United States Department of the Interior
Bureau of Land Management

Environmental Assessment
DOI-BLM-MT-C010-2009-0010-EA
April, 2011

Bull Mountains Mine No. 1
Federal Coal Lease MTM 97988
Musselshell County, Montana



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TAKE PRIDE IN AMERICA

In Reply Refer To:
3420 (MTM-97988)

April 15, 2011

Dear Reader:

Enclosed is a copy of the Finding of No Significant Impact (FONSI) and Decision Record (DR) for the Bull Mountains Mine Number 1 Federal Coal Lease by Application project.

The Environmental Assessment (EA) was prepared pursuant to the National Environmental Policy Act (NEPA), other regulations, and statutes to fully disclose potential impacts of: 1) the proposed action to competitively lease coal; 2) the continued operation and development of an existing underground coal mine; and 3) the impacts from not taking any action.

The EA, FONSI, and DR are also available for viewing and printing on the web at http://www.blm.gov/mt/st/en/fo/billings_field_office.html.

We solicited public comments on the EA via a letter mailed to the appropriate agencies, specific interested parties, and the general public dated March 16, 2010, and by posting the letter on the BLM Billings Field Office website. The EA was available for public review from March 28, 2010, to April 27, 2010, by legal notice published in the *Federal Register* and the Billings newspaper. In addition, there were announcements of the availability of the EA in the Roundup newspaper. A public hearing was held on April 13, 2010, at the BLM State Office, 5001 Southgate Drive, Billings, Montana. Public comments were received through April 27, 2010.

Five parties commented on the EA by letter during the public comment period. We reviewed and analyzed all EA comments. Those requesting clarification or additional analyses were considered and, as appropriate, supplemental information is highlighted and included in the revised EA. Comments that were outside the scope of the analysis or required a response that is not included in the revised EA are addressed in the DR.

The BLM would like to thank everyone who participated in the analysis process. Your input was essential to ensure that all issues were fully considered.

If you have questions or need additional information, please contact Jim Sparks at 406-896-5241, or Craig Drake at 406-896-5349.

Sincerely,

James M. Sparks
Field Manager

Enclosure

Finding of No Significant Impact / Decision Record
Billings Field Office

INTRODUCTION:

Signal Peak Energy, LLC (SPE) filed a Coal Lease-by-Application (LBA), MTM 97988, with the Bureau of Land Management (BLM) on March 20, 2008 according to 43 CFR 3425. The Federal Coal Tract contains the following lands:

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

Sec. 4, lot 1, S1/2NE1/4, SE1/4NW1/4 and S1/2;	479.76 acres
Sec. 8, NE1/4, NE1/4NW1/4, S1/2NW1/4 and S1/2;	600.00 acres
Sec. 10, W1/2NE1/4, SE1/4NE1/4, NW1/4 and S1/2;	600.00 acres
Sec. 14, SW1/4NE1/4, NW1/4 and S1/2;	520.00 acres
Sec. 22, W1/2 and SE1/4.	480.00 acres
Total	2,679.76 acres

The BLM has prepared an environmental assessment (EA No. DOI-BLM-MT-C010-2009-0010-EA) to analyze the potential impacts of incorporating the LBA into the existing Bull Mountains Mine No. 1, Musselshell County, Montana. The EA is available at the Billings Field Office and is incorporated by reference for this Finding of No Significant Impact (FONSI). The LBA would provide a logical extension of SPE's Mammoth coal seam workings within the current Bull Mountains Mine No. 1 and would allow the mine to continue producing coal at the current rate instead of ceasing production as recoverable private coal reserves are exhausted.

PLAN CONFORMANCE AND CONSISTENCY:

The authorized officer shall only consider for lease sale those lands that have been included in a comprehensive land use plan (43 CFR 3425.2). The federal coal lands are located in the Billings Field Office and were analyzed in the Billings Resource Management Plan (RMP) prepared in 1983. The Record of Decision for the RMP was issued in September 1984. The RMP Decision Record states at page 34, " All the Federal coal which is mineable by underground methods is suitable for further consideration for leasing..." in the Bull Mountains coal field. The proposed action has been reviewed and found to be in conformance with the BLM Land Use Plan. A number of changes have occurred since that time including the development of the Bull Mountains Mine No. 1, and the RMP is currently being revised.

FINDING OF NO SIGNIFICANT IMPACT DETERMINATION:

Based upon a review of the EA and the supporting documents, I have determined that the project is not a major federal action and will not significantly affect the quality of the human environment, individually or cumulatively with other actions in the general area. No environmental effects meet the definition of significance in context or intensity as

defined in 40 CFR 1508.27 and do not exceed those effects described in the Billings RMP/FEIS. Therefore, an environmental impact statement is not needed. This finding is based on the context and intensity of the project as described in the sections below.

Context: This project is a site-specific action directly involving underground mining of federal coal reserves in a 2,679.76 acre lease tract. There will be no direct surface impact above the coal to be mined as the surface facilities for the mine are already established and in operation. This coal is an element of the life of mine (LOM) plan that has been approved for the mine and does not have international, national, regional or state-wide importance. There would be socioeconomic benefits related to continued mining and coal production at or near current levels that are currently being mined.

Short-term effects to some water resources may occur as a result of mine related subsidence. Fractures in the overburden above the mined coal seam could cause leakage of water into the mine. A monitoring program has already been implemented for the existing mine area and will be applied to the coal lease area. Approved mitigation measures will also be applied to prevent, minimize, or restore any potential effects from subsidence. Settling of the land associated with subsidence would not change the existing character of the local landscape.

Affected interests related to this coal lease may include special use, grazing, and people who use the project area for recreation. Effects would be minor and short-term in nature. No short or long term significant impacts on affected interests are expected in a regional context.

Intensity: The following discussion is organized around the Ten Significance Criteria described in 40 CFR 1508.27 and incorporated into BLM's Critical Elements of the Human Environment list (H-1790-1), and supplemental Instruction Memorandum, Acts, regulations, and Executive Orders. The following have been considered in evaluating intensity for this proposal:

1. **Impacts may be both beneficial and adverse**. Beneficial and adverse effects of the Proposed Action alternative were described in the EA. Mitigating measures to reduce potential short-term impacts to geology, water resources, air quality, soils, vegetation, wildlife, sensitive species, ownership and use of land, and cultural resources were incorporated in the design of the Proposed Action. The project would make a minor contribution to small amounts of airborne particulate matter and release of minor amounts of greenhouse gases (GHGs) at the surface facilities. Benefits of the project would be continuation of gainful employment at the mine and associated suppliers, and contribution to the supply of coal to meet the nation's energy demands. None of the environmental effects discussed in the EA are considered to be significant.

2. **The degree to which the selected alternative will affect public health or safety**. The Proposed Action Alternative is designed to control the limited public traffic that may occur in the project area of the existing surface facilities. Mine

subsidence would be monitored and mitigation measures would be implemented when subsidence would occur in the area of roads or other structures. Precautions for public health and safety would also be implemented during transport of equipment along public roads to and from the project area. Potential risks to public health and safety would be low and would occur over limited, brief periods.

3. **Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farm lands, wetlands, wilderness, wild and scenic rivers, or ecologically critical areas**. Inventories have been completed for historic and cultural resources in the area and no potential impacts to important historic or cultural resources have been identified. These resources are discussed further in Item 8. The following Critical Elements of the Human Environment are not affected because they are not present near the project area: Areas of Critical Environmental Concern, Wilderness Areas, Wild and Scenic Rivers, and Prime or Unique Farmlands. The Proposed Action includes mitigation measures to minimize any effects to small areas of wetlands in the lease areas. Fourteen Critical Elements of the Human Environment and five Non-critical Elements were analyzed in detail in the EA. Best Management Practices (BMPs) and mitigation measures were identified for those elements that could be affected. None of these elements would be significantly impacted because BMPs and mitigation measures would reduce any potential effects to either minor, or no impacts.

4. **The degree to which the effects on the quality of the human environment are likely to be highly controversial**. This decision for leasing coal reserves and its effects are not unique. Coal leasing decisions have been made in this region for many years. There is no scientific controversy over the nature of the impacts. There is some scientific uncertainty regarding the long-term effects of subsidence and how these effects can be managed. Proposed mitigation and reclamation procedures should be successful in reducing impacts. The potential intensity of these effects on the quality of the human environment is minimal.

5. **The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks**. The coal lease area is not unique or unusual. The BLM has experience implementing similar actions in similar areas. The environmental effects to the human environment are fully analyzed in the EA. There are no anticipated effects on the human environment that are considered to be highly uncertain or involve unique or unknown risks.

6. **The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.** This decision is not precedent setting. The actions considered in the selected alternative were considered by the interdisciplinary team within the context of past, present, and reasonably foreseeable future actions. Significant

cumulative effects are not anticipated. A complete analysis of the direct, indirect, and cumulative effects of all alternatives is described in Chapter 4 of the EA.

7. **Whether the action is related to other actions with individually insignificant but cumulatively significant impacts – which include connected actions regardless of land ownership.** The interdisciplinary team evaluated the possible actions in context of past, present and reasonably foreseeable actions. Present and future mining activities in the area were considered and significant cumulative effects are not anticipated. A complete disclosure of the effects of the project is contained in Chapter 4 of the EA.

8. **The degree to which the action may adversely affect districts, sites, highways, structures, or other objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.** Inventories have been completed for historic and cultural resources in the area and no potential impacts to districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or potential loss or destruction of significant scientific, cultural, or historic resources have been identified. No cultural or historic sites would be directly affected by the Proposed Action. Subsidence over mined areas could result in localized cracking, sloughing or rock toppling, particularly in areas of steep slopes. No significant or potentially eligible cultural resources have been identified in settings that may be affected by subsidence.

9. **The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973, or the degree to which the action may adversely affect: 1) a proposed to be listed endangered or threatened species or its habitat, or 2) a species on BLM's sensitive species list.** No adverse impacts to endangered, threatened, or sensitive species or their habitat have been identified. Nevertheless, mitigating measures to reduce impacts to all wildlife species have been incorporated into the design of the Proposed Action as described in the EA.

10. **Whether the action threatens a violation of a federal, state, local, or tribal law, regulation or policy imposed for the protection of the environment, where non-federal requirements are consistent with federal requirements.** The project does not violate any known federal, state, local or tribal law or requirement imposed for the protection of the environment. State, local, and tribal interests were given the opportunity to participate in the environmental analysis process. Furthermore, letters were sent to area Native American tribes concerning consulting party status, and there was no response from any of the tribes. Follow up phone calls were initiated with the tribes, and it was concluded and documented that there was no interest in this project by those tribes. In addition, the project is consistent with applicable land management plans, policies, and programs.

DECISION:

This FONSI is based on the information contained in the EA and my consideration of criteria for significance (40 CFR 1508.27). It is my determination 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 EIS is not required.

It is in the public interest to offer the Federal Coal Tract described in the introduction to this FONSI for competitive sale so that these reserves are available to compete for sale in the open coal market to meet the national coal demand.

Under this decision, the Proposed Action for the Federal Coal Tract has been selected from the Bull Mountains Mine No.1 EA. Under the Proposed Action, the Federal Coal Tract will be offered for lease at a competitive sealed-bid sale. The tract includes 2,679.76 acres, more or less, and the BLM estimates that the tract contains approximately 61.4 million tons of mineable Federal coal resources in Musselshell County, Montana.

If the highest bid received at the sale meets or exceeds the Fair Market Value (FMV) as determined by BLM and if all other leasing requirements are met, a lease will be issued to the successful qualified high bidder. The competitive lease sale will be held as described in Federal regulations found at 43 CFR Subpart 3422, Lease Sales. In the event that the highest bid submitted at the competitive lease sale of the Federal Coal Tract does not meet or exceed the FMV as determined by BLM, the BLM may, but is not obligated to, re-offer the coal tract for leasing at a later date.

Under the Proposed Action, it is assumed that the applicant would be the successful bidder on the Federal Coal Tract and that the Federal coal would be mined to the extent as provided for in the LOM underground mining plan for the adjacent Bull Mountains Mine No.1.

This decision incorporates by reference the standard coal lease stipulations which address compliance with the basic requirements of the environmental statutes and additional BLM special stipulations (Appendix A).

Alternatives Considered: The EA addressed two alternatives, the No Action and the Proposed Action Alternative. 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 LOM plan and these same mitigation measures would be applied to the lease areas.

Rationale for Decision: This action would make additional federal coal reserves available for competitive leasing, provide an opportunity to extend the life of the mine, and be consistent with BLM management goals and prescriptions for the area. This decision balances recovery of the coal resource with protection of other resources and their uses consistent with the applicable laws, regulations, BLM policy and Resource Management Plan goals and objectives, standards and guidelines, and multiple-use decisions. The coal lease application was submitted under the Mineral Leasing Act of 1920, Federal Coal Leasing Amendments Act of 1976, and the implementing regulations found at 43 CFR 3425.

The decision to allow the proposed action does not result in any undue or unnecessary environmental degradation and is in conformance with the 1984 Billings Resource Management Plan. It has been made in consideration of the impacts to the affected resources. The lease stipulations applied to the proposed action will meet or exceed the standard for Public Land Health.

A summary of these mitigation measures contained in the MDEQ Mining and Reclamation Permit, Bull Mountains Mine No 1 SMP 93017discussed in the EA are described below:

Topography and Physiography

- A monitoring plan has been implemented to determine the nature of subsidence and the potential effects to other resources listed below.

Geology, Mineral Resources, and Paleontology

- As subsidence data is collected, observed surface effects to topography would be repaired on a case by case basis by mechanical or other measures as deemed appropriate by MDEQ;

Air and Atmospheric Values

- Mining operations at the surface facilities would continue to comply with the Air Quality Permit requirements as the federal coal is mined;

Water Resources

- Depending on the resource, impacts and mitigation alternatives available, SPE would rehabilitate water resources as appropriate. This might include drilling new wells, piping water from wells or springs to specific locations, development of new springs, repair of stream channels, repair of ponds, or establishment of other water management structures. SPE would evaluate these measures on a site-specific basis in consultation with MDEQ;

Soils

- Subsidence over mined areas may alter surface drainage and accelerate erosive or unstable soils in limited areas. Mitigation of surface effects to soils would be evaluated on a site-specific basis and remedial measures would be implemented in consultation with MDEQ;

Vegetation

- Areas of subsidence disturbance would be evaluated on a site-specific basis and, if the extent of disturbance warranted, a specific repair plan would be developed and implemented in consultation with MDEQ;

Wildlife

- Subsidence may result in local changes to water resources or distribution of vegetation resources. This may affect habitat available to wildlife, however, mitigation measures for water resources and vegetation would reduce or eliminate effects on wildlife;

Threatened, Endangered, and Sensitive Species

- Subsidence may result in local changes to water resources or distribution of vegetation resources. This may affect habitat available to sensitive species, however, mitigation measures for water resources and vegetation would reduce or eliminate effects on sensitive species;

Ownership and Use of Land

- SPE would repair damage to existing buildings and structures resulting from subsidence;
- SPE would repair damage to existing infrastructure over mined areas such as roads, fences, communications facilities and utilities;
- Where there would be known or reasonably anticipated damage to infrastructure, SPE would submit a protection and mitigation plan to MDEQ for approval prior to mining under that area;
- SPE would publish the mining schedule at least six months prior to mining under an individual's land, to provide adequate warning to minimize the potential risk to humans and livestock; and

Cultural Resources

- If any cultural resources are located during subsidence repair, work would stop and the MDEQ and BLM would be notified.

Compliance/Monitoring: BLM conducts quarterly compliance inspections and production verification actions throughout the life of the lease. The inspections will be designed to insure that the operator complies with the lease stipulations. In addition, the MDEQ monitors all surface disturbing and mining activities in the lease area to insure compliance with the mine permit and the reclamation plan.

Public Involvement: Public comments were solicited via a letter mailed to the appropriate agencies, specific interested parties, and the general public dated March 16, 2010, and by posting this letter on the BLM Billings Field Office website. The EA was made available for public review from March 28, 2010 to April 27, 2010 by legal notice published in the Federal Register and Billings Newspaper. In addition there were

announcements of the availability of the EA in the Roundup Newspaper. A public hearing was held on April 13, 2010 at the BLM State Office, 5001 Southgate Drive, Billings, Montana. Public comments were received through April 27, 2010.

Five parties commented on the EA by letter during the public comment period. All EA comments were reviewed and analyzed. Comments requesting clarification or additional analyses were considered and, as appropriate, supplemental information is highlighted and included in the revised EA. Those comments that were outside of the scope of this analysis or require a response that is not included in the revised EA are provided as follows:

- Global warming has not been described as part of the environmental setting but is an observed trend in climate patterns. Furthermore, effects on global warming at the contribution level of this mine cannot be quantified. Climate tipping points are a theoretical possibility, not a verifiable reality; thus, climate tipping points have not been identified. There is speculation that tipping points may exist and may result in sudden and irreversible climate change. However, no studies have identified any thresholds or quantifiable tipping points that could be addressed in this EA. No agency has identified this as a regulatory issue and assumed responsibility for establishing standards.

- Many of the proposed impact mitigation measures take the form of adaptive management and would be evaluated as they are implemented. These types of measures are implemented until one is found to be effective. The effectiveness of proposed mitigation measures have been included in the Final EA where past experience is known.

- Air quality assessments for the existing operating mine were completed during permit updates and are summarized in the EA. Ongoing operations of the mine will comply with the terms and conditions of the permits issued.

- As stated in the EA, the only listed species with the potential to occur in Musselshell and Yellowstone Counties are the Whooping Crane and the black-footed ferret. The project area analyzed in this EA does not contain habitat for either of these species, nor have they been documented in any of the wildlife monitoring surveys. The Bureau of Land Management is not required to formally consult with the USFWS or the NMFS where a listed species is not known to occur or have its habitat potentially impacted;.

- The legal status of the Powder River Basin related to a coal production region is beyond the scope of the EA. In any event, the petition to reconsider the decertification of the Powder River Basin as a coal production region has been recently considered and rejected by the Director of the Bureau of Land Management. The detailed findings considering the decertification are a public record and can be provided upon request;

- The EA has adequately demonstrated that the foreseeable effects of the Bull Mountain Mine No. 1 expansion would not significantly affect the quality of the human environment and that there was no need to prepare a detailed EIS;

- Analysis of additional alternatives related to renewable energy sources pertain to national policy and are beyond the scope of this document;

- A protective financial bonding lease stipulation is not necessary since the regulations implementing the provisions of the Surface Mining Control and Reclamation Act (SMCRA) at chapter VII of 30 CFR, subchapter J sets forth requirements for performance bonds and public liability insurance for both surface mining and underground mining activities. Furthermore, the regulations at 30 CFR 740.4c (Responsibilities) state that the following responsibilities of OSM may be delegated to a State regulatory authority under a cooperative agreement: 4) Approval and release of performance bonds, liability insurance and, as applicable, Federal lessee protection bonds required for surface coal mining and reclamation operations on Federal lands. The State of Montana has an approved Cooperative Agreement as described in the regulations at 30 CFR 926.30. This agreement allows for State control and regulation of coal mining and reclamation operations on Federal lands. The MDEQ has the responsibility to administer this Agreement. Therefore financial bonding for water replacement, erosion control, and damage to surface improvements will be handled by the State of Montana's Department of Environmental Quality; and.

- SPE is working with MDEQ, landowners, and other agencies to monitor and determine potential impacts of subsidence. SPE will consider establishment of an Advisory Committee to address subsidence issues.

Appeals Procedures:

This decision may be appealed to the Interior Board of Land Appeals, Office of the Secretary, in accordance with the regulations contained in 43 CFR, Part 4 and the enclosed Form 1842.1. If an appeal is taken, your notice of appeal must be filed in this office (at the above address) within 30 days from receipt of this decision. The appellant has the burden of showing that the decision appealed from is in error.

If you wish to file a petition for a stay (suspension) of the effectiveness of this decision during the time your appeal is being reviewed by the Board, pursuant to Part 4, Subpart B, §4.21 of Title 43, Code of Federal Regulations, the petition for a stay must accompany your notice of appeal. A petition for a stay is required to show sufficient justification based on the standards listed below. Copies of the notice of appeal and petition for a stay **must** be submitted to each party named in this decision and to the Interior Board of Land Appeals and to the appropriate Office of the Solicitor (see 43 CFR 4.413) at the same time the original documents are filed with this office. If you request a stay, you have the burden of proof to demonstrate that a stay should be granted.

Standards for Obtaining a Stay

Except as otherwise provided by law or other pertinent regulation, a petition for a stay of a decision pending appeal shall show sufficient justification based on the following standards:

1. The relative harm to the parties if the stay is granted or denied,

2. The likelihood of the appellant's success on the merits,

3. The likelihood of immediate and irreparable harm if the stay is not granted, and

4. Whether the public interest favors granting the stay.

Should you have any questions regarding this decision, please feel free to contact...Jim Sparks, Billings Field Office Manager at (406) 896-5241.

Recommendation: I recommend that following a competitive coal lease sale, Federal Coal Tract MTM 97988 and its associated 2679.76 acres, more or less, be leased to the successful qualified high bidder provided it is determined that the highest bid meets or exceeds the Fair Market Value of the tract as determined by BLM and that all other leasing requirements are met. The competitive lease sale requirements will be held in accordance with the requirements at 43 CFR 3422. **It is further recommended to not offer the Federal Coal Tract on a deferred bonus basis, but to require payment of the balance of the bonus bid prior to award of the lease.** The lease will be subject to the standard and special stipulations found in Appendix A of this decision.

James M. Sparks

James M. Sparks, Billings Field Office Manager, Billings, Montana
Date Signed: 4/15/11

ATTACHMENTS: DOI-BLM-MT-C010-2009-0010-EA

Approval: I agree with the recommendation of the Billings Field Office Manager and approve the FONSI and the decision of the BLM to offer for lease sale the coal contained in the Federal Coal Lease Application MTM 97988.

Theresa M. Hanley

Theresa M, Hanley, Deputy State Director, Division of Resources,
Billings, Montana
Date Signed: 4/15/11

Bull Mountains Mine No. 1
Federal Coal Lease MTM 97988
Musselshell County, Montana
EA No. DOI-BLM-MT-C010-2009-0010-EA

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Appendix A BLM Special Coal Lease Stipulations, and BLM Coal Lease Form 3400-12

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Environmental Assessment
Bull Mountains Mine No. 1
Federal Coal Lease MTM 97988
Musselshell County, Montana
DOI-BLM-MT-C010-2009-0010-EA

1.0 PURPOSE AND NEED

1.1 Introduction

This Environmental Assessment (EA) has been prepared to analyze and disclose the environmental consequences of the Bull Mountains Coal Lease by Application as proposed by Signal Peak Energy, LLC (SPE), operator of the Bull Mountains Mine No. 1 underground coal mine. The EA is a site-specific analysis of potential impacts that could result with the implementation of a proposed action or alternative to the proposed action. The EA assists the Bureau of Land Management (BLM) in project planning and ensuring compliance with the National Environmental Policy Act (NEPA), and in making a determination as to whether any "significant" impacts could result from the analyzed actions. "Significance" is defined by NEPA and is found in regulation 40 CFR 1508.27. An EA provides evidence for determining whether to prepare an Environmental Impact Statement (EIS) or a statement of "Finding of No Significant Impact" (FONSI). If the decision maker determines that this project has "significant" impacts following the analysis in the EA, then an EIS would be prepared for the project. If not, a Decision Record (DR) may be signed for the EA approving the selected action, the proposed action or another alternative. A DR, including a FONSI statement, documents the reasons why implementation of the selected action would not result in "significant" environmental impacts (effects) beyond those already addressed in the Lease by Application for subject coal to be leased.

This EA analyzes the environmental effects of leasing five tracts of federal coal reserves under private and federal owned land east of the existing Bull Mountains Mine No. 1 permit area. The Bull Mountains Mine No. 1 is in the Bull Mountains of south central Montana in Musselshell County between the Musselshell and Yellowstone Rivers, approximately 30 miles north of Billings and 20 miles southeast of Roundup, Montana. On March 19, 2008, SPE filed an application 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. These tracts are shown in **Figure 1.1-1** and are referred to in this document as the coal lease area. The legal description for each tract is provided in **Chapter 2** of this EA.

1.2 Background

The coal lease area is east of the existing Mine Permit area and within the existing Bull Mountains Mine No. 1 Life of Mine (LOM) area. The coal lease area would be mined as part of the existing mine plan proposed by SPE (described in Chapter 2 of this EA). The coal would be accessed and recovered by underground continuous miner development and longwall panels. Previous assessments that have included portions or all of the LOM area include:

- Record of Decision (ROD), Billings Resource Area Final Environmental Impact Statement and Resource Management Plan (RMP) (BLM 1984)
- Bull Mountains Exchange Final EIS (BLM 1990)
- Proposed Development of the Bull Mountains Mine No. 1 FEIS (MDSL 1992)
- Bull Mountains Permit Revision 00178 EA (MDEQ 2006)
- Bull Mountains Mine No. 1 State Mine Permit (SPE 2009)

The Billings RMP (BLM 1984) included a discussion of two coal beds (Mammoth-Rehder and McCleary) in the Bull Mountains. The Bull Mountains Mine No. 1 area is within the south central portion of the Mammoth-Rehder coal field discussed in the RMP. The RMP briefly discussed the areas of this coal field suitable for further consideration for surface mining and noted that all federal coal that is mineable by underground methods is suitable for further consideration for leasing or exchange pending more detailed studies. The RMP specifically states that underground mining will be encouraged in the Bull Mountains at the expense of other mining methods. No detailed studies were completed for the RMP.

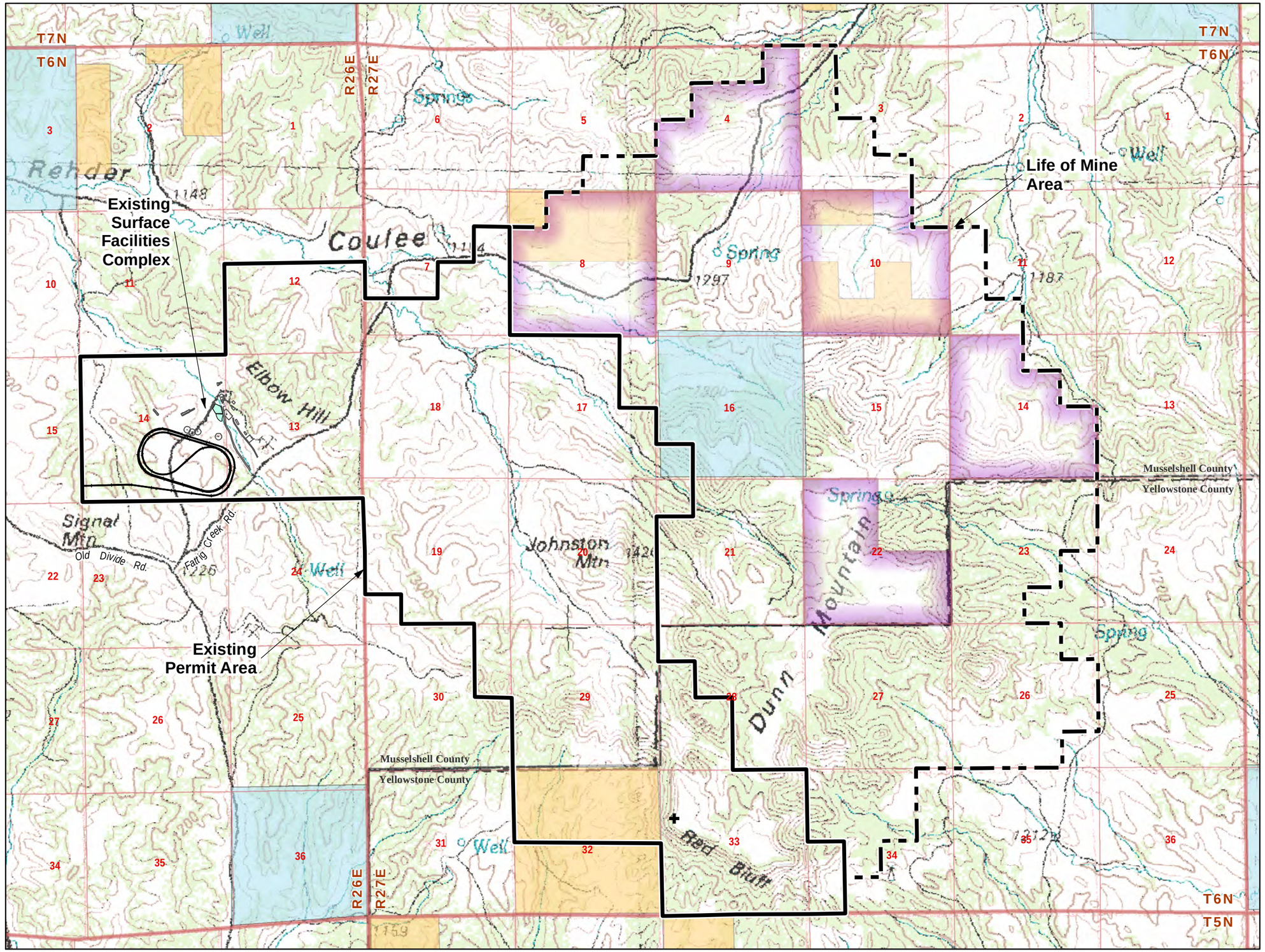
The Bull Mountains Exchange Final EIS (BLM 1990) addressed the exchange of selected federal coal lands in the Bull Mountains Mine No. 1 LOM area for high value recreation and wildlife offered lands in Montana. This EIS considered various underground mining methods with associated mine surface facilities.

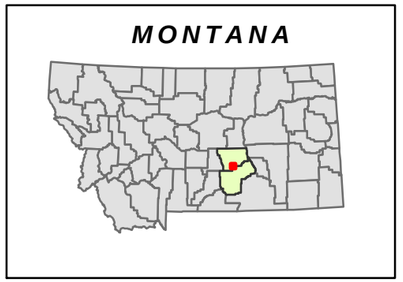
The Final Environmental Impact Statement (FEIS) for the Bull Mountains Mine No. 1 (MDSL 1992) was prepared as part of the approval process for State Mine Permit (SMP) No. 93017. The FEIS covered the mine permit area, all proposed surface facilities at the mine, the Huntley load-out facilities near Billings, Montana, and the railroad spur to Broadview, Montana. The LOM area was analyzed as a foreseeable development, and detailed studies were included in the analysis as presented in the FEIS.

Bull Mountains Mine No. 1 Mine Permit Application was submitted to Montana Department of Environmental Quality (MDEQ) in 1990 and approved with a mine permit being issued in 1993. This document has been revised to reflect current facilities and operations approved for the mine over the past 15 years. This is a living document and will continue to be updated to reflect future changes in facilities and operations for the mine.

The Bull Mountains Permit Revision 00178 EA (MDEQ 2006) was prepared as part of the application process to add 2,172 acres to the south end of the permit area and revise the mine plan (Revision No. 00178). This EA contains a description of the acreage to be added to the permit area and a discussion of proposed modifications to the longwall mining methods and design to reduce the surface effects of the longwall mining.

This EA evaluates the effects of leasing the federal coal within the five tracts in the LOM area. This EA also includes recently collected information specific to the coal lease area and would be used to determine the social, economic, and environmental resource effects of leasing the coal.





LEGEND

- Communication Tower
- Existing Permit Area
- Life of Mine Area
- BLM Coal Lease Area

Surface Ownership

- BLM Land
- State Trust Land

0 3,000 6,000 Feet

NAD 83 MONTANA STATE PLANE, US FOOT

SOURCE: USGS 1:100,000 SCALE TOPOGRAPHIC QUADRANGLE - ROUNDUP (1982), MONTANA

BULL MOUNTAIN COAL LEASING ENVIRONMENTAL ASSESSMENT

Figure 1.1-1
Project Location

ANALYSIS AREA: Musselshell & Yellowstone Counties, Montana

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1.3 Need for the Proposed Action

The purpose of the Proposed Action is to develop the coal reserves contained within the Bull Mountains LOM area, as provided for under the Mineral Leasing Act of 1920. The Proposed Action is needed to continue economically viable development of the coal resources and to allow the lessee to exercise their right to develop the leases mentioned above. The BLM is required to evaluate the Lease by Application (Proposed Action) submitted by SPE and issue decisions related to the coal lease area. This EA provides the analysis upon which the BLM can base such decisions.

The underlying need for the Proposed Action is for SPE to develop these federal coal reserves by continuing underground mining operations. The Proposed Action would extend the existing permitted mine plan to the full extent of the LOM area. These coal lease tracts are located within the LOM area and are within the mining sequence for developing large blocks of state and private coal reserves. Based on the current projected annual coal production, SPE estimates that underground mining would reach the first coal lease tract in Section 8 within approximately three years. If the federal coal reserves are not leased, the Life of Mine Plan could not be implemented in its entirety. Mining would cease upon reaching the federal coal lease area and the state and private coal reserves to the south and east would not be accessible by the longwall mine plan that has been proposed (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 mine plan; however, the accessible coal would not be economically mineable by longwall methods. The need for this leasing action would be to acquire the federal coal to ensure implementation of the Life of Mine Plan and economically recover federal, state, and private coal reserves through a logical mining unit.

A primary goal of the National Energy Policy is to add energy supplies from diverse sources, including domestic oil, gas, and coal, as well as hydropower and nuclear power. BLM recognizes that the continued extraction of coal is essential to meet the nation's future energy needs. As a result, private development of federal coal reserves is integral to the BLM coal leasing program under the authority of the Mineral Leasing Act, as well as FLPMA and FCLAA. The coal leasing program, managed by BLM, encourages the development of domestic coal reserves and reduction of the U.S. dependence on foreign sources of energy. As a result of the leasing and subsequent mining and sale of federal coal resources from the Bull Mountains Mine, the public receives lease bonus payments, lease royalty payments, and a reliable supply of low sulfur coal for power generation.

1.4 Purpose(s) of the Proposed Action

The purpose of this assessment is for the BLM to respond to SPE's Lease by Application to acquire the coal reserves in five coal lease tracts in order to implement the Life of Mine Plan for the Bull Mountains Mine No. 1. The lease area contains an estimated 61.4 million tons of in-place coal reserves in the Mammoth coal seam. The BLM, charged with administration of the mineral estate under these private and federal lands, is required, by law, to consider leasing federally-owned minerals for economic recovery. The BLM considers leasing the coal reserves and prescribes mitigation or stipulations for the protection of non-mineral resources.

The BLM is the lead agency responsible for leasing federal coal under the Mineral Leasing Act of 1920 as amended by the Federal Coal Leasing Act Amendment (FCLAA) of 1976, and is also

responsible for the preparation of this EA to evaluate the potential environmental effects of issuing the coal lease.

1.5 Conformance with Land Use Plan(s)

The FCLAA requires that lands considered for leasing be included in a comprehensive land use plan and that leases be compatible with that plan. The Bull Mountains LOM area is within the Powder River Coal Region and includes public lands administered by the BLM Billings Field Office. These lands are covered by the RMP prepared in 1983 (BLM 1983). The ROD for that plan was issued in September 1984. A number of changes have occurred since that time including the development of the Bull Mountains Mine No. 1, and the RMP is currently being revised. Under the existing RMP, coal reserves were assessed for suitability for leasing for surface mining. The assessment process entails identifying the presence of known coal deposits, consulting surface owners, applying unsuitability criteria for surface mining (but not for underground mining), and applying multiple-use management concepts. Known coal deposits have been identified in the Mammoth-Rehder seam in this area. The current surface ownership of the coal lease area is both private and federal (**Figure 1.1-1**). There is an exemption under Surface Mining Control and Reclamation Act (SMCRA) from application of unsuitability criteria for coal to be mined by underground methods. Subsidence caused by underground coal mining is not included in the definition of surface coal mining operations under Section 701(28) of the SMCRA. All federal coal which is mineable by underground methods is suitable for further consideration for leasing or exchange pending further studies. The RMP ROD (BLM 1984) specifically states that underground mining would be encouraged in the Bull Mountains area. Furthermore, legislative and administrative guidance to encourage longwall mining over surface mining provides directives why SMCRA Section 522(b) and 43 CFR Subpart 3461 (designating areas unsuitable for surface coal mining) do not apply to the subsidence effects of underground mining.

1.6 Relationship to Statutes, Regulations, or other Plans

The coal lease application would be processed in accordance with the regulations found at 43 CFR 3425 for Lease by Application, 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);
- Energy Policy and Conservation Act, 2005 (EPCA).

The Office of Surface Mining Reclamation and Enforcement (OSMRE) is a cooperating agency for this EA. When a federal coal lease is issued, OSMRE is responsible for the administration of programs that regulate the surface effects of underground coal mining operations under SMCRA.

Pursuant to Section 503 of SMCRA, MDEQ developed Montana's permanent regulatory program authorizing MDEQ to regulate surface coal mining operations and the surface effects of underground coal mining on private, state, and federal lands in the State of Montana. MDEQ is

also a cooperating agency for this EA and is responsible for issuing a permit to allow mining to occur on the leased areas.

1.7 Identification of Issues

Identification of issues began during the preparation of the Bull Mountains Mine No. 1 FEIS (MDSL 1992) and has continued to the present during several modifications to the mine permit. Under federal regulations governing BLM leasing of federal minerals (43 CFR 3420.4), the BLM is required to consult with qualifying surface owners in the preparation of a land use plan or analysis only for "mining by other than underground methods." Consultation with surface owners is not required for underground mines. Nevertheless, the public, including surface owners, have been provided the opportunity, through the scoping process, to express their concerns over potential environmental effects of leasing the coal. Special meetings have been held with several landowners in the area to discuss their concerns.

BLM released an announcement to interested parties on November 19, 2008 upon receipt of the coal Lease by Application and an invitation to comment on the application was provided. A public scoping period was held from November 24, 2008 through December 23, 2008. An open house was held in the Roundup, Montana Community Center on December 10, 2008 to answer questions about the project and receive public comment. Nine written comments were received during the scoping period. Issues identified for analysis in the EA include:

- Effects on employment, local economy, and tax base, including the adverse effects of not leasing the coal.
- Effects on steep slopes from subsidence in mined areas.
- Effects to aquifers and springs from subsidence in the mined areas.
- Effects to local surface drainages and water users from subsidence in the mined areas.
- Effects to structures in areas of surface subsidence and compensation for structural damage.
- Effects to historic and archaeological resources from subsidence in the mined areas.

Most of these issues are related to the potential direct or indirect effects of subsidence in the mined areas. These issues, as well as others identified by the Interdisciplinary Team preparing this analysis, are presented in this EA.

1.8 Summary

This chapter has presented the purpose and need of the Proposed Action, as well as the relevant issues, i.e., those elements of the human environment that could be affected by the implementation of the Proposed Action. In order to meet the purpose and need of the Proposed Action in a way that resolves the issues, the BLM has analyzed the Proposed Action and the No Action Alternative. These alternatives are described in **Chapter 2**. The affected environment of the coal lease area is described in **Chapter 3**. Potential environmental impacts resulting from the implementation of an action is analyzed in **Chapter 4** for each of the identified issues. Consultation and Coordination for the EA is included in **Chapter 5** and References and Acronyms are presented in **Chapter 6**.

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2.0 DESCRIPTION OF NO ACTION AND PROPOSED ACTION

This chapter describes the existing facilities and operations at the Bull Mountains Mine No. 1, the No Action Alternative and the Proposed Action for the coal lease, and a comparison of the potential effects related to these alternatives. The existing conditions include all of the operating mining facilities within the permit area as approved by the federal, state, and local regulatory agencies. The continued operation of these existing permitted facilities during mining of the proposed coal lease is an essential part of the Proposed Action. The Proposed Action is to lease five tracts of federal coal in the current LOM area, east of the current mine permit area as shown on **Figure 1.1-1**. The No Action Alternative would result in not leasing the federal coal and would result in no future mining in the LOM area under the currently proposed mine plan.

2.1 Existing Condition

There has been a long history of coal mining in the Bull Mountains and specifically, at the Bull Mountains Mine No. 1 site. PM Coal Company opened a small underground mine at the current location of the Bull Mountains Mine No. 1 surface facilities in 1932 that operated until 1973. In 1973, PM Coal Company opened the PM Surface Mine which produced 15,000 to 25,000 tons of coal per year from the Mammoth and Rehder coal seams. Also in the 1970s, Consolidation Coal Company and the Montana Bureau of Mines and Geology (MBMG) completed various investigations gathering information about coal quantity and quality of the Mammoth coal seam and regional hydrology in the current Bull Mountains LOM area. In the early 1980s, Louisiana Land and Exploration (LLE) gathered additional coal and environmental data in the current Bull Mountains LOM area for a permit application that was never completed. In the late 1980s, Meridian Minerals Company (Meridian) acquired the rights to mine coal in the area and also purchased the PM Mine. In 1989 and 1990, Meridian permitted and mined a surface test pit adjacent to the current Bull Mountains Mine No. 1 surface facilities and extracted approximately 180,000 tons of coal for test burn purposes. Meridian submitted a permit application to MDEQ for the existing Bull Mountains Mine No. 1 in 1990 and was issued State Mine Permit (SMP) No. 93017 in 1993. Since that time, the permit has been transferred to several ownership entities and was acquired by SPE in 2008.

The Bull Mountains Mine No. 1 is an operating underground operation using continuous and longwall mining methods as approved by MDEQ under SMP No. 93017 (SPE 2009). Continuous mining methods are used for development of production mains and longwall panels. Longwall equipment is currently extracting the coal in panels between the development entries. This combination of mining methods is the most efficient in the underground coal mining industry, and results in the highest coal recovery with the lowest costs while providing a safe working environment for mine personnel. Surface facilities associated with the Bull Mountains Mine No. 1 provide mine servicing, coal handling, coal cleaning and storage, coal transport by railroad, soil and sub-soil storage, coal processing and waste disposal, and water and air pollution control. Layout of the mine plan and surface facilities is shown in **Figure 2.1-1**. All surface facilities and the mining plan have been permitted in accordance with applicable MDEQ regulations and guidelines.

The following sections briefly summarize the existing operations. It is intended to provide a basic understanding of how the mine currently operates.

2.1.1 Mine Plan

The continuous mining method is used for main entry development, longwall panel development, and sump or other underground facility development. Longwall equipment is also currently mining the coal in panels. This is the most efficient mining method currently utilized in the underground coal mining industry. It results in the highest coal recovery with the lowest costs, while providing a safe working place for mine personnel.

The existing highwall at the PM Surface Mine (located in Section 13, Township 6 North, Range 26 East) was used to develop five portals for access to the underground mine. Main entry development followed portal development. Initially, the mains advanced toward the northeast corner of Section 13, Township 6 North, Range 26 East. Expansion of the five portal entries to multiple mainline underground entries provides travel ways for personnel, materials and ventilating air. Mainline development includes roof support installations that protect these areas over the LOM.

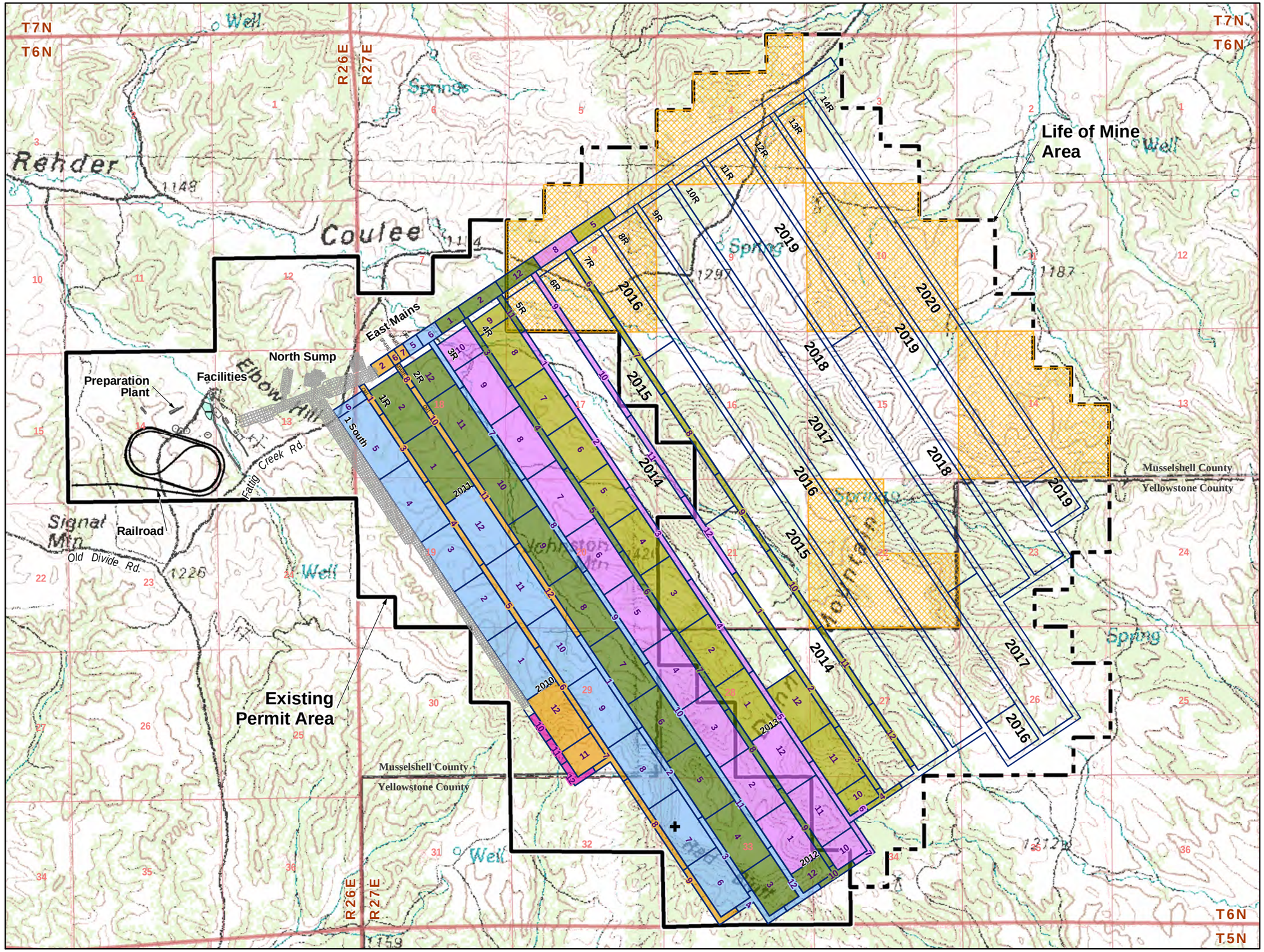
Mainlines are for multiple entries on centers ranging from 60 of 160 feet with connecting cross-cuts. The entry configuration is normally 18 to 20 feet wide and an average of about 9 feet in height, with a 1 foot coal roof (where applicable). Mining height normally does not exceed 10 feet in development entries to assure stable rib conditions. Thick coal found on the eastern portion of the property may provide top coal and bottom coal boundaries on the roof and floor. The multiple entry system includes return entries, intake entries, and an isolated belt entry located between the intakes and returns.

After development of the mainline entries and longwall panel headgate and tailgate, longwall equipment was installed for maximum production. The longwall is designed to mine the full seam up to 13 feet. The panel development widths are approximately 1,250 feet. Longwall panels would extend to near the outcrop, but would not mine under overburden of less than 200 feet in thickness.

SPE is permitted to mine about 12 million tons of raw coal per year with four crews working seven days per week. The 2,000-ton-per-hour coal processing facility provides clean coal recovery to approximately 85 percent. The coal processing facility will produce about 10 million tons of clean coal annually. The estimated mineable tons in the current permit area are 34 million tons of raw coal or 29 million tons of clean coal. The estimated production in the LOM area is 167 million tons of raw coal or about 144 million tons of clean coal. **Figure 2.1-1** shows the LOM underground mining plan and the sequence of mining by years.

2.1.1.1 Continuous Mining Operations

A continuous mining section employs a production machine (continuous miner), a haulage system (shuttle cars) and a roof support system (roof bolting machine). The major components of the continuous miner are the rotating cutting drum, gathering head and conveyor. The machine is electro-hydraulic powered and cat track propelled. The cutting drum is equipped with carbide tip cutting tools (bits). Operation of the machine at the working face involves driving the rotating cutting drum into the coal bed and raking downward, thereby cutting coal from the coal face. Mined coal is transferred via the gathering head to the conveyor. The conveyor transports cut



LEGEND

Mine Timing Plan

(Color represents Year. Month is labeled inside each patch. For example, 1 represents January, 5 represents May, etc.)

- 1 — 2008
- 2 — 2009
- 3 — 2010
- 4 — 2011
- 5 — 2012
- 6 — 2013

- Existing Permit Area
- Life of Mine Area
- Current Mine Workings
- BLM Coal Lease Area
- ✚ Communication Tower

0 3,000 6,000 Feet

NAD 83 MONTANA STATE PLANE, US FOOT

SOURCE: USGS 1:100,000 SCALE TOPOGRAPHIC QUADRANGLE - ROUNDUP (1982), MONTANA

BULL MOUNTAIN COAL LEASING ENVIRONMENTAL ASSESSMENT

Figure 2.1-1
Mine Plan

ANALYSIS AREA: Musselshell & Yellowstone Counties, Montana

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Prepared By: JC | Reviewed By: EC

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coal from the head (cutting drum) of the continuous miner to the tail of the machine which features a conveyor discharge section that is articulating. A continuous miner operates in a cyclic manner to provide coal for the haulage system. Elements of the mining cycle depend on mining conditions but generally include sump, shear, floor cut and raise-the-head. Each cycle advances the mining operation about 3 feet. Typical operations allow for 20 feet of total advancement, and then the mined area is roof supported in order to assure that the miner operator never works directly under an unsupported roof. Advancement can be much greater than 20 feet when using remote control continuous miners. Multiple entries are developed concurrently to allow for continuous mining (while roof bolts are installed in some entries, mining occurs in other entries). Multiple entries also provide working room for personnel and equipment (at least two entries are required to establish intake and return ventilation).

Shuttle cars are used as the primary face haulage vehicles. They transport mined coal from the tail of the continuous miner to a conveyor belt transfer point, known as a feeder breaker. Conveyor belts transfer the coal from the feeder breaker to outside the mine portal. The typical shuttle car has a payload of 10 to 15 tons and may be electric or diesel powered two-wheel or four-wheel drive, with a conveyor or push ram discharge design. The function of the shuttle cars is to receive a load of mined coal, tram to an unloading unit, discharge the loaded coal and return to the continuous miner for reloading. Each continuous miner typically requires two or three shuttle cars to allow for continued loading of one shuttle car while the others are in the tram/dump cycle.

Completion of the mining cycle is followed by roof support installation to ensure that a safe working environment is maintained. The most common roof support is installation of roof bolts which are an effective control for the immediate roof material.

2.1.1.2 Longwall Mining Operations

Longwall mining accomplishes the same objectives of production, haulage and roof support systems as continuous mining. However, longwall mining uses an electro-hydraulic powered shearer to mine the coal, and the major components of this machine are the drums and the tram system. The drums are located at each end of the machine, are limited to up-down movement, and are equipped with carbide cutting tools or bits. Operation of the shearer involves driving the rotating cutting drums into the coal seam and tramming along the face conveyor. The mined coal falls from the drums to the floor-supported face conveyor (**Figure 2.1-2**).

The longwall face conveyor transports mined coal from any location along the coal face to a belt conveyor transfer dump, known as the headgate. The end of the conveyor opposite the headgate is known as the tailgate. The major components of the face conveyor are the track, pan, chain, and drives. The track is the structure used by the shearer to advance back and forth along the face. The pan is a steel member which is designed to guide and house the conveyor chain and support the shearer. The pan has sections with normal lengths of five feet joined together to form a single, continuous unit from headgate to tailgate and sits on the floor of the coal seam. The chain is the conveyor instrument and is made up of steel chain and flight bars. The drives, located at each end of the conveyor, consist of sprockets coupled to electric motors which are used to power the conveyor chain.

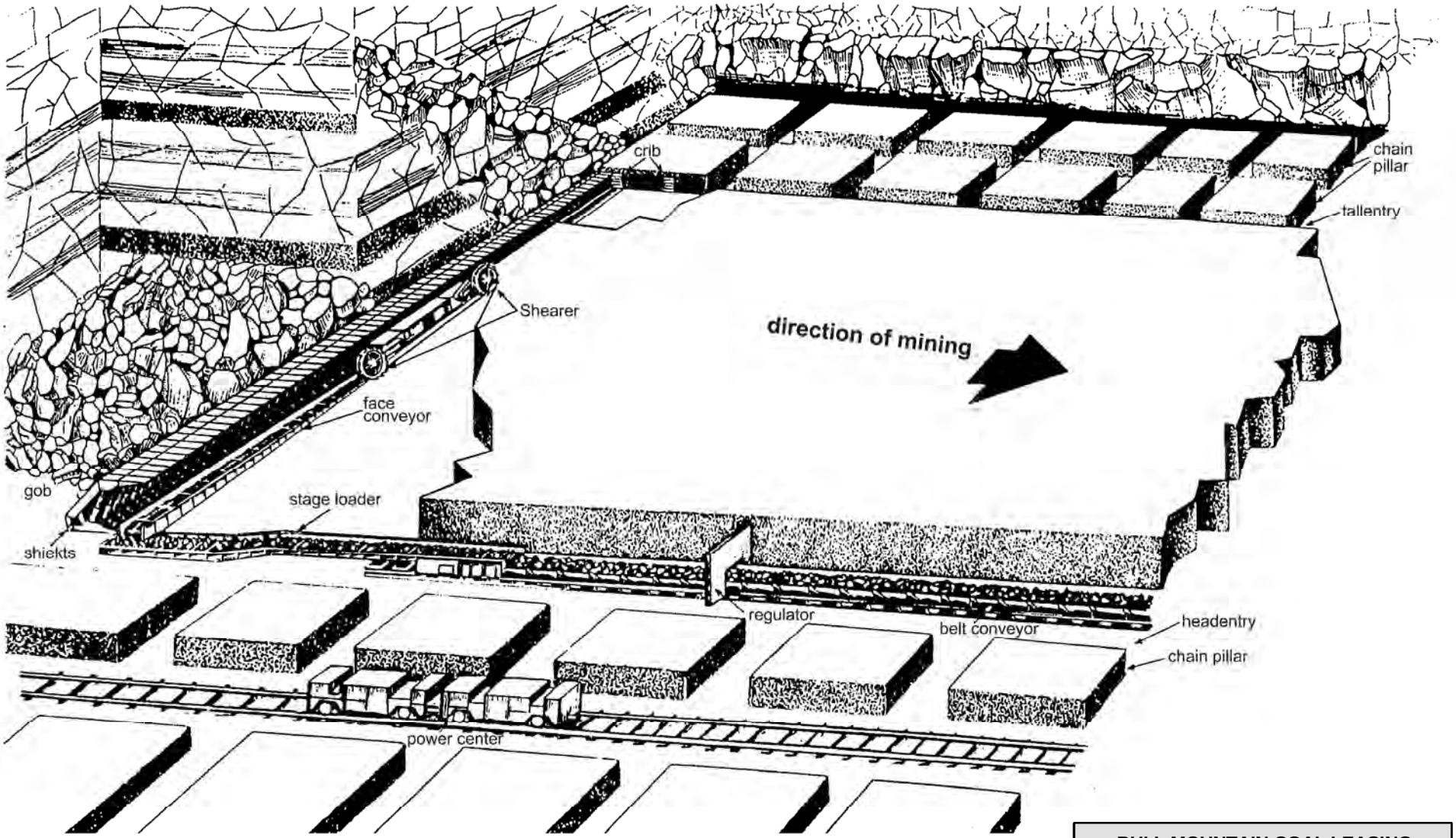
The longwall roof support is accomplished by using hydraulic roof supports, referred to as shields. The major components of the shields are the canopy, hydraulic cylinder, hydraulic controls, and base. The canopy is a thick steel plate, structurally reinforced, which is pushed against the roof. The hydraulic cylinders are used to push the canopy against the roof and to support the weight of the roof. The shields typically have a design load capacity of 500 tons or more per shield. The hydraulic cylinder diameter is approximately 12 inches and the hydraulic fluid pressure on the cylinders is approximately 5,000 pounds per square inch. The canopy is designed long enough to allow the face conveyor and shearer to be located under it. The base length of the shield is relatively short, allowing the face conveyer to sit on the floor ahead of the base and under the canopy.

Installation of longwall equipment was accomplished by using continuous mining equipment to develop a set of parallel entries. The distance between the entries is equal to the longwall face length. The continuous miner is used to establish a mineable block of coal; the longwall equipment is used to extract the block of coal between development entries.

2.1.1.3 Subsidence

Each of the longwall panels at the Bull Mountains Mine No. 1 consists of a large block of coal, approximately 1,250 feet wide by approximately 15,000 to 23,300 feet long (**Figure 2.1-1**). The panels would be completely extracted. Once the coal has been removed and the shields have advanced, the opening (mined-out area or "gob") would be unsupported, allowing overlying rock strata to collapse into the void. As subsequent rock strata above the mine caves in, the disturbance eventually propagates to the surface in the form of subsidence, or surface depression. The gob caves in behind the longwall system as it advances along the length of the panel. Collapse of the roof over the longwall panel would cause the surface overlying the panel to subside by an amount somewhat less than the thickness of the coal seam. Subsidence in the Bull Mountains has been predicted to be about 70 percent of the extraction thickness. The Mammoth Coal ranges in thickness from 8 to 13 feet in the permit area. Maximum subsidence is expected to be 9.1 feet (SPE 2009).

The mine plan incorporates large longwall panels that result in relatively uniform surface subsidence over larger areas as shown on **Figure 2.1-3**. From an environmental regulatory perspective, the surface effects of this mining method are uniform. In addition, the pillars supporting the gateroad openings have been designed to slowly fail as the longwall panel progresses. Failure of the gateroad pillars would result in partial subsidence over the gateroads. In longwall mining, surface subsidence typically occurs as a series of troughs over the longwall panels. But because the gateroads are designed to yield under the stress of the mined-out panels, the expected result is less extreme transitions between each trough. The expected outcome is that the surface subsidence would be uniform and less surface cracking would occur. However, uniform means that there would be few sudden transitions, not that surface effects would be identical at all locations. Subsidence would occur as a progressive wave behind mining resulting in a deflection plane that is not vertical, distributing shear laterally. Changes in surface slope are expected to be less than three degrees over the mined area. A slight slope into the subsided area would remain over the final mine boundary.



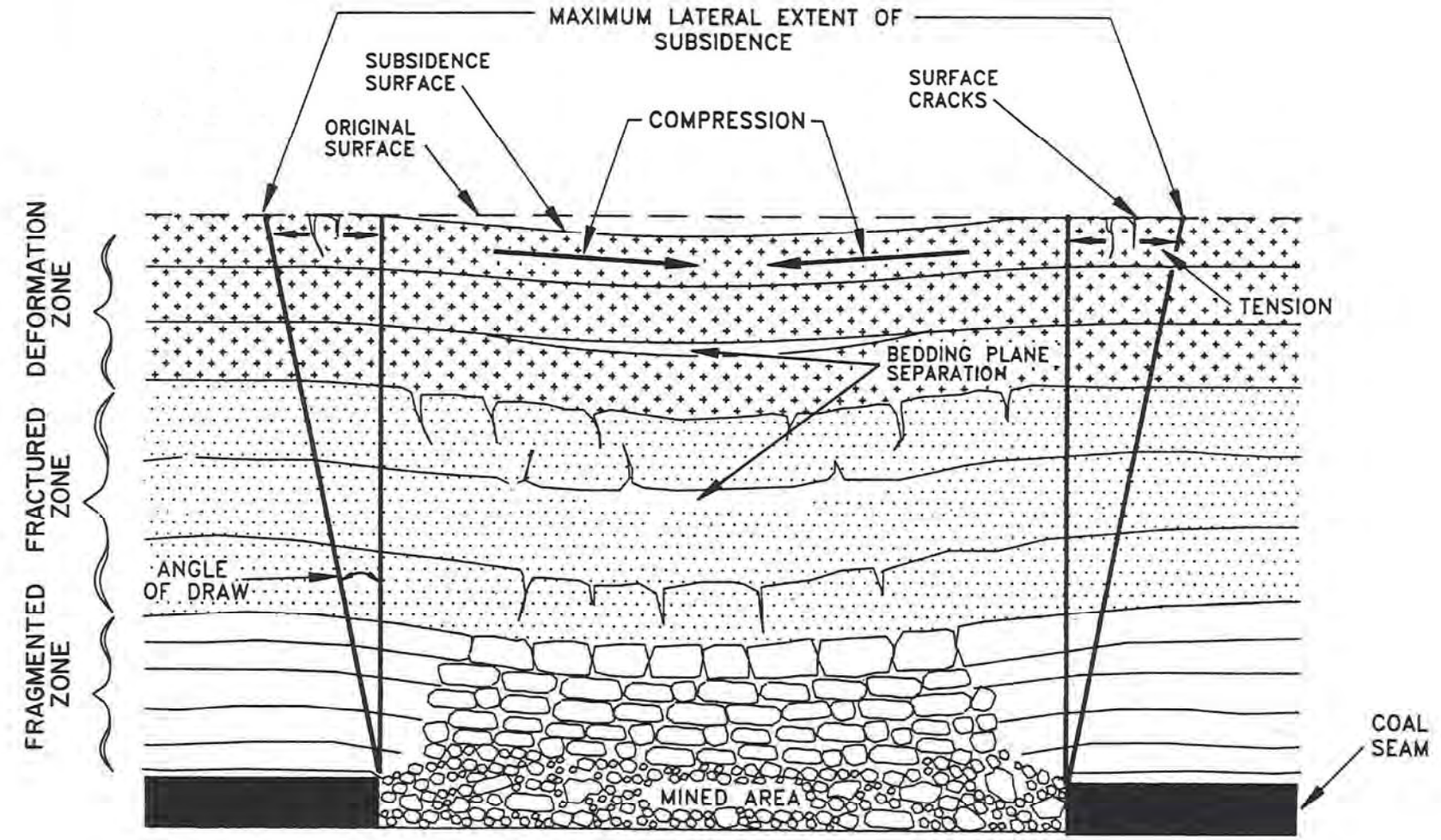
BULL MOUNTAIN COAL LEASING ENVIRONMENTAL ASSESSMENT

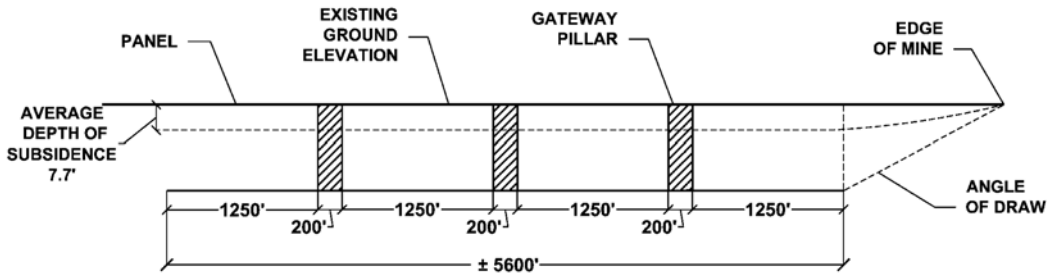
FIGURE 2.1-2
Typical Longwall
Retreating Panel Layout

ANALYSIS AREA: Musselshell & Yellowstone Counties, Montana

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Prepared By: JC	Reviewed By: EC





Schematic Cross Section Illustrating Subsidence Across Four Longwall Panels

BULL MOUNTAIN COAL LEASING ENVIRONMENTAL ASSESSMENT

Figure 2.1-3
Conceptual Representation of Subsidence

ANALYSIS AREA: Musselshell & Yellowstone Counties, Montana

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Prepared By: JC | Reviewed By: EC

Other subsidence-related damage is expected to be minimal. Surface cracking is expected in some areas. Minor damage to roads and fences is possible. State regulations require the mine operator to promptly repair damage to private property. Steep slopes in the area may be prone to rockslides during subsidence. Mechanical treatment of rockslides (if any) will be assessed and appropriate repair will be completed. Landowners are provided with a mine plan schedule and notified at least six months prior to their property being undermined. The schedule would contain enough information to enable landowners to move cattle to other areas while mining is taking place. Subsidence could also negatively impact springs, wells, and stream courses. The extent of these impacts are uncertain, so groundwater monitoring wells and surface water monitoring stations have been established to measure any impacts of mining. These potential impacts are further discussed in the surface water and groundwater sections of **Chapter 4**.

2.1.2 Mine Operations

Run of Mine (ROM) raw coal is crushed underground to minus 6-inch. The coal is transferred from the underground conveyance system and discharges onto a belt conveyor connected to Stockpile #1 at a nominal rate of 7,500 tons per hour (TPH). A portion of Stockpile #1 feed conveyor is partially located in a Conveyor Tunnel (in the portal area) to allow for vehicular access over this conveyor (**Figure 2.1-4**). This conveyor discharges into Stockpile #1, which includes a stacker tube and storage for a nominal 200,000 tons of coal. A collection ditch is maintained around the perimeter of this stockpile to keep coal sediment from washing onto the adjacent native ground. Coal from this stockpile area is stored ahead of sizing, crushing and further processing. Coal from Stockpile #1 is reclaimed using feeder(s), a reclaim tunnel, and a conveyor delivering coal to the screening and crusher building at a nominal rate of 3,500 TPH (**Figure 2.1-4**). Coal from Stockpile #1 is processed for product coal at the surface facilities. The entire surface facilities complex is involved in storage and processing of the coal and loading it for shipment. Portions of the surface facilities may be upgraded. The following sections briefly describe coal storage, crushing and cleaning, coal preparation, coal waste disposal, product load-out, and the functions of ancillary facilities.

2.1.2.1 Coal Crushing and Cleaning Facilities

The raw coal from Stockpile #1 is conveyed to the screening and crusher building which contains two sizing screens and crushers. Any runoff from this area is controlled and diverted to a sediment control ditch and Sedimentation Pond D (**Figure 2.1-4**). The minus-6-inch raw coal is discharged onto the sizing screens which size the coal at 2-inch. The plus-2-inch (screen oversize) is delivered into the crushers for reduction to a minus 2-inch product size. Both the screen and crusher units are located inside a building. The minus 2-inch crusher product discharges onto a conveyor which connects to Stockpile #2. The minus 2-inch (undersize from the screens) also discharges onto this same Stockpile #2 conveyor. An elemental analyzer, capable of determining coal quality is installed on this conveyor. Depending upon analysis of the raw coal, the sized and crushed raw coal flows either into Stockpile #2 or into Stockpiles #3. Quality analysis determines the flow of the raw coal. Raw coal destined for the preparation plant flows to Stockpile #2 and raw coal determined by analysis acceptable for direct shipment and meeting contract specifications flows to Stockpiles #3. An elevated transfer conveyor connects Stockpile #2 with Stockpile #3 (**Figure 2.1-4**).

2.1.2.2 Coal Storage Area

The coal storage area has three concrete stacking tubes (Stockpiles #2, #3 and #4). Total storage capacity for the stockpiles is approximately 400,000 tons (**Figure 2.1-4**). A collection ditch is maintained around the perimeter of these stockpiles to keep coal sediment from washing onto the adjacent native ground. Any runoff from this area is controlled and diverted to a sediment control ditch and Sedimentation Pond D (**Figure 2.1-4**). An elevated conveyor, designed for a nominal 3,500 TPH, connects Stockpile #2 with Stockpiles #3. Depending upon the coal quality, this conveyor connects the stacking tubes and provides a method to transfer coal between the stockpiles for segregation, storage, blending and production purposes. Concrete reclaim tunnels, fitted with reclaim feeders are below each stockpile. Included with each reclaim tunnel is an escape tube. The reclaim tunnel from the Stockpile #2 discharges onto a conveyor to the preparation plant. This conveyor is designed for a nominal 2,000 TPH rate (**Figure 2.1-4**).

2.1.2.3 Preparation Plant

The preparation plant is a heavy media processing facility that does not require thermal dryers. The plant has a nominal production capacity of 2,000 TPH, with a maximum annual capacity of 15,000,000 tons per year (TPY). Make-up water is provided from two Madison Formation wells. A nominal 350 gallons per minute (gpm) of make-up water is required when the plant is operating at full capacity. Excess water from the underground workings would be used to supplement water from the Madison Formation wells.

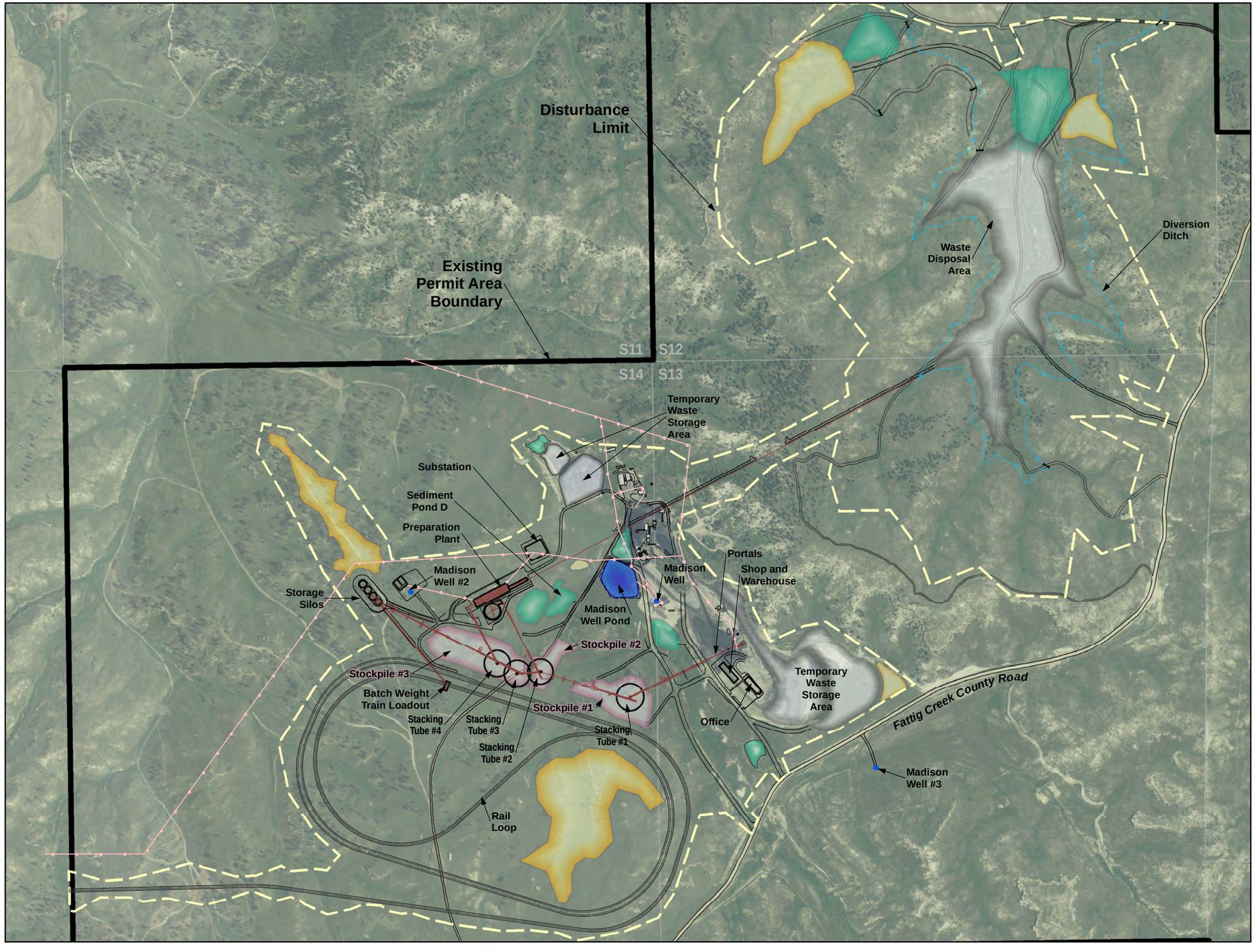
The preparation plant has been designed to process run of mine (ROM) coal into a product coal. The preparation plant processes coal at a nominal 2,000 TPH rate. Any runoff from the plant area is controlled and diverted to a sediment control ditch(es) and Sedimentation Pond D and Sedimentation Pond T2 (**Figure 2.1-4**).

2.1.2.4 Waste Disposal Area

Mine development and coal processing wastes are permanently disposed of in the Waste Disposal Area (WDA). These wastes are transported to the WDA via an overland conveyor system. The location of the WDA is shown on **Figure 2.1-4**. Generally, mine development wastes would represent poor quality coal, shale, claystones, mudstones, siltstones, etc., that are mined to access economic coal zones or to clean up roof falls, maintain floor grades, or to maintain necessary roof heights. The capacity of the WDA is designed for 29 million tons which will contain the waste material from the Life of Mine Plan.

Construction of the WDA fill, topsoil, and sub-soil stockpiles is an ongoing process during operation of the mine. SPE notifies the MDEQ 30 days prior to critical construction periods. Construction and inspections are be performed by an SPE qualified registered professional engineer experienced in the construction of waste structures and inspected by the MDEQ. Inspections are made quarterly during operation of the WDA and during critical construction periods to include at a minimum the following:

- Foundation preparation including the removal of all organic material and soil;
- Installation of final surface drainage systems;
- Final grading and revegetation of the site.



LEGEND

- Madison Well
- Existing Powerline
- Diversion Ditch
- S11 | S12 / S14 | S13 Section Corner
- Existing Permit Area
- Waste Disposal Area (WDA)
- Sediment Pond
- Soil Stockpile
- Coal Storage Area Stockpile

0 500 1,000 Feet

NAD 83 MONTANA STATE PLANE, US FOOT

SOURCE: NAIP 2005, MUSSELSHELL COUNTY, MONTANA

BULL MOUNTAIN COAL LEASING ENVIRONMENTAL ASSESSMENT

Figure 2.1-4
Surface Facilities

ANALYSIS AREA: Musselshell & Yellowstone Counties, Montana

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Prepared By: JC | Reviewed By: EC

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The WDA includes a "head-of-hollow fill" for permanent disposal of wastes, a temporary topsoil storage stockpile, a temporary sub-soil storage stockpile, and two sedimentation ponds to control runoff and discharge of suspended solids from the respective storage areas. The topsoil and sub-soil stockpiles and the sedimentation ponds will ultimately be removed and reclaimed. The WDA does not contain any springs, natural or manmade water courses (except ephemeral flow in drainages), or wet-weather seeps.

Underground mine development waste is discharged from the mine and transported directly to the WDA without further processing. Underground development waste represents less than 10 percent of the WDA material. Only a small quantity of underground development waste and no coal processing wastes is stored underground due to a variety of physical, economic, and safety constraints.

During the mining operations, areas of the WDA are inspected to determine the moisture versus wheel compaction curves. This allows the equipment operators and personnel to know how many trips must be made across an area to achieve the 90 percent maximum dry density compaction as required by MDEQ Regulations. Moisture studies are made to determine optimum moisture for compaction. The moisture of the refuse varies between 15 to 30 percent. Air drying is accomplished by spreading and windrowing the piles of refuse before placement and compaction. Dry material is stored and blended into the wetter material as the fill is developed. A rubber-tired dozer is the spreading and compacting machine.

No underground development or coal processing wastes from outside the permit area are disposed of in the WDA without approval from the MDEQ. Underground development and coal processing waste is conveyed and placed within the permitted area. The WDA is designed to control runoff by diverting surface runoff from undisturbed and disturbed areas through sediment ponds to achieve compliance with discharge requirements. Fills are designed, permitted and constructed to ensure stability during and after construction.

The WDA will be covered with 4 feet of non-toxic material (including topsoil and sub-soil) and revegetated with an approved, weed-free native seed mix when final fill contours are achieved (both during operations and at end of life). For those areas of the WDA which have been enhanced for topographic diversity, (knobs and the top and the nose of the WDA face at the head of the valley) additional placement of spoil material is planned to further reduce potential erosion problems. The enhanced topographic areas of the WDA are constructed with the standard 4 feet of non-toxic material (topsoil and sub-soil) with the placement of an additional 6 feet of spoil located between the non-toxic material and the coal fines. Stockpiles are vegetated to minimize erosion and reclaimed to approximate original contour when the WDA is no longer in operation. The WDA will not create a public hazard either during mining operations or after reclamation and is posted to limit public access. Wastes are well-compacted and covered with non-toxic material to eliminate the possibility of spontaneous combustion.

Planned post-reclamation land use is rangeland and wildlife habitat. The final configuration of the fill area will have a 3 foot horizontal to a 1 foot vertical front slope and a relatively flat top level graded to drain at 1 to 2 percent. This configuration will have no depressions or impoundments and should be ideal for revegetation and the proposed land use.

Analyses of underground development and coal processing wastes were conducted to determine the acid-base potential of the materials to be placed in the WDA (Dollhopf 1989). The study determined that these materials are non-acid forming due to either their low sulfur content and/or lack of framboidal pyrite. The acidity from any pyrite contained in the waste will be neutralized by the inherent base chemistry of these massive morphology materials. Based on the results of the previous analyses, it was concluded that coal refuse will not produce acid upon exposure to water and oxygen. The analyses also indicated that there should be no long-term problem with pH, liberation of metals, or acidity from the waste materials. Liberation of metals was confirmed from TCLP laboratory analysis of the waste material conducted by SPE in December 2009 (SPE 2010).

2.1.2.5 Clean Coal Handling, Storage and Load-out

The preparation plant product conveyor delivers minus-2-inch plant product coal into Stockpile #4. A collection ditch is maintained around the perimeter of these stockpiles to keep coal sediment from washing onto the adjacent native ground.

Located under Stockpiles #3 and #4 is a reclaim tunnel, feeders and conveyor. This conveyor transfers coal into either of one of two coal storage silos. For additional product storage, a dozer is used to extend this stockpile area. Any runoff from the silo load-out area is controlled and diverted to a sediment control ditch(es) and Sedimentation Pond D. Product coal is reclaimed using a dozer pushing to the reclaim tunnel. Product coal is transferred using feeders onto a conveyor for transfer into two coal storage silos. The silos transfer to a conveyor connected to the batch-weigh device load-out bin. This conveyor is fitted with a scale, analyzer and a sampling system. The batch-weigh load-out system is located over the rail loop track. The batch weigh system is in a heated and insulated building. The batch weigh system consists of a surge bin and a batch weigh installed on the track loop (**Figure 2.1-4**). Any runoff from the batch-weigh load-out area is controlled and diverted to a sediment control ditch(es) and Sedimentation Pond D.

2.1.2.6 Railroad Loop and Spur

A railroad loop track is within the mine permit boundary (**Figure 2.1-4**). This loop track is constructed in a figure eight arrangement. The loop track and spur line within the mine permit area is approximately 5.7 miles in length (includes the double track sections) and is capable of handling two-150 car length unit trains with up to four locomotives per train. Based on a nominal 7,500 TPH load-out rate, the speed of the unit train during loading is approximately one mile per hour.

A 35 mile rail line has been constructed connecting the railroad loop to the Burlington Northern/Santa Fe (BNSF) mainline track near Broadview, Montana. The rail line is constructed at a 1 percent grade capable of handling unit trains of 150 car length.

2.1.2.7 Ancillary Facilities

Various surface facilities provide water, air and sewage treatment for the mine. Fresh water is supplied by a 400 foot well and stored in water tanks located in a cistern near the office for showers and toilets. Potable water for office use is supplied by the fresh water well and bottled water. A chlorine water treatment system for potable water is currently in place. Two deep

Madison Formation wells provide water used for the underground mine equipment and the coal preparation plant. Mine use is approximately 500 gpm. Excess water from underground seepage is pumped to a settling pond and is used to supplement water for mine operations. Fresh air is provided to the mine using ventilation fans located at the portals. Electrical power to the mine is supplied by Fergus Electric Cooperative facilities.

Additional mine service facilities consists of mine roads, fuel storage, fire control, water and air pollution control, and supplemental supply service centers. All disturbed areas have appropriate diversion-collection ditches and sedimentation ponds to control runoff, soil wash and erosion. Montana Pollutant Discharge Elimination System (MPDES) permit has been issued and discharge requirements are maintained for all surface discharges from the sedimentation ponds. Air quality protection is provided by equipment designed to control dust and spillage, and by applying water or other dust suppressants to roadways, parking areas, and refuse disposal areas. The MDEQ air quality permits have been obtained for the mine. There are no plans to generate Resource Conservation and Recovery Act (RCRA) type hazardous wastes at the mine. Solid and liquid wastes are handled by contractors and are recycled or disposed of at approved facilities.

2.1.3 Stipulations and Mitigation Measures

Table 2.1-1 lists the primary permit stipulations and approved mitigation measures for the existing Bull Mountains Mine No. 1 SMP 93017. These are listed by issue or potential impacts for each resource.

Table 2.1-1 Permit Stipulations and Approved Mitigation Measures

Resource	Issue or Potential Impact	Stipulation or Approved Mitigation Measures
Topography and Physiography	Subsidence of topography over mined areas	The ground surface would be surveyed prior to mining in accordance with Administrative Rules of Montana (ARM) and SMP conditions. The area over the mine would be inspected regularly. If evidence of impacts from subsidence is observed, the area would be monitored more closely. If evidence of damage is observed, treatment measures would be developed and implemented.
	Areas of short-term slope instability or rock toppling resulting from subsidence over mined areas.	Surface owners would be notified before mining would occur under their land. Areas of potential risk for slope instability or rock toppling would be identified to the land owner, and measures would be implemented to minimize the potential risk to humans and livestock
Geology, Mineral Resources and Paleontology	Impacts of subsidence	Subsidence would be limited to small areas of cracking, sloughing of some steep slopes and rock toppling. Geological strata and mineral resources would subside as a unit.
Air Quality	Pollutants	Emissions from the mine surface facilities would continue for the Life of Mine (LOM). Approved best management practices (BMPs) and mitigation measures would continue. BMPs for

Table 2.1-1 Permit Stipulations and Approved Mitigation Measures

Resource	Issue or Potential Impact	Stipulation or Approved Mitigation Measures
		pollutants include equipping below ground vehicles with scrubbers, ventilation sufficient to maintain acceptable NO_x and CO levels, and proper operation and maintenance of on-site sources. Air quality would meet MDEQ Air Quality Permit (MAQP) #3179 requirements and all state and federal standards.
	Particulates	Permitted surface facilities would continue to generate fugitive dust from ROM storage, coal processing, train loading, and other activities. Air quality would meet MAQP #3179 requirements and all state and federal standards.
Water Resources	Changes in surface drainage resulting from subsidence over mined areas.	Subsidence may affect surface drainage patterns. Surface drainage at selected sites in stream drainages, at ponds, and at small wetland areas would be monitored throughout the mining and post-mining stages. Monitoring frequency would vary depending on the size, use and location of the feature or area. Long-term mitigation to restore drainage patterns would be implemented after subsidence effects stabilize.
	Impacts to flow and quality of springs and wells (groundwater) from subsidence over mined areas	All wells, springs, and seeps in the LOM area would be monitored throughout the pre-mining, mining, and post-mining stages. Additional groundwater monitoring wells have also been developed. If flow or supply is affected, approved mitigation measures would be implemented in consultation with MDEQ. Surface water mitigation plans are in the current mine permit. The plans include restoring springs, stream reaches, and ponds by opportunistic development of springs where they appear, guzzler emplacements, horizontal wells, vertical wells, pipeline systems, deepening or rehabilitating existing wells, reclamation of stream reaches and function, and water treatment where appropriate or necessary for post-mine land uses. Surface water impacts would need to be evaluated and site-specific replacement or mitigation plans developed by SPE, in cooperation with the landowner, to ensure adequate long-term replacement of the surface water source.
Wetlands	Impacts from changes in surface and groundwater flow	Subsidence over mined areas may result in alteration of surface and groundwater flow, which may alter the flow of water to wetlands. Surface and groundwater flow would be

Table 2.1-1 Permit Stipulations and Approved Mitigation Measures

Resource	Issue or Potential Impact	Stipulation or Approved Mitigation Measures
		monitored on a regular basis, and if water flow to wetlands is disrupted, the water flow would be restored or replaced.
Soils	Erosion	Subsidence may alter surface drainage and accelerate degradation of erosive or unstable soils in some locations. In consultation with MDEQ, soil salvage, regrading, soil replacement, and seeding may be necessary to maintain stream profiles, minimize erosion, and ensure continuation of pre-mine land use.
	Ground disturbance - surface facilities	Surface disturbance would be in previously approved facilities areas. The area is already disturbed and currently permitted. Conditions of the existing reclamation plan that conforms to the ARM would be followed.
	Ground disturbance - subsidence over mined areas	Mining would result in subsidence of the overlying surface. Subsidence would be gradual and uniform and may create undulations and cracking in some areas. Soil profiles would remain intact and retain their chemical and physical characteristics. In consultation with MDEQ, mitigation of effects of surface subsidence would be evaluated on a site-specific basis.
Vegetation	Erosion and slope instability	No threatened, endangered, or candidate plant species have been identified in the LOM area. Subsidence would result in localized areas of erosion and slope instability which could disrupt the distribution of vegetation communities. Soil profiles would generally subside in-place with limited areas of cracking (see Soils). Vegetation would naturally re-colonize disturbed areas. Areas of surface disturbance would be evaluated and, if the extent of disturbance warranted, a site-specific repair and mitigation plan would be developed and implemented in consultation with MDEQ.
	Changes in surface drainage	Subsidence would result in areas of altered surface drainage which could affect the distribution of plant communities. Stabilization or reclamation of surface drainage is discussed under water resources. Areas of altered drainage would be evaluated and, if the extent of displacement of plant species warranted, a site-specific repair and mitigation plan would be developed and implemented.

Table 2.1-1 Permit Stipulations and Approved Mitigation Measures

Resource	Issue or Potential Impact	Stipulation or Approved Mitigation Measures
Wildlife	Local changes in wildlife habitat	Subsidence may result in local changes to surface and groundwater flow and to the distribution of vegetation communities. This may affect the distribution of resources available to wildlife. A number of species utilize these areas, including those that are dependent on surface water and the associated vegetation (e.g. waterfowl, shorebirds, and several songbirds) and those that are wider ranging and use the water during their movements throughout a larger home range (e.g. bats, upland game birds, raptors, deer and elk). Affects to water resources and vegetation would be mitigated as described in those sections.
Ownership and Use of Land	Impacts to buildings and structures	Impacts to existing buildings and structures over mined areas may occur as a result of subsidence. ARM and SMP conditions require that damage to structures be mitigated. SPE would repair damage to existing buildings and structures resulting from subsidence.
	Impacts to infrastructure (roads, fences, utilities, communication tower)	Impacts to existing infrastructure over mined areas such as roads, fences and utilities may occur as a result of subsidence. Subsidence-related damage is expected to be minimal. Surface cracking is expected in some areas. Minor damage to roads and fences is possible. State regulations require the mine operator to promptly repair damage to private property. SPE would repair damage to existing infrastructure.
	Livestock Grazing	For a short period (within a few months) after areas have been mined there may be a potential for slope failure and rock toppling as a result of subsidence. This would create a potential risk for grazing livestock. To minimize the potential risk to humans and livestock, SPE is required to publish the mining schedule at least six months prior to mining under an individual's land, in accordance with the ARM.
Cultural Resources	Rock toppling (rock art or rock shelters); erosion or slope instability.	All areas of steep slope (greater than 25 percent) have been surveyed for cultural resources. No potentially affected archaeological resources were identified.
Native American Religious and Traditional Concerns	Effects to Native American religious and traditional concerns	No Native American religious and traditional concerns have been identified in the LOM area. If religious and traditional concerns are identified through consultation between BLM and interested tribes, appropriate mitigation measures would be developed through government-to-

Table 2.1-1 Permit Stipulations and Approved Mitigation Measures

Resource	Issue or Potential Impact	Stipulation or Approved Mitigation Measures
		government consultation and implemented.
Visual Resources	Impacts to natural landscape	Key observation points for the mine surface facilities and LOM area are along U.S. Highway 87. The view of the approved surface facilities would be largely shielded from U.S. Highway 87 by topographic features during operation and the approved reclamation plan would minimize visual impacts after completion of mining. Impacts of dust and haze during mine operation would be minimized by air quality control measures specified in MAQP # 3179. Areas of the LOM area that would subside over mined areas are several miles from key locations along U.S. Highway 87. The overall character of the visual landscape would not change.
Noise	Noise of surface facility operation	Principal noise sources during operation of the surface facilities include the preparation plant, ventilation fans, trucks, conveyors, load-out equipment, and trains. Facilities are approximately 4,500 feet from the nearest residences. Noise control measures include maintenance of equipment and screening to contain or deflect noise.
Transportation	Employee and equipment traffic	SPE would maintain mine-related infrastructure for traffic. Mine tax revenue would contribute to maintenance of public roads. If issues requiring mitigation are identified, SPE would participate in planning.
	Railroad	Railroad traffic would not affect other traffic. There are no at-grade crossings in high-traffic areas. No need for mitigation has been identified.
Hazardous and Solid Waste	Continued generation of solid/liquid waste at surface facilities	Current approved BMPs and procedures for solid/liquid waste management would continue to be implemented.
Socioeconomics	Employment	Mine operation would improve local job opportunities. No need for mitigation has been identified.
	Tax base and tax revenues	Permitted mining operations would provide coal severance taxes and continued employment would contribute to continued federal and state income taxes. Tax revenues from mine would contribute to state, county, and nearby communities. No need for mitigation has been identified.
Environmental Justice	Disproportionate effects to communities or ethnic groups.	No need for mitigation has been identified.

2.2 No Action

Under the No Action Alternative, the federal coal lease area analyzed in this EA would not be approved for lease sale and mining would not occur within the federal lease area. In addition, private and state coal reserves to the south and east of the federal coal lease area would not be accessible under the current mine plan. Without access to the federal coal reserves, these private and state coal reserves would not be economically minable by longwall methods from the existing mine. Currently permitted operations and employment would continue until mining reaches the federal coal lease boundaries. This stage of the mine plan corresponds roughly with the eastern extent of the existing permit boundary and approved mine plan. If leasing is not approved, the current Life of Mine Plan would be shortened by approximately seven years. Approximately 133 million tons of mineable coal reserves (61.4 million tons of federal coal and 71.6 million tons of private and state coal) identified in the Life of Mine Plan would not be mined.

2.3 Proposed Action

Under the Proposed Action, the coal lease area, as applied for, would be leased to SPE for underground longwall mining in the Mammoth coal seam. The boundaries of the five coal lease tracts are shown in **Figure 1.1-1**. The legal descriptions of the proposed lease tracts are:

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

Sec. 4, lot 1, S1/2NE1/4, SE1/4NW1/4 and S1/2;	479.76 acres
Sec. 8, NE1/4, NE1/4NW1/4, S1/2NW1/4 and S1/2;	600.00 acres
Sec. 10, W1/2NE1/4, SE1/4NE1/4, NW1/4 and S1/2;	600.00 acres
Sec. 14, SW1/4NE1/4, NW1/4 and S1/2;	520.00 acres
Sec. 22, W1/2 and SE1/4.	480.00 acres
Total	2,679.76 acres

Coal identified for production as a result of this lease would be produced from one coal seam referred to as the Mammoth coal seam that range from 8 to 11 feet thick. The leased federal coal reserves would be accessed from the mains of the existing Bull Mountains Mine No. 1 (**Figure 2.1-1**) and the coal would be processed at the existing surface facilities. The coal would be removed by underground longwall mining methods as an integral part of the mine plan and there would be no surface facilities or direct surface disturbance on the lease tracts. However, as a result of the longwall extraction method, the ground surface would subside over the mined areas.

Mining the coal lease tracts would allow current plans for mining private and state coal reserves in the LOM area east of the existing permit area. These private and state coal reserves would not be accessible or economically minable by longwall methods without access to the federal coal reserves. The entire LOM area contains approximately 167 million tons of mineable coal. About 34 million tons of this mineable coal is within the existing permit area. The coal lease area contains approximately 61.4 million tons of mineable coal. Another 71.6 million tons of mineable coal within the LOM area is contained in private and state mineral leases. Under the

Proposed Action, mining operations under the Life of Mine Plan would continue for approximately 10 years and would recover all of the economically mineable coal reserves in the Mammoth coal seam in the LOM area. Leasing the federal coal in the LOM area would account for 7 of the 10 years of mining.

The existing surface facilities have been established to sustain the Life of Mine Plan. No additional facilities would be needed for the Proposed Action. The Proposed Action would comply with currently approved stipulations, mitigation measures, and monitoring programs as described in SMP 93017 and summarized in **Section 2.1** of this EA. Additionally, under the proposed action, the lease would be subject to the BLM special coal lease stipulations and the standard stipulations found on the coal lease form, both of which are located in Appendix A of this document.

2.4 Summary Comparison of Alternatives and Environmental Impacts

A summary of potential effects from leasing the coal under the Proposed Action and the No Action Alternative are presented in **Table 2.4-1**.

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Table 2.4-1 Bull Mountains Coal Lease EA Comparison of Potential Effects by Alternative and Resource

Resource	Proposed Action	No Action
Topography and Physiography	Minor, lowering of topography in subsided areas. Maximum subsidence is expected to be 9.1 feet over the mined areas. Pre-mine surveys would be conducted for all surface structures. Subsidence monitoring would be conducted before and after mining. Damage to surface structures would be repaired.	The No Action Alternative would continue ongoing permitted effects of the existing mine. This would include minor lowering of topography in the subsided areas northwest of the lease areas.
Geology, Mineral Resources, and Paleontology	Minor, local steep slope instability from subsidence. Mining the coal would eliminate the mineral resource in the lease area. No paleontology resources identified in the coal lease area.	Not mining the coal reserves within and south of the federal lease areas under the proposed plan would leave these reserves uneconomical to mine in the future resulting in loss of coal royalties. Effects to geology and paleontology would be similar to the Proposed Action, but would be restricted to the mined areas north and west of the federal coal lease areas.
Air Quality	Negligible effects on air quality in the coal lease area. Emissions from the mine surface facilities would continue for the LOM, approximately 7 additional years. Approved BMPs and mitigation measures would continue. Air quality would meet existing permit requirements and all state and federal standards.	There would be no emission produced within the Federal coal lease areas. Permitted emissions from the operation of the surface facilities would continue until mining reaches the federal coal lease areas and would then end. Air quality would meet existing permit requirements and all state and federal standards.
Climate	Negligible greenhouse gas emissions would continue for an additional seven years.	Current permitted operations at the surface facilities would continue, continuing to generate the permitted, negligible emissions.
Groundwater	The effects of the Proposed Action on groundwater would be similar to the No Action Alternative, but would extend into the federal lease areas and into the private and state lands southeast of the federal lease areas. Minor to moderate effects from mining and subsidence would disrupt groundwater flow and recharge in the bedrock zones	Minor to moderate effects from mining and subsidence would disrupt groundwater flow and recharge in the bedrock zones directly above the mined coal.

Table 2.4-1 Bull Mountains Coal Lease EA Comparison of Potential Effects by Alternative and Resource

Resource	Proposed Action	No Action
	directly above the mined coal. Removal or water table reduction at private wells located on or adjacent to the coal lease areas. Mitigation measures would replace water losses. Minor changes to groundwater quality as water moves from fractured bedrock to the mine. Minor loss of recharge to downstream aquifers from inflow into the mine. Minor drawdown from underburden groundwater use and infiltration into the mine.	Removal or water table reduction at private wells located on or adjacent to the coal lease areas. Mitigation measures would replace water losses. Minor changes to groundwater quality as water moves from fractured bedrock to the mine. Minor loss of recharge to downstream aquifers from inflow into the mine. Minor drawdown from underburden groundwater use and infiltration into the mine.
Surface Water	Possible effects to surface water from the Proposed Action would be the same as the No Action Alternative, but would also extend into the federal lease areas and private and state land over mined areas southeast of the lease areas. Minor effects from subsidence; possible changes in stream channel drainage. Spring flow may increase, decrease, relocate, or be lost. Mitigation measures would replace water losses. Minor effects on ponds and stream flow from subsidence. Mitigation measures would repair channels and replace water losses. Negligible effects to surface water quality.	The potential effects over mined areas are described under the Proposed Action. Under No Action, these potential effects would be limited to the mined areas in the mine permit area northwest of the federal lease areas.
Wetlands	Minor, potential disruption of water supply to 15 springs within the coal lease area from subsidence. May temporarily impact spring-fed wetlands.	The potential effects over mined areas are described under the Proposed Action. Under No Action, these potential effects would be limited to the mined areas in the mine permit area northwest of the federal lease areas.
Soils	No surface disturbance from mine facilities. All facilities have been constructed.	No effects to the federal coal lease area and no additional surface disturbance at the mine surface facilities.

Table 2.4-1 Bull Mountains Coal Lease EA Comparison of Potential Effects by Alternative and Resource

Resource	Proposed Action	No Action
	Minor, localized soil erosion on steep slopes at the interface between non-subsidence and subsidence areas.	
Vegetation	No surface disturbance from mine facilities. All facilities have been constructed. Minor, localized changes in vegetation from soil erosion at the interface between non-subsidence and subsidence areas.	No effects to the federal coal lease area and no additional surface disturbance at the mine surface facilities.
Wildlife	Negligible, localized changes in habitat from soil erosion from subsidence.	No effects to the federal coal lease area and no additional surface disturbance at the mine surface facilities.
Threatened, Endangered, and Special Status Species	No effects from mining the lease area.	No effects to the federal coal lease area and no additional disturbance at the mine surface facilities.
Ownership and Use of Land	Minor, subsidence over longwall mined areas may damage structures. Immediate repair of damage to mitigate impacts.	No effects to the federal coal lease area and no changes in ownership and use of land at the surface facilities compared to existing permitted conditions.
Cultural Resources	No effects to cultural resources of the area.	No effects to the federal coal lease area and no additional surface disturbance at the mine surface facilities.
Visual Resources	No effects to scenic quality of the area.	No effects to the federal coal lease areas and no additional disturbance at the mine surface facilities.
Noise	No effects in the lease area. Minor, continued noise at surface facilities and railroad from mining leased coal for approximately 7 additional years.	Minor, continued noise at surface facilities and railroad corridor from mining the currently permitted coal.
Transportation Facilities	Minor, extends use of existing transportation infrastructure by employee travel to the mine and coal by railroad traffic for approximately 7 additional years.	Existing use of the transportation infrastructure for mine operations and employee travel to the mine until mining reaches the federal coal lease areas.
Hazardous and Solid Waste	No effects to federal coal lease area. Generation of solid/liquid waste from the mine surface facilities would continue for approximately 7 additional years. Solid/liquid	No effects to the federal coal lease area. Generation of solid/liquid waste from the mine surface facilities would continue. Solid/liquid waste handling would meet

Table 2.4-1 Bull Mountains Coal Lease EA Comparison of Potential Effects by Alternative and Resource

Resource	Proposed Action	No Action
	waste handling would meet existing permit requirements and all state and federal standards.	existing permit requirements and all state and federal standards.
Socioeconomics	Moderate beneficial effects; positive effects on employment, local economy and tax revenue from continued operation of mine for approximately 7 additional years. No increase in mine employment. No effects on public infrastructure or services.	Moderate negative effects; early closure of mine would result in unemployment and loss of tax revenue by eliminating mining for approximately 7 additional years.
Environmental Justice	No effects from continued mining operations.	No effects from not mining coal on federal coal lease area.

3.0 AFFECTED ENVIRONMENT

This chapter discusses the existing conditions of the physical, biological, cultural, and socioeconomic resources that could be affected by the implementation of the alternatives described in **Chapter 2** as they relate to the leasing of federal minerals in the identified tracts of the Bull Mountains Mine No. 1 LOM area. Aspects of the affected environment described in this chapter focus on the issues presented in **Chapter 2**. Baseline information is adapted from the current Bull Mountains Mine No. 1 SMP 93017 (SPE 2009), available data and literature from state and federal agencies, peer-review scientific literature, and resource studies conducted in the project area. For the purpose of this analysis, the project area is considered the Bull Mountains Mine No. 1 LOM area (containing the five coal lease tracts) and a surrounding one mile buffer. The coal lease area includes the five lease tracts as described in **Chapter 2**.

Elements of the environment specified by statute, regulation, Executive Order, or the Standards for Public Land Health are described and analyzed in this section. The following critical elements are considered in (**Table 3.0-1**). Those that could be impacted are brought forward for analysis. Any elements not affected by the alternatives were not analyzed in this document.

Table 3.0-1 Environmental Assessment Critical Elements

Critical Element	Not Applicable or Not Present	Present, But No Impact	Applicable and Present; Brought Forward for Analysis	Chapter 3 Section
Air Quality			✓	Air Quality
ACEC	✓			
Wilderness	✓			
Wild and Scenic Rivers	✓			
Cultural Resources			✓	Cultural Resources
Native American Religious Concerns			✓	Cultural Resources
Environmental Justice			✓	Environmental Justice
Farmlands (Prime & Unique)	✓			
Soils			✓	Soils
Threatened, Endangered, or Candidate Plant Species			✓	Vegetation
Invasive, Non-native Species			✓	Vegetation or Wildlife
Threatened and Endangered Species			✓	Vegetation or Wildlife
Migratory Birds			✓	Wildlife
Wildlife, Terrestrial			✓	Wildlife
Wildlife, Aquatic			✓	Wildlife
Wetlands & Riparian Zones			✓	Wetlands
Floodplains			✓	Alluvial Valley Floors

Table 3.0-1 Environmental Assessment Critical Elements

Critical Element	Not Applicable or Not Present	Present, But No Impact	Applicable and Present; Brought Forward for Analysis	Chapter 3 Section
Water Quality, Surface and Groundwater			✓	Water Resources
Wastes, Hazardous or Solid			✓	Hazardous and Solid Waste

The following non-critical elements are considered (**Table 3.0-2**). Those that could be impacted are brought forward for analysis.

Table 3.0-2 Environmental Assessment Non-Critical Elements

Other Elements	Not Applicable or Not Present	Present, But No Impact	Applicable and Present; Brought Forward for Analysis	Chapter 3 Section
Access			✓	Transportation Facilities
Transportation			✓	Transportation Facilities
Realty Authorizations		✓		
Range Management			✓	Ownership and Use of Land
Forest Management and Fire		✓		
Hydrology/Water Rights			✓	Water Resources
Noise			✓	Noise
Recreation			✓	Ownership and Use of Land
Visual Resources			✓	Visual Resources
Geology and Minerals			✓	Geology, Mineral Resources, and Paleontology
Paleontology			✓	Geology, Mineral Resources, and Paleontology
Law Enforcement			✓	Socioeconomics
Socio-Economics			✓	Socioeconomics

3.1 Topography and Physiography

The Bull Mountains Mine No. 1 is in the eastern foothills of the Rocky Mountains at the western edge of the Great Plains (**Figure 1.1-1**). The LOM area is in the Bull Mountains, which divide the drainages of the Musselshell River to the north and the Yellowstone River to the south. The federal coal lease area is in southern Musselshell County, about 30 miles north of Billings and 20 miles southeast of Roundup. The coal lease area is in mountainous terrain east of the existing surface facilities complex. The principal drainage is Rehder Creek and its tributaries, which flow to the west past the surface facilities complex, and Fattig Creek which flows northeast. Rehder and Fattig creeks are both tributaries of the Musselshell River. A small portion of the Section 22 tract is drained by Railroad Creek which flows southeast to the Yellowstone River. Dunn Mountain is on the divide between these two rivers. The lands to the north drain to the Musselshell River while the lands to the south drain to the Yellowstone River.

The general climate in south-central Montana is Middle Latitude Steppe. This is a semi-arid region characterized by low rainfall, low humidity, clear skies, and wide ranges in annual and diurnal temperatures. Average annual precipitation is about 14 inches with about one third of that falling in May and June. The driest period is from November to February. Heavy snows are not unusual during the winter. Strong downslope winds known as Chinooks have a thawing and drying effect and snow seldom accumulates to great depths.

Topography in the project area is characterized by gently sloping valleys bounded by ridges and sandstone-capped mesas. Differential erosion of rocks of varying hardness and resistance is the main process active in forming the present landscape. The underlying rocks are composed of interbedded shale, claystones, siltstones, coals, and sandstones; however, the high mesas and ridges are capped by "clinker". Clinker is a term used to describe the baked sedimentary rocks resulting from burning of underlying coal beds. The shale and claystones tend to be easily eroded, while the sandstone and clinker are more resistant to erosion. Sheet and rill erosion are active geomorphic processes in the upper drainage basins, and mass-wasting occurs locally along the steep-walled ridges.

Elevations in the coal lease area range from 3,970 feet above mean sea level along Rehder Creek in Section 8 to about 4,730 feet atop Dunn Mountain in Section 22. The terrain ranges from uplands with rock outcrops and ravines forested by ponderosa pine and Rocky Mountain juniper to sagebrush and mixed prairie grassland on lower benches, slopes, and drainage bottoms.

The project area covers a broader area of similar terrain ranging in elevation from about 3,700 feet to 4,750 feet. Average elevations in the area of the existing surface facilities complex are about 3,900 feet. Surface slopes can be as great as 15 percent in the area of the surface facilities and as great as 45 percent around mesas and ridges, including Dunn Mountain. The existing rail spur to Broadview extends westward from the surface facilities through higher terrain about five miles west of the facilities. After exiting the foothills, the rail spur crosses an area of flat-to-rolling agricultural land as low as 3,300 feet in Yellowstone County. The lowest elevations are south of Broadview.

Historical land use in the project area has been dominated by rangeland with some nearby areas of cropland and limited historical coal mining and timber production. The area contains wildlife

habitat and is an attractive area for hunting and other dispersed outdoor recreation. In recent years there has been an increase in dispersed rural residential development.

3.2 Geology, Mineral Resources, and Paleontology

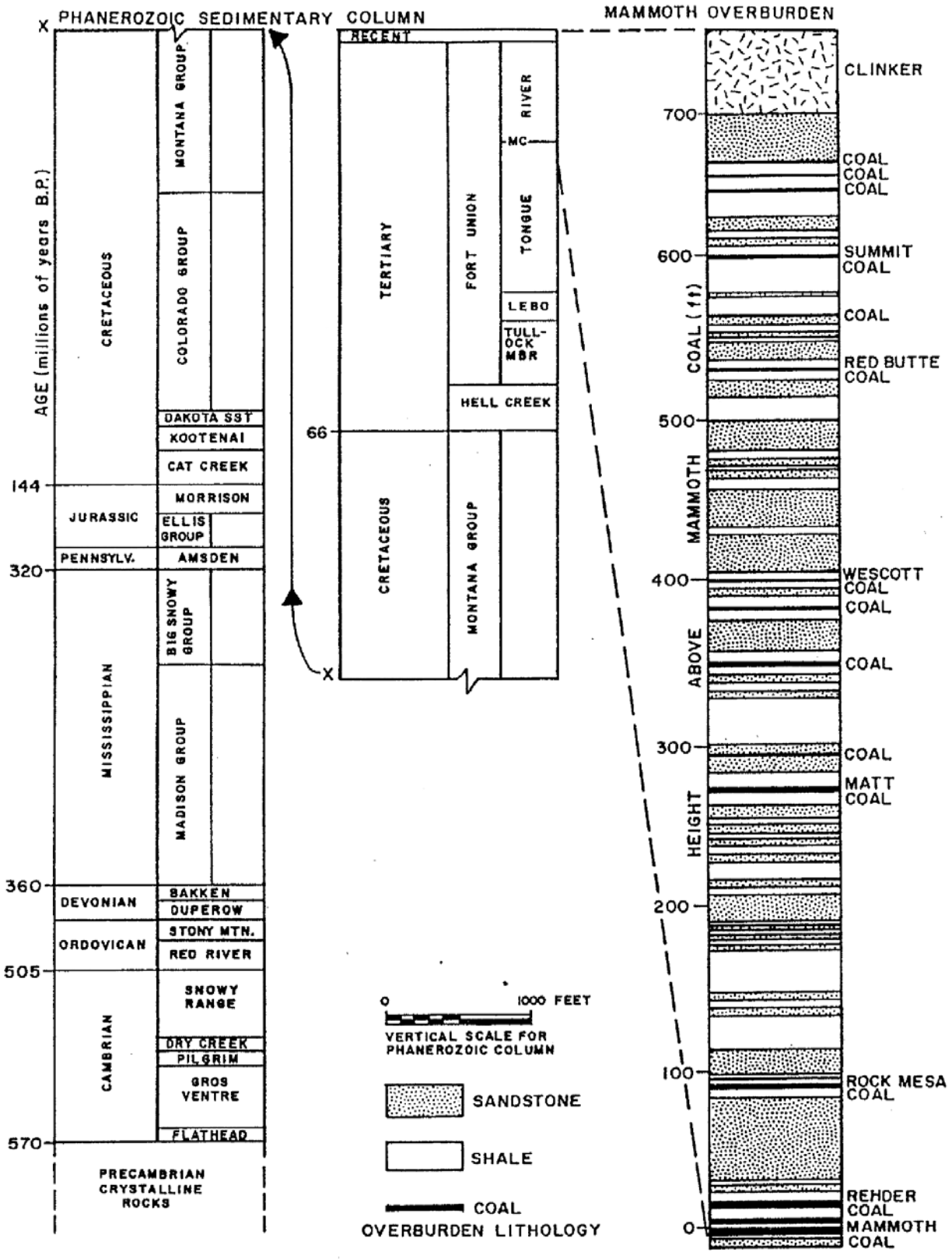
The Bull Mountains are composed of sedimentary rocks of the Fort Union Formation. This formation contains all of the commercial coal within the Bull Mountains. **Figure 3.2-1** illustrates the typical stratigraphy of the project area. The Fort Union has been divided into three members; in ascending order, these are:

- The Tullock Member, which is 400 to 500 feet thick in the study area. It consists of yellowish and darker colored sandstones and shale and contain no commercial coal beds.
- The Lebo Member, which consists of 200 to 300 feet of olive green and gray sandstone and shale. To the southeast, in the Northern Powder River basin, it contains minor coals. In the project area, however, it is less carbonaceous, and the few coal beds are thin, high in ash, and not of commercial value. The Lebo Member is less resistant to erosion than the overlying Tongue River Member and tends to form gently rolling grass covered slopes.
- The Tongue River Member, which is composed of light-gray to brownish-gray sandstones and siltstones, light-buff to dark-gray shaley siltstones and shale, brown to black carbonaceous shale, and coals. Several thin beds of buff colored limestone also have been observed in the upper portion of the Tongue River (Woolsey et al. 1917). The thick sandstones were deposited by fluvial processes as point bars and channel deposits, while the siltstones, shale, and claystones were deposited by flood plain, overbank, and lacustrine processes. The coals were deposited in peat swamps and the limestones probably were deposited in shallow lakes.

Twenty-six coal beds in the Tongue River Member, ranging in thickness from approximately one foot to 15 feet, have been named and mapped in the Bull Mountains (Woolsey et al. 1917). Numerous additional thin coal beds occur in the project area and are of no commercial value. Only the McCleary, Mammoth, and Rehder coals have been or are now of economic importance. The coal of primary interest for the Bull Mountains Mine No. 1 is the Mammoth coal.

Relatively thin valley alluvium, colluvium and mesa forming clinker are other lithologic units exposed in the Bull Mountains. The alluvium, exposed in some of the drainage bottoms, is of Quaternary to Recent age. The clinker, exposed along the ridge and mesa tops, is of Quaternary or late Tertiary age.

The Bull Mountains are underlain by a gently plunging syncline in the western portion of the Bull Mountains basin. The axis of the syncline, based on the Mammoth coal structure, trends northwest-southeast through the central and topographically highest portion of the project area. The deepest portion of the syncline is located about 8 miles north-northwest of the mine surface facilities (Connor 1988). Thickness of the overburden increases rapidly with distance from the outcrop.



SOURCE: MINE PERMIT EXECUTIVE SUMMARY (SPE 2009)

BULL MOUNTAIN COAL LEASING ENVIRONMENTAL ASSESSMENT

Figure 3.2-1
Stratigraphy of Bull Mountains

ANALYSIS AREA: Musselshell & Yellowstone Counties, Montana

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The stratigraphy of the project area has been divided into four hydrogeologic units:

- The alluvium, which includes the unconsolidated valley fill material in drainages;
- The overburden, defined as the portion of the Tongue River Member that overlies the Mammoth coal or the combined Mammoth and Rehder coals, including the clinker;
- The Mammoth coal or the combined Mammoth and Rehder coals; and
- The underburden, defined as the portion of the Tongue River Member of the Fort Union Formation that underlies the Mammoth coal.

Alluvium/Colluvium

The alluvium/colluvium includes both water and gravity deposited unconsolidated material. In the project area, it is relatively thin, and is confined to the valleys of the larger ephemeral streams, including Rehder Creek. As part of the hydrogeologic field program, numerous wells have penetrated the alluvium and indicate that it ranges in thickness from 0 to 37 feet.

The alluvium is composed of clastic material having a wide range of particle sizes including clay, silt, sand, and gravel. These materials are deposited as point bars, fine grained over bank deposits, and coarse grained basal conglomerates.

Overburden

Within the project area, the overburden varies in thickness from zero feet at the coal outcrop to more than 800 feet under the highest mesas. Within the areas planned for longwall mining, the overburden is greater than 200 feet thick.

The overburden is composed of interbedded sandstones, siltstones, shale, claystones, and coals. A few thin freshwater limestones were encountered in several of the exploration drill holes, but these represent an insignificant percentage of the overburden.

The sandstones in the project area exhibit a range of bed geometries, some sandstone, in particular that overlie the Rock Mesa coal, are massive and are up to 80 feet thick. The massive sandstones often are cross-bedded to thinly laminated, with clay ball conglomerate, fossilized wood fragments and logs, and flute casts occurring at their bases. These features are indicative of deposition by fluvial processes. Most of the sandstones occur in thinner beds, which can vary from lenticular and discontinuous to laterally continuous. The laterally continuous beds can show variations in thickness from a few inches to 70 feet. Sandstones comprise up to 50 percent of the overburden. Shale and claystones comprise 23 to 39 percent of this interval.

A number of coal beds occur in the overburden. In the project area, the Rehder coal is the first significant coal above the Mammoth coal; however, in the central portion of the project area, the interburden between these two coals thins rapidly, and the two beds merge. Other coal beds that occur in the overburden range in thickness from inches to several feet. Most are laterally continuous throughout the project area, except where they have been removed by erosion.

The most continuous coals (the Mammoth, Rehder, Rock Mesa, Matt, Lower and Upper Bull Mountains, Wescott, Strait, Red Butte, Fattig, and Summit) were correlated and mapped, and

have been used to subdivide the overburden into seven stratigraphic intervals. The outcrops were used to define the areal extent of each of the seven intervals (**Table 3.2-1**).

Table 3.2-1 Overburden Stratigraphic Intervals Bull Mountains Mine No. 1

Interval 1	All rocks and clinker above the Summit coal. This interval occurs only on the tops of the highest mesas and ridges. Thickness varies from zero feet, where it has been removed by erosion, to more than 200 feet on the highest mesas. Contains several thin coals, interbedded sandstones, shale and clinker.
Interval 2	All rocks from the top of the Summit coal to the base of the Lower Strait coal. Occurs on the high mesas and ridges. Ranges from 130 to 145 feet in thickness and contains interbedded sandstones and shale, the Fattig and Red Butte coals, and several other thin discontinuous coals. The Summit coal is missing in the northwestern portion of the project area where the top of Interval 2 is inferred using the projected stratigraphic position of the Summit coal.
Interval 3	Rocks bound by the bottom of the Lower Strait coal and the top of the Wescott coal. Ranges in thickness from 75 to 105 feet and is composed of massive sandstones and interbedded sandstones and shale.
Interval 4	Rocks bound by the top of the Wescott coal and the bottom of the Matt coal. A range in thickness from 120 to 150 feet and it is composed of interbedded sandstones, shale, and numerous coals, including the Upper and Lower Bull Mountain coals. In most areas, three or four unnamed coals and the Wescott coal overlie sandstones all of which are laterally quite continuous.
Interval 5	Rocks bound by the bottom of the Matt coal and the top of the shale above the Rock Mesa coal. Ranges in thickness from 160 to 190 feet and composed predominantly of sandstone. Several massive sandstone units occur within this interval, the thickest of which occurs above the shale overlying the Rock Mesa coal throughout the southern portion of the project area.
Interval 6	In the western portion of the project area, Interval 6 consists of the rocks between the shale above the Rock Mesa coal and the top of the Rehder coal, including the Rock Mesa coal. In the eastern portion of the project area, where the Rehder and. the Mammoth coals have merged, the interval consists of the rocks between the shale above the Rock Mesa coal and the top of the combined Rehder-Mammoth coal. It ranges in thickness from approximately 40 to 110 feet. In the areas where the Rehder and the Mammoth have merged, Interval 6 is predominantly massive channel sandstone. Where the Rehder and Mammoth are split, the interval thins and is composed of interbedded sandstones and shale.
Interval 7	The Rehder coal and the Rehder/Mammoth coal interburden ranges in thickness from zero to approximately 55 feet and are composed of both a massive sandstone and thinner sandstones with interbedded shale. Based upon field observations, a thickness map, and cross-sectional geometries, Connor (1988) concluded that this interval is composed of fluvial channel sandstones and associated crevasse splay and overbank deposits.

Mammoth Coal

The Mammoth coal is continuous throughout the project area to the outcrop. Within the project area the Mammoth coal ranges from 8 to 11 feet thick. In the eastern portion of the project

area, where the Mammoth coal and Rehder coal merge, the thickness of the combined Rehder-Mammoth coal (herein referred to as the Mammoth coal) is approximately 13.5 to 15.0 feet.

Underburden

The underburden is composed of the rocks below the Mammoth coal. For the baseline characterization, SPE has investigated the underburden down to 430 feet below the Mammoth coal as described in the following table.

All of the rocks outcropping within the project area, including the underburden, belong to the Tongue River Member of the Fort Union Formation. Numerous studies (Connor 1988; Shurr 1972; Woolsey et al. 1917; Flores 1981) indicate that massive sandstones are common in the Tongue River Member (including the rocks below the Mammoth coal), and that they represent large fluvial channels. The geometry of these sandstones, therefore, is more linear than tabular. Although linear in overall dimension, these channel sandstones still may be several miles wide and reflect the high sinuosity or meandering of the paleostream.

Examination of Woolsey's (1917) detailed stratigraphic sections and geophysical logs for oil and gas test wells in the Bull Mountains area shows that massive sandstones are common in the underburden of the Mammoth coal. Monitor well 62720-03 located east of the surface facilities is completed in one of these; a 50 foot thick, massive, fluvial sandstone that is approximately 350 feet below the Mammoth coal.

Associated with these fluvial channel-dominated facies are thinner sandstones; finer grained overbank deposits of siltstones, shale, and claystones; and backswamp coals. The Pompey and the Dougherty coals were encountered in several Louisiana Land and Exploration Company (LL&E) drill holes and wells and in five of the 1991 boreholes completed by Meridian.

3.2.1 Geologic Structure

The geologic structure of the area was defined using borehole information as well as photogeologic interpretation. The former was used to determine the geologic structure of the site especially with regard to the Mammoth coal and several other coal seams. The latter was used to identify fractures and lineaments within the project area.

Structural Evaluation

Drillhole data from the project area were combined with the outcrop data to construct a structure contour map on the base of the Mammoth coal. Dips on the base of the coal are generally less than 1 percent. Within the project area, the deepest portion of the syncline is located along the north-central boundary, and the highest portion is located along the south-central boundary in the vicinity of Dunn Mountain. The maximum difference in the structural elevation of the Mammoth coal is approximately 280 feet, and the base ranges from 3,960 to 3,680 feet above sea level.

The Bull Mountains Mine No. 1 permit area is located on the western flank of the syncline where the elevation of the Mammoth coal vary by approximately 180 feet, from approximately 3,920 feet in the southwest to 3,740 feet above sea level in the north. The project area is located on the

northern and eastern flank of the syncline where the Mammoth coal is dipping to the north and northwest, respectively.

Fracture Interpretation

Fracturing of rocks in the area has been investigated for its importance in mine stability, subsidence, and groundwater flow. Conclusions from the fracture/lineament studies indicate:

- There is no evidence of fracturing being hydraulically significant in the deeper Fort Union Formation bedrock. In shallow bedrock (less than 100 to 200 feet deep), jointing may enhance permeability of sandstones and coals. In the near-surface, some joints may be sufficiently open to serve as conduits, focusing bedrock flow to some springs.
- Orientation sets of all scales of lineaments and of joints mapped in outcrop are similar, but there is no apparent spatial correlation between lineaments and jointing (joints striking northeast are not more frequent along northeast lineaments and are not more frequent on lineaments).
- Large, regional lineaments related to major drainage orientations are broad, diffuse features. They may be related to fracturing in higher strata that have since been removed by erosion; that is, watercourses may have been directed by structures no longer existing except as diffuse jointing in lower strata.
- No faults have been identified in the project area. All fracturing is jointing (without displacement).
- Jointing in any orientation set tends to occur in swarms, with very large unjointed areas between swarms.
- Jointing is vertically discontinuous (although the same orientation sets are seen at each horizon) and largely confined to sandstone beds. Claystones and shale have tended to absorb pre-mining strain by non-brittle deformation.
- Jointing frequency and aperture size are believed to decrease with depth, based on bedrock core studies, aquifer test results (permeability decrease with depth), and rock test results (rock strengths are low and do not favor brittle fracturing).
- Some large joints observable in air photographs do, nevertheless, appear to be associated with spring or seep occurrence. Shallow joints may, due to larger apertures under low confining overburden load, serve as conduits focusing spring emanation points.
- Joints induced by subsidence above the fragmented roof zone are very unlikely to cross shale or claystones of more than ten feet thickness and to remain open to function as significant conduits for vertical groundwater movement. These clayey strata are likely to deform in a non-brittle manner, and fractures that do open are likely to heal in the presence of water due to softening. Standard laboratory tests for plasticity and slake durability operate on very short time scales (minutes), and are not appropriate to demonstrate claystone behavior over days to months, and geologic evidence is more appropriate in predicting plastic behavior of shale and claystones.

After subsidence is complete, fractures in compressional zones should close, while shale should deform plastically and are expected to heal fractures in tensional zones; therefore, subsidence-induced fracturing should not have long term radical effects on the hydrology of aquifers above the fragmented roof zone.

Additional mineral resources in the region include sand and gravel resources that occur throughout Musselshell and Yellowstone Counties, and may also include undeveloped oil and gas resources. There has been exploration for oil and gas in the past, but there are no known plans to develop these resources.

3.2.2 Mine Related Subsidence

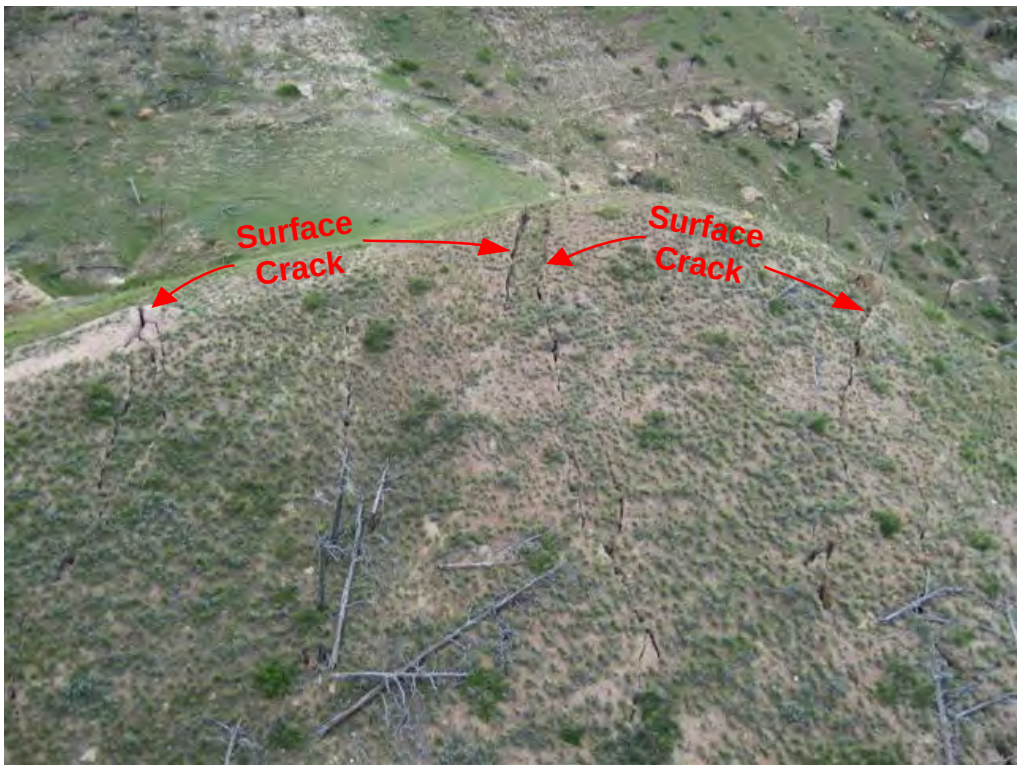
Longwall mining began in December 2009 and has advanced approximately 12,000 feet to date, most of the first panel. Prior to longwall mining, a pre subsidence topography survey was completed for several locations above the panel. After longwall mining has progressed beyond a given survey point, topography surveys are completed again to measure subsidence. To date, seven subsidence surveys have been completed and additional surveys will continue as the longwall operations progress throughout the mine plan. In the area that has been mined, the coal seam thickness was 9.3 feet and the average overburden thickness was 259 feet. As predicted, subsidence deformation of approximately 70 percent of the coal seam height is occurring with a maximum surface elevation reduction of about six feet. Monitoring to date has shown that subsidence begins in the first week after mining and reaches near the maximum prediction within three to four weeks.

The predicted longwall subsidence mechanism includes surface cracking followed by closure of the cracks. Site surveys have been conducted by vehicle and aircraft to observe surface cracks. **Figure 3.2-2** shows some of the initial surface cracks that developed over the longwall panel. The experience to date has shown that smaller cracks have healed while some of the larger cracks are still expressed on the surface. To date, some large rocks have been displaced on the steeper slopes but only minor erosion has occurred from subsidence and has been well within the amounts contemplated by this analysis. These larger cracks may create a surface hazard to wildlife, livestock, and humans that traverse these areas. Appropriate mitigation measures would be implemented as specific hazards are identified by MDEQ as being a risk to heath and safety. There have been no observable effects to groundwater or surface water resources. Subsidence, hydrology, and ecological monitoring will continue according to the permit requirements and any associated damage related to subsidence will be repaired, as appropriate.

3.2.3 Paleontology

Paleontological resources are the physical remains, impressions, or traces of plants or animals from a former geological age. These resources may include casts, molds, and trace fossils such as burrows or tracks. Fossil localities typically include surface outcrops, areas where subsurface deposits are exposed, and special environments favoring preservation such as caves or wetlands. Paleontological resources are important primarily for their potential to provide scientific information on the evolutionary history of plants, animals, and their environments. Shale and sandstones of the Fort Union Formation are best known for their abundant plant and animal fossils. Significant accumulations of mammalian fossils (including multituberculates, marsupials,





BULL MOUNTAIN COAL LEASING ENVIRONMENTAL ASSESSMENT

Figure 3.2-2
Surface Subsidence Cracks

ANALYSIS AREA: Musselshell & Yellowstone Counties, Montana

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Prepared By: JC | Reviewed By: JK

cimolestans, pantolestans, primates, condylarths, and pantodonts) have been recovered within the Tongue River Member of the Fort Union Formation in eastern Montana (Robinson and Honey 1984; Lofgren et al. 2004). However, their occurrences are neither consistent nor predictable as in other Tertiary formations such as the Wasatch. Based on variable occurrences of fossils that have potential to be scientifically significant, the Fort Union Formation is determined to be a Potential Fossil Yield Classification (BLM 2009a) Class 5 stratigraphic unit (Very High potential for significant paleontological resources). No paleontological localities have been documented in the project area, but the area is expected to yield plant and invertebrate remains. Vertebrate remains are less-likely to be encountered.

3.3 Air Quality

3.3.1 Site Specific Air Quality

An Air Quality Permit for the existing Bull Mountains Mine No. 1 has been obtained through the MDEQ (MAQP # 3179). The most recent revision of this permit (MAQP # 3179-04, issued January 20, 2009) assigns the permit to SPE. The air quality standards apply to the operation of the surface facilities complex. There would be no proposed surface facilities or activity in the coal lease area subject to the conditions and limitations of the MAQP. The conditions and limitations of the MAQP for the existing surface facilities are shown in **Table 3.3-1**.

Table 3.3-1 Conditions and Limitations of the Montana Air Quality Permit

Conditions and Limitations	Regulation
Coal production from the facility shall be limited to 15.0 million tons during any rolling 12-month time period for the primary phase of the coal mining operation.	ARM 17.8.749
SPE shall not cause or authorize any particulate stack emissions (total particulate), from pneumatic coal cleaning equipment, which exceed the following: 0.040 grams per dry standard cubic meter (0.018 grains per dry standard cubic foot); and 10 percent opacity or greater averaged over 6 consecutive minutes.	ARM 17.8.340 and 40 CFR 60, Subpart Y
SPE shall not cause or authorize to be discharged into the outdoor atmosphere from any coal processing and conveying equipment, coal storage system, or coal transfer and loading system processing coal, any emissions that exhibit an opacity of 20 percent or greater averaged over 6 consecutive minutes.	ARM 17.8.340 and 40 CFR 60, Subpart Y
SPE shall not cause or authorize to be discharged into the atmosphere, from any other source of process or fugitive particulate emissions, any visible emissions that exhibit opacity of 20 percent or greater averaged over 6 consecutive minutes.	ARM 17.8.304, ARM 17.8.308, and ARM 17.8.752
Water and/or chemical