerline construction. The measures specified in the permit and enforced by MDEQ ensure compliance with the Migratory Bird Treaty Act, the Bald and Golden Eagle Protection Act, and the Endangered Species Act, thereby ensuring impacts to those protected wildlife species would not be significant. Approved measures include:

- **Minimizing surface disturbing activities (e.g. soil salvage, road and drill pad construction, grubbing, logging) during the April through July time period.** If surface disturbing activities are scheduled during the April through July time period, SPE will make the area unsuitable for ground nesting (e.g. mow, blade, etc.) prior to the nesting period.
- **Ensuring searches for raptor nests are conducted prior to initiating disturbance during raptor nesting season.** Searches will be conducted within the proposed disturbance area with an additional 500 foot buffer zone.
- **Conducting regular discussions with equipment operators, supervisors, and contractors to maintain awareness for the commitment to minimize surface disturbances, especially during the April through July time period.**
- **Locating and operating access and haul roads to avoid or minimize impacts to important fish and wildlife species or species protected by state or federal law.**

### 4.1.8 Threatened, Endangered, and Special Status Species

No species listed as threatened or endangered under ESA are known or likely to occur in the area affected by the Proposed Action Alternative (OSMRE 2013, 2015); therefore, OSMRE has determined that there would be “No Effect” to listed species.

Greater sage-grouse (candidate for listing) has not been observed in the Project Area and core habitat is not present, and there is little habitat that would be considered suitable for sage-grouse. Therefore, this species would not likely be adversely affected by the Proposed Action. The nearest historical greater sage-grouse leks are over 8 miles from areas that would be affected by the Proposed Action and greater sage-grouse have not been observed during the historical (1989-2013) wildlife surveys of the permit area (Catena 2014b). Based on the current estimated disturbance (Figure 2.1-2), the Proposed Action would disturb less than 9 acres designated general habitat for greater sage-grouse (MFWP 2015). Considering the limited disturbance, marginal quality of the habitat (see Section 3.6), and lack
of greater sage-grouse observations during historical monitoring, effects to this species are not anticipated. If greater sage grouse are identified in the Permit Area in the future, MDEQ is responsible for ensuring the mine’s compliance with Montana Governor’s Executive Order (2014) and MSUMRA regarding protection of this species and its habitats.

Special status species, including BLM-sensitive species and Montana Species of Concern (SOC) are present (Appendix B) and would likely be directly and indirectly affected by the Proposed Action in a manner similar to other wildlife, as discussed in the preceding section. The effects of subsidence on special status species was previously discussed in the Coal Lease EA.

4.1.9 Ownership and Use of Land

The extent of effects to ownership and land use related to subsidence, mining facilities, and associated reclamation or repair would occur throughout the mining area and would continue for at least the next 11.5 years of mining. The type of effects caused by undermining and subsidence would be similar to those described for the Proposed Action analyses in the Coal Lease EA. Disturbances associated with future mining facility construction and subsidence reclamation on approximately 475 acres would temporarily preclude some land uses such as grazing on those areas. All surface disturbing activity would be completed in accordance with landowner agreements and all disturbances would be reclaimed in a timely manner in accordance with State mining regulations. Following reclamation, vegetative communities would be reestablished (see Section 4.1.6) in a manner that supports the post-mine land use, resulting in no long-term effects. Impacts to water sources (e.g., springs, ponds, and wells) used to support land uses would also be mitigated through repair or replacement as discussed in Section 4.1.4.

4.1.10 Cultural Resources

Coal Lease EA special stipulations (see Appendix A, Appendix A) and the State-approved mine permit require SPE to conduct Class III cultural resources surveys prior to disturbances, including subsidence, that would be associated with these types of activities envisioned in the Proposed Action and connected actions to ensure impacts to cultural resources are avoided, minimized, or mitigated, as necessary, in accordance with Section 106 of the National Historic Preservation Act (NHPA).

The Federal coal lease area has continued to be surveyed for cultural resources. No resources eligible for the National Register have been documented; however, for three sites (24YL1046, 24YL1047, and 24YL1055) it was recommended that they be avoided by any future disturbance activities until the nature and character of the sites can be determined (GCM Services, Inc. 2012). Until these sites are evaluated, they would be treated as eligible sites.

Cultural resources on steep slopes and in areas of cliffs and rock outcrops may be affected by subsidence movement resulting from underground mining. However, no surface disturbance is proposed for the coal lease area on the steep slopes or in areas of cliffs and rock outcrops, and to date, no eligible cultural resources have been identified on these areas in the LOM area. Preliminary indication is that there may be an eligible site near the perimeter of the proposed WDA #2 area; when a report is final, SPE would determine what actions if any need to be
taken prior to disturbance. If potentially eligible cultural resources are identified that may be affected by mining, site-specific treatment plans would be developed in consultation with the State Historic Preservation Office and implemented prior to disturbance. Further survey requirements and consultation are specified in stipulations to the Coal Lease EA (see Appendix A, Appendix A).

4.1.11 Visual Resources

Depending on their location, new surface disturbances and mining related facilities associated with the Proposed Action (Figure 2.1-2) would be visible from public roads (including Fattig Creek Road) and private ranch trails. Facilities most likely to be visible by the public would occur near Fattig Creek Road and would include expanded disturbance in the Surface Facilities Area (including WDA #2) and borehole pads and subsidence repairs above the East Mains. Surface disturbances would be evident until fully reclaimed and locally affect the character of the area. However, in the long-term, blending of reclaimed areas with the adjacent topography and selection of plant species compatible with surrounding communities are expected to diminish the effects on visual resources. Impacts to visual resources are considered negligible.

Reclamation activities on south and west facing slopes of Dunn Mountain, if required, could be visible from US Highway 87 North and Old Divide Road, similar to the existing subsidence repair at the south end of Longwall Panel 2 (Figure 2.1-2). However, disturbances east of Longwall Panel 5 are less likely to be visible from the west where most public traffic occurs.

4.1.12 Noise

Surface activities associated with the Proposed Action would continue to generate noise for approximately 11.5 years (nine more years than the proposed action) in a manner comparable to the existing condition (Chapter 3). Additional noise generating activities in the Surface Facilities Area would include construction and operation of the proposed WDA #2, which is expected to have noise levels comparable to the existing and adjacent WDA. Outside the Surface Facilities Area, noise would continue to be generated along roads, at borehole pads, and in the vicinity of subsidence repairs. The level and extent of noise generation would be comparable to the existing conditions, but would occur at new locations (Figure 2.1-2) as mining progresses.

The most notable noise generation would occur in association with the continuously operated ventilation fan, which would be installed at new locations above the East Mains as mining progresses. The slow expansion of mining activity north-eastward as mining progresses would be coupled with reduced activity above earlier mining areas (e.g., first few panels) as facilities outside of the Surface Facilities Area are decommissioned and reclaimed. The distance to receptors at residences and public roads would change as boreholes and associated facilities are added or decommissioned. Based on the current plan, a potential ventilation fan installation could be located within 1,000 to 2,000 feet of a residence. Based on recent measurements at the existing fan, the fan noise could be approximately 50 to 59 dBA at a residence due to new installations, which would be higher than ambient conditions of 35 to 40 dBA and be comparable to sound levels at an urban residence or conversation at a distance of 1 meter.
(OSHA 2013). Any future relocations of mine fan would be subject to DEQ approval and current or future surface access agreements.

### 4.1.13 Transportation Facilities

The Proposed Action would continue to utilize existing transportation facilities including roads and overhead electrical transmission lines. New facilities required to support the Proposed Action would include roads, a conveyor and road crossing associated with WDA #2, and transmission lines.

New secondary and tertiary roads would be constructed to access boreholes and perform reclamation activities (see Figure 2.1-2 and Chapter 2). These roads would remain until they are no longer required to support mining activities, after which they would typically be reclaimed, resulting in no long-term effects.

Construction of the proposed WDA #2 would require construction of a conveyor crossing of Fattig Creek Road and an at-grade equipment crossing of Fattig Creek Road (Figure 2.1-1). Construction, operation, and maintenance of the conveyor and crossing would periodically affect traffic on Fattig Creek Road. SPE would obtain the necessary permits or permissions from Musselshell County prior to constructing the facility and would comply with provisions of the agreement and State-approved mine permit pertaining to these facilities, ensuring that adverse effects to existing transportation facilities are minimal. The conveyor and equipment crossing would be removed or reclaimed, as appropriate, at the conclusion of mining, ensuring that there are no long-term effects.

New buried or overhead electrical transmission lines would likely be required to power ventilation fans installed at boreholes above the East Mains (Figure 2.1-2). These new transmission lines would connect to existing transmission lines in the Surface Facilities Area and extend from one fan installation to the next as mining proceeds eastward and fan installations are moved to accommodate mining advance.

At the conclusion of mining, transmission lines would be decommissioned and roads would be reclaimed to the pre-mine condition unless landowners request that they remain to support post-mine land uses. All proposed facilities permanent facilities are subject to future MDEQ approval as part revisions of the mine permit as mining advances. If transmission lines are removed, there would be no long-term effects. Transmission structures allowed to remain after mining would support existing land uses and have beneficial impacts.

### 4.1.14 Hazardous and Solid Waste

The Proposed Action would continue to generate CPW for nine years more than the No Action Alternative (11.5 years total). The volume of waste generated would fill the existing WDA and require construction of proposed WDA #2 (Figure 2.1-1). Waste is expected to be similar to that described in the Coal Lease EA and would be handled in a manner described therein (see Appendix A, Section 2.1.2.4). The specific design and operation of WDA #2 must be conducted in accordance with applicable regulations (e.g., ARM 17.24.924) and would be
subject to approval by MDEQ. The potential effects of this connected action on other environmental resources are discussed elsewhere in this chapter.

4.1.15 Short-term Uses and Long-term Productivity

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

4.1.16 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, subsidence is unavoidable if coal is mined in a productive and economic manner. The subsidence indirectly affects a number of resource areas as described in the Coal Lease EA and updated herein. Details regarding these impacts are presented in the preceding resource sections and the Coal Lease EA (Appendix A). Unavoidable adverse effects are summarized in Table 4.1.16-1.

4.2 Effects from No Action

4.2.1 Topography and Physiography

Mining would continue to have the effects discussed in the Coal Lease EA. Additionally, borehole pads and other surface facilities required to support mining would be constructed and alter the topography and physiography in the same manner as the Proposed Action, but the extent of these activities would be limited to areas associated with mining to the end of Longwall Panel 6.

4.2.2 Geology, Mineral Resources, and Paleontology

The effects of mining would occur as described in the Coal Lease EA, resulting in removal of 35 million tons of coal through the end of Longwall Panel 6, including 0.9 million tons of Federal coal that would be mined in accordance with the current mining plan (SPE 2014a).
### Table 4.1.16-1. Unavoidable adverse effects of the Proposed Action.

<table>
<thead>
<tr>
<th>Resource</th>
<th>Unavoidable Adverse Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Topography and Physiography</td>
<td>Topographic effects of WDA #2 construction are unavoidable because waste must generate and permanently stored to conduct operations in an economical manner and to maximize coal quality.</td>
</tr>
<tr>
<td>Geology, Mineral Resources and Paleontology</td>
<td>Buried paleontological resources may be permanently impacted by construction activities. Such impacts are unavoidable as the resources are not locatable and, therefore, cannot be avoided by construction.</td>
</tr>
<tr>
<td>Air Quality</td>
<td>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.</td>
</tr>
<tr>
<td>Water Resources</td>
<td>Impacts to water resources resulting from coal extraction and subsidence are unavoidable. However, these impacts would be mitigated through implementation of detailed plans, which require replacement of water to support uses that existed prior to mining.</td>
</tr>
<tr>
<td>Soil</td>
<td>Soil in disturbance areas would exhibit more homogenous textures and may have more coarse fragments near the surface following mining. Some soil loss may occur as a result of erosion, prior to stabilization.</td>
</tr>
<tr>
<td>Vegetation</td>
<td>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.</td>
</tr>
<tr>
<td>Wildlife</td>
<td>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.</td>
</tr>
<tr>
<td>Cultural Resources</td>
<td>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.</td>
</tr>
<tr>
<td>Visual Resources</td>
<td>Mining activity and associated disturbances and facilities would unavoidably alter the landscape during the mining term, affecting the aesthetic qualities. Some features would be visible from public access points, including US Highway 87. The effects would be negligible following reclamation.</td>
</tr>
<tr>
<td>Noise</td>
<td>Noise would result from mining activities similar to the existing condition. However, activities would extend farther eastward in the permit area. Ventilation fans would likely result in 50 to 59 dBA noise levels at the nearest residence during a portion of the future mining term.</td>
</tr>
<tr>
<td>Transportation Facilities</td>
<td>Fattig Creek Road would be periodically affected by construction of road crossings associated with WDA #2. The effects would occur during the mining term.</td>
</tr>
<tr>
<td>Hazardous and Solid Waste</td>
<td>Economical coal mining and associated coal processing would yield coal waste to be permanently stored in the proposed WDA #2.</td>
</tr>
</tbody>
</table>

#### 4.2.3 Air Quality

**Particulate Matter**

Estimates based on 2012 PM$_{10}$ and PM$_{2.5}$ emissions resulting from the specific mine operations at the Bull Mountains Mine No. 1 and described in Section 3.1.1 would continue for another 2.5 years until the Federal coal is reached.


**Greenhouse Gases/Climate Change**

The No Action Alternative anticipates that SPE would mine its remaining estimated 35 million tons of recoverable coal reserves at the Bull Mountains Mine No. 1 in 2.5 years at average and maximum annual production rates of approximately 11.7 and 15 million tons, respectively. Estimates based on 2014 GHG emissions (23.16 million metric tons annually) resulting from the mine operations, transporting, and combusting coal would continue for another approximately 2.5 years until the Federal coal is reached at the north end of Longwall Panel 6.

Coal shipped from Bull Mountains Mine No. 1 would most likely be used by coal-fired power plants to generate electricity as described in **Section 3.1**. The No Action Alternative would not likely result in a decrease of CO₂ emissions attributable to coal-burning power plants in the long term. There are multiple other sources of coal that could supply the demand for coal beyond the time that the Bull Mountains Mine No. 1 completes recovery of all coal proposed for mining. Without continued coal export from the Bull Mountains Mine No. 1 after the remaining 35 million tons is mined, it is reasonable to expect that power plant(s) would obtain coal from alternative sources on the spot market and coal combustion emissions would be comparable to the Proposed Action, depending on the coal quality and associated efficiency. Negligible impacts to climate change are expected under the No Action Alternative.

**4.2.4 Water Resources**

For the No Action scenario, the response of the underlying groundwater system is anticipated to be similar to, but slightly greater in magnitude to, what has been observed to date (see **Section 3.2**). Effects that would occur in association with the mining and associated subsidence are projected as follows:

- **Drawdown** would occur in the following stratigraphic units:
  - In the lower portions of the overburden strata (mainly interval OB-5 and near active long-wall mining).
  - Mammoth coal (a majority of drawdown would occur in the northern central portion of the permit and in areas adjacent to/north of the mine).
  - Upper underburden (a majority of drawdown, would occur in the northern central portion of the permit area and in areas to the north of the mine).
  - Deep underburden aquifer (a maximum drawdown of about 1 to 2 feet is projected).
  - There is the potential that if a groundwater supply source is dependent upon the deeper overburden, Mammoth coal, or even upper underburden, then that well could be adversely affected by mining. If that were to occur, mitigation would be required accordingly and the most likely mitigation source would be the deep underburden aquifer.

- The effective cone of depression area would expand slightly beyond that which is presently being observed.

- Long term effects to spring flows for either water quality or quantity are considered unlikely based upon the response of springs to date.
• Water quality effects to groundwater are projected to be limited to the mine gob and to strata immediately underlying and/or immediately adjacent to this gob.
• Surface water quantity effects are considered unlikely. Some limited detention/ponding may occur if ridges develop, but the storage associated with that ponding, if it occurs, would be minimal.
• Surface water quality effects associated with subsidence are considered unlikely.

4.2.5 Soil

Impacts to soil resulting from the No Action Alternative would be comparable to those described for the Proposed Action. However, the total new disturbance would be limited to 109 acres more than the current condition and WDA #2 would not be constructed.

4.2.6 Vegetation

Impacts to soil resulting from the No Action Alternative would be similar to those described for the Proposed Action, but would be lesser in extent. Total new disturbance would be limited to 109 acres and would generally be comprised of the same vegetation types as those that would be disturbed by the Proposed Action. Impacts associated with noxious weed infestations would be similar, but their expansion as a result of mining activity would likely occur across a smaller area.

4.2.7 Wildlife

Impacts to wildlife resulting from the No Action Alternative would be similar to those described for the Proposed Action, but would be lesser in extent. Wildlife disturbances would be limited to the areas affected by mining through Panel 6 and impacts associated with construction of WDA #2 would not occur. The duration of effects would be approximately nine years less than the Proposed Action Alternative and would likely continue following mining in association with reclamation activities.

4.2.8 Threatened, Endangered, and Special Status Species

No species listed as threatened or endangered under ESA are known or likely to occur in the area affected by the No Action Alternative (OSMRE 2013, 2014). Special status species, including BLM-sensitive species and Montana SOC are present (Appendix B) and would likely be directly and indirectly affected by the No Action Alternative in a manner similar to other wildlife as discussed in the preceding section.

4.2.9 Ownership and Use of Land

The extent of effects to ownership and land use would be similar to the Proposed Action, but limited to those areas affected by mining through Longwall Panel 6. The effects would occur for approximately nine years less than the Proposed Action and effects related to future facility construction and subsidence repairs would be limited to approximately 109 acres.
4.2.10 Cultural Resources

Similar to the Proposed Action, impacts to cultural resources would be avoided, minimized or mitigated in conjunction with the No Action Alternative. However, the extent of future surface disturbance would be limited to 109 acres, most of which would occur over undermined areas subject to subsidence effects.

4.2.11 Visual Resources

Effects of the No Action Alternative on visual resources would be similar to those of the Proposed Action, but would occur over a smaller area. While one more borehole pad may be required in the vicinity of Fattig Creek Road and disturbance in the Surface Facilities Area may be expanded, WDA #2 would not be constructed and activities would not occur beyond Longwall Panel 6.

4.2.12 Noise

Surface activities associated with the No Action Alternative would continue to generate noise for approximately 2.5 years in a manner comparable to the existing condition (Section 3.8). Outside the Surface Facilities Area, noise would continue to be generated along roads, at borehole pads, and in the vicinity of subsidence repairs. The level and extent of noise generation would be comparable to the existing conditions and would occur at new locations (Figure 2.1-2) as mining progresses, but would not occur beyond Longwall Panel 6. The continuously operated ventilation fan may be moved to one new location above East Mains. A new fan location would likely be located at least 4,000 feet from the nearest residence, equating to an estimated maximum noise level of 47 dBA at the residence.

4.2.13 Transportation Facilities

The No Action Alternative would continue to utilize existing transportation facilities and would also require new facilities similar to the Proposed Action. However, new roads would not be required to support mining beyond Longwall Panel 6. Similarly, ventilation fan installations would not be constructed beyond Longwall Panel 6, reducing the length of additional transmission lines that would be constructed, if any. The No Action Alternative would not require construction of WDA #2 and the associated conveyor and equipment crossing would not be constructed. Similar to the Proposed Action, constructed roads and powerlines may remain in place following mining where approved by MDEQ.

4.2.14 Hazardous and Solid Waste

Under the No Action Alternative, waste generated for the remaining 2.5 years of mine life would be deposited in the existing WDA and WDA #2 would not be required.
4.3 Cumulative Impacts

The Proposed Action and No Action Alternatives would contribute to past, present, and reasonably foreseeable actions to have cumulative effects on the environment. The direct and indirect effects of the Proposed Action and No Action Alternatives are described in Sections 4.1 and 4.2. The information presented in this section supplements the cumulative effects analysis presented in the Coal Lease EA, which remains applicable and is hereby incorporated by reference into the analysis in this section.

4.3.1 Climate Change

The impacts of mining, processing, shipping, and combusting the coal are considered in this EA because it is a logical consequence of approving a mining plan for an existing mine. It is not possible to identify the ultimate purchaser and the ultimate use of coal to be mined in the future; however, based on current and historical uses, it is likely that the coal would be used by coal-fired power plants to generate electricity. A description of cumulative GHG emissions, climate change, and associated policies and regulations was presented in the Coal Lease EA and an analysis of potential impacts of mining and burning 12 million tons of coal annually has been evaluated herein (see Section 4.1.3).

Background and Regulatory Environment

Historically, the coal mined in Montana and Wyoming has been transported and used as one of the sources of fuel to generate electricity in power plants located throughout the United States. Coal-fired power plant emissions include carbon dioxide (CO₂), which has been identified as a principal anthropogenic GHG. Coal from the Powder River Basin is also being exported to Asia and Europe.

The Coal Lease EA summarized findings of the International Panel of Climate Change’s (IPCC) 2007 Synthesis report (IPCC 2007; AR4). The IPCC’s Fifth Assessment Report (AR5) was released on October 31, 2014. The evidence for human influence on the climate system has grown since the Fourth Assessment Report (AR4). Major findings (IPCC 2014) regarding the mining, processing, shipping, and combusting of coal as an energy source include the following reported with high confidence:

- Human influence on the climate system is clear, and recent anthropogenic emissions of greenhouse gases are the highest in history. Recent climate changes have had widespread impacts on human and natural systems.
- Warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, and sea level has risen.
- Anthropogenic greenhouse gas emissions have increased since the pre-industrial era, driven largely by economic and population growth, and are now higher than ever. This has led to atmospheric concentrations of carbon dioxide, methane and nitrous oxide that are unprecedented in at least the last 800,000 years. Their effects, together with those of other anthropogenic drivers, have been detected throughout the climate system and are...
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extremely likely to have been the dominant cause of the observed warming since the mid-20th century.

As depicted on the graphic below, anthropogenic greenhouse gas emissions in 2010 have reached 49 ± 4.5 gigatonne CO₂ equivalent per year (GtCO₂ eq/yr.). Emissions of CO₂ from fossil fuel combustion and industrial processes contributed about 78 percent of the total greenhouse gas emissions increase from 1970 to 2010, with a similar percentage contribution for the increase during the period 2000 to 2010. Globally, economic and population growth continued to be the most important drivers of increases in CO₂ emissions from fossil fuel combustion. The contribution of population growth between 2000 and 2010 remained roughly identical to the previous three decades, while the contribution of economic growth has risen sharply (Figure 4.3.1-1). AR5 has high confidence that increased use of coal has reversed the long-standing trend of gradual decarbonization (i.e., reducing the carbon intensity of energy of the world’s energy supply).

Source: IPCC 2014

Figure 4.3.1-1 Global anthropogenic CO₂ emissions

Expected impacts of greenhouse gas emissions as described in AR5 include:

- In recent decades, changes in climate have caused impacts on natural and human systems on all continents and across the oceans. Impacts are due to observed climate change, irrespective of its cause, indicating the sensitivity of natural and human systems to changing climate.
- Changes in many extreme weather and climate events have been observed since about 1950. Some of these changes have been linked to human influences, including a decrease in cold temperature extremes, an increase in warm temperature extremes, an increase in extreme high sea levels and an increase in the number of heavy precipitation events in a number of regions.
- Continued emission of greenhouse gases will cause further warming and long-lasting changes in all components of the climate system, increasing the likelihood of severe, pervasive and irreversible impacts for people and ecosystems. Limiting climate change would require substantial and sustained reductions in greenhouse gas emissions which, together with adaptation, can limit climate change risks.
Cumulative emissions of carbon dioxide largely determine global mean surface warming by the late 21st century and beyond. Projections of greenhouse gas emissions vary over a wide range, depending on both socio-economic development and climate policy.

Surface temperature is projected to rise over the 21st century under all assessed emission scenarios. It is very likely that heat waves will occur more often and last longer, and that extreme precipitation events will become more intense and frequent in many regions. The ocean will continue to warm and acidify, and global mean sea level to rise.

Climate change will amplify existing risks and create new risks for natural and human systems. Risks are unevenly distributed and are generally greater for disadvantaged people and communities in countries at all levels of development.

Many aspects of climate change and associated impacts will continue for centuries, even if anthropogenic emissions of greenhouse gases are stopped. The risks of abrupt or irreversible changes increase as the magnitude of the warming increases.

The EPA recently released the Overview of Greenhouse Gases and Sources of Emissions (EPA 2014a). Key findings from the 1990-2012 U.S. inventory include:

- In 2012, U.S. greenhouse gas emissions totaled 6,526 million metric tons of carbon dioxide equivalents.
- U.S. emissions decreased by 3.4 percent from 2011 to 2012. Recent trends can be attributed to multiple factors including reduced emissions from electricity generation, improvements in fuel efficiency in vehicles with reductions in miles traveled, and year-to-year changes in the prevailing weather.
- Greenhouse gas emissions in 2012 were 10 percent below 2005 levels.

According to EPA (2014a), the primary sources of greenhouse gas emissions in the United States in 2012 were:

- Electricity Production (32 percent of 2012 greenhouse gas emissions or 2,008 million metric tons) - Electricity production generates the largest share of greenhouse gas emissions. Over 70 percent of our electricity comes from burning fossil fuels, mostly coal and natural gas.
- Transportation (28 percent of 2012 greenhouse gas emissions or 1,827 million metric tons) - Greenhouse gas emissions from transportation primarily come from burning fossil fuel for our cars, trucks, ships, trains, and planes. Over 90 percent of the fuel used for transportation is petroleum-based, which includes gasoline and diesel.
- Industry (20 percent of 2012 greenhouse gas emissions) - Greenhouse gas emissions from industry primarily come from burning fossil fuels for energy as well as greenhouse gas emissions from certain chemical reactions necessary to produce goods from raw materials.
- Commercial and Residential (10 percent of 2012 greenhouse gas emissions) - Greenhouse gas emissions from businesses and homes arise primarily from fossil fuels burned for heat, the use of certain products that contain greenhouse gases, and the handling of waste.
• Agriculture (10 percent of 2012 greenhouse gas emissions) - Greenhouse gas emissions from agriculture come from livestock such as cows, agricultural soils, and rice production.

Energy policy in the United States is determined by Federal, state and local entities and addresses issues of energy production, distribution, and consumption, such as building codes and gas mileage standards. Energy policy may include legislation, international treaties, subsidies and incentives to investment, guidelines for energy conservation, taxation and other public policy techniques. At this time, there is no comprehensive over-riding long-term energy policy or policy or law in place that regulates CO₂ emissions. Three Energy Policy Acts have been passed, in 1992, 2005, and 2007, which include many provisions for conservation, such as the Energy Star program, and energy development, with grants and tax incentives for both renewable energy and non-renewable energy. EPA is developing standards for greenhouse gas emissions from mobile and stationary sources under the Clean Air Act (EPA 2014c).

Greenhouse Gas Emissions

According to the EPA 1990-2012 emissions inventory estimated CO₂ emissions in the US totaled approximately 6,526 million metric tons in 2012 and estimated CO₂ emissions from electric power generation totaled approximately 2,088 million metric tons (EPA 2014a). Annual coal production destined for electricity production in connection with the Federal lease would be 12 million tons of clean coal or roughly less than 1 percent of the estimated US total coal production of 1,016.4 million tons of coal in 2012 (EIA 2014). The emissions from burning coal from the Federal lease would be a small percentage of the US total.

As discussed in the BLM Coal Lease EA (2011), “The coal used by the target power plants could be provided by Powder River Basin mines rather than the Bull Mountains Mine No. 1. However, there is an approximate 10 percent increase in the energy value (BTUs per pound) provided from the coal considered in this assessment. Relative to Powder River Basin Mines, the energy efficiency of coal sold by Bull Mountains Mine No. 1 would decrease GHG emissions by burning less coal to produce the same amount of electricity.”

Technologies and emission control systems are reducing emissions and increased regulation would likely reduce emissions in the future. The cumulative impact would be negligible and reduced by these measures. Potential future GHG emissions from the mine and related actions such as coal transport and combustion are expected to remain relatively consistent with the maximum estimated annual emissions discussed herein. Therefore, the rate of contribution to the cumulative impact during mining of Federal coal land would remain relatively constant, with the primary difference between the alternatives being the duration of the contribution. At the maximum rate of emissions evaluated herein (15 million tons raw coal mined, 12 million tons of clean coal sold), the Proposed Action would operate for an additional 6.6 years more than the No Action and then exhaust the permitted coal reserves. However, the expected mining rate (annual tons of production) is lower, which would result in less annual emissions, but more years of mining (11.5 years under the Proposed Action Alternative).
Additional contributions of fugitive dust and GHG emissions would occur from dispersed residential subdivisions including houses, roads, infrastructure and residential traffic.

The level and duration of emissions from the Proposed Action has been quantified, but the state of climate change science does not allow any given level of emissions to be tied back to a quantifiable effect on climate change.

*It is difficult to discern whether global climate change is already affecting resources in the analysis area because no specific studies have been done. It is important to note that projected changes are likely to occur over several decades to a century. Therefore many of the projected changes associated with climate change may not be measurably discernible within the reasonably foreseeable future. Existing climate prediction models are global or continental in scale; therefore, they are not appropriate to estimate potential impacts of climate change on the planning area. Yellowstone National Park is being considered as a location for a long-term climate study.*

### 4.3.2 Vegetation

The inherent nature of noxious and invasive weeds contributes to their continued expansion throughout Yellowstone and Musselshell Counties, including the permit area. Human activities distribute noxious and invasive weeds, particularly activities involving movement of vehicles, machinery, and livestock from an infested area to an uninfested area. Natural distribution occurs as a result of wind, water and wildlife. Mining activities and associated vehicle and equipment operations would contribute to ongoing expansion of noxious and invasive weeds. Continued application of herbicide and other measures to control noxious weeds would help limit this expansion, but noxious weeds are difficult to eradicate and are likely to be present to some extent in the vicinity of the mine and surrounding counties into the foreseeable future. The cumulative effect would be minimized through continued implementation of noxious weed control plans, likely preventing substantial adverse effects to vegetation or associated land uses.
5.0 CONSULTATION & COORDINATION

5.1 Consultation & Coordination

A full discussion of the consultation and coordination efforts made during preparation of the application for the existing state mining permit and the preparation of the Coal Lease EA is presented in Chapter 5 of the Coal Lease EA (Appendix A). No subsequent non-government consultation was conducted during the preparation of this EA.

OSMRE released a Public Notice of the availability of the Federal Mining Plan Modification EA on October 19, 2014 in the Billings Gazette and on October 22, 2014 in the Roundup Record-Tribune. Written comments were solicited until November 21, 2014. Appendix C presents a summary of the comments received by the public and the OSMRE’s responses to these comments.

5.2 Preparers and Contributors

OSMRE and SPE personnel that contributed to the development of this EA include the following:

**Table 5.2-1. OSMRE and Signal Peak Energy personnel.**

<table>
<thead>
<tr>
<th>Name</th>
<th>Organization</th>
<th>Project Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bob Postle</td>
<td>OSMRE</td>
<td>Project Lead</td>
</tr>
<tr>
<td>Marcelo Calle</td>
<td>OSMRE</td>
<td>Project Coordination</td>
</tr>
<tr>
<td>Lauren Mitchell</td>
<td>OSMRE</td>
<td>Project Assistance</td>
</tr>
<tr>
<td>Dusty Weber</td>
<td>SPE</td>
<td>Identification of existing condition and description of proposed action</td>
</tr>
<tr>
<td>Robert Ochsner</td>
<td>SPE</td>
<td>Identification of existing conditions</td>
</tr>
</tbody>
</table>

Third party contractors who contributed to the development of this EA are identified in **Table 5.2-2.**

**Table 5.2-2. Third party contractor personnel.**

<table>
<thead>
<tr>
<th>Name</th>
<th>Organization</th>
<th>Project Responsibility</th>
<th>Education/Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Judd Stark</td>
<td>Catena Consulting, LLC</td>
<td>Project Manager, Biological and Physical Impact Assessment, Primary Author</td>
<td>B.S. Land Rehabilitation 14 years of experience</td>
</tr>
<tr>
<td>Karen Lincoln</td>
<td>Catena Consulting, LLC</td>
<td>Assistant Project Manager, Social Impacts, Primary Author</td>
<td>B.A. Urban Studies 40 years of experience</td>
</tr>
<tr>
<td>Pete Feigley, PhD</td>
<td>Catena Consulting, LLC</td>
<td>Review of Anticipated Wildlife Impacts</td>
<td>PhD Environmental and Forest Biology 24 years of experience</td>
</tr>
<tr>
<td>Michael Nicklin, P.E., PhD.</td>
<td>Nicklin Earth and Water, Inc.</td>
<td>Water Resources Impact Assessment &amp; Discussion</td>
<td>PhD, Civil Engineering (PE) M.S. Water Resources 35 years of experience</td>
</tr>
</tbody>
</table>
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

6.0 REFERENCES, ABBREVIATIONS & ACRONYMS

6.1 References


Montana Department of Environmental Quality (MDEQ). 2013 cumulative hydrologic impact assessment found in section 4.1.4


Montana Natural Heritage Program 2013. Element occurrence records for Montana species of concern. Data provided by Montana Natural Heritage Program, P.O. Box 201800, 1515 East Sixth Ave., Helena, MT 59620-1800. August 2013.


Montana DEQ Coal Program, 2001 11th AV Bldg B, Helena, MT 59601
Phone: (406) 444-4970
OR
Office of Surface Mining Reclamation and Enforcement, 1999 Broadway, Suite 3320, Denver, CO 80202
Phone: (303) 293-5000

SPE. 2014b. Application To Modify Air Quality Permit #3179-08, Per Montana Department of Environmental Quality – Air Resources Management Bureau, ARM 17.8. Prepared by IML Air Science, a division of Inter-Mountain Laboratories, Inc., July.


SPE. 2014e Yellowstone County Weed District Weed Management Plan. March 14, 2014.


Smith, R. 2014b. Personal communication with Ronn Smith, Air Science Manager, Inter-Mountain Labs for CO₂ Emissions Calculations from Coal Transportation. Email communication with Karen Lyncoln, Catena Consultants. September 18, 2014.


## 6.2 Abbreviations and Acronyms

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
</tr>
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<tbody>
<tr>
<td>ARM</td>
<td>Administrative Rules of Montana</td>
</tr>
<tr>
<td>ASLM</td>
<td>Assistant Secretary, Land and Mineral Management (DOI)</td>
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<tr>
<td>BACT</td>
<td>Best available control technology</td>
</tr>
<tr>
<td>BLM</td>
<td>U.S. Bureau of Land Management</td>
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<tr>
<td>BMP</td>
<td>Best management practice</td>
</tr>
<tr>
<td>Btu</td>
<td>British thermal unit</td>
</tr>
<tr>
<td>C</td>
<td>Celsius</td>
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<tr>
<td>CEQ</td>
<td>Council on Environmental Quality</td>
</tr>
<tr>
<td>CFR</td>
<td>Code of Federal Regulations</td>
</tr>
<tr>
<td>CAA</td>
<td>Clean Air Act</td>
</tr>
<tr>
<td>CH₄</td>
<td>Methane</td>
</tr>
<tr>
<td>CO</td>
<td>Carbon monoxide</td>
</tr>
<tr>
<td>CO₂</td>
<td>Carbon dioxide</td>
</tr>
<tr>
<td>CPW</td>
<td>Coal processing waste</td>
</tr>
<tr>
<td>CWA</td>
<td>Clean Water Act</td>
</tr>
<tr>
<td>dBA</td>
<td>Adjusted decibels, a logarithmic unit of sound levels</td>
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<tr>
<td>DOI</td>
<td>U.S. Department of the Interior</td>
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<tr>
<td>DPF</td>
<td>Diesel particulate filters</td>
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<tr>
<td>EA</td>
<td>Environmental Assessment</td>
</tr>
<tr>
<td>EIS</td>
<td>Environmental Impact Statement</td>
</tr>
<tr>
<td>EPA</td>
<td>U.S. Environmental Protection Agency</td>
</tr>
<tr>
<td>ESA</td>
<td>Endangered Species Act</td>
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<tr>
<td>FCLAA</td>
<td>Federal Coal Leasing Act Amendment (1976)</td>
</tr>
<tr>
<td>FONSI</td>
<td>Finding of No Significant Impact</td>
</tr>
<tr>
<td>GHG</td>
<td>Greenhouse gas</td>
</tr>
<tr>
<td>gpm</td>
<td>gallons per minute</td>
</tr>
<tr>
<td>HAP</td>
<td>Hazardous air pollutants</td>
</tr>
<tr>
<td>HIH</td>
<td>high first high, a term in air quality monitoring</td>
</tr>
<tr>
<td>LBA</td>
<td>Lease by Application</td>
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<tr>
<td>LOM</td>
<td>Life of mine</td>
</tr>
<tr>
<td>μg/m³</td>
<td>micrograms per cubic meter</td>
</tr>
<tr>
<td>MAAQS</td>
<td>Montana Ambient Air Quality Standards</td>
</tr>
<tr>
<td>MAQP</td>
<td>Montana Air Quality Permit</td>
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</tbody>
</table>
MDEQ  Montana Department of Environmental Quality
MLA   Mineral Leasing Act (1920)
MPDES Montana Pollutant Discharge Elimination System
MSHA  Mining Safety and Health Act
MSUMRA Montana Strip and Underground Mine Reclamation Act
N₂O   Nitrous oxide
NAAQS National Ambient Air Quality Standards
NEPA  National Environmental Policy Act (1969)
NHTSA National Highway Traffic Safety Administration
NRHP  National Register of Historic Places
NOx   Nitrous oxides
OB    Overburden well
OSMRE Office of Surface Mining Reclamation and Enforcement
PAP   Permit Application Package
ppm   parts per million
PM2.5 Fine particulates less than 2.5 microns
PM10  Fine particulates less than 10 microns
PSD   Federal Prevention of Significant Deterioration Program
R2P2  Resource Recovery and Protection Plan
SMCRA Surface Mining Control and Reclamation Act (1977)
SO₂   Sulfur dioxide
SPE   Signal Peak Energy, LLC
TDS   Total dissolved solids
THC   Hydrocarbons
TSS   Total suspended solids
tpy   tons per year
VOC   Volatile organic compound
WDA   Waste disposal area
WET   Whole effluent toxicity
APPENDIX A

Federal Coal Lease EA

MTM 97988, April 2011
APPENDIX B

Species Recorded or Potentially Occurring
in Wildlife Monitoring Area
APPENDIX C

Comment Response Summary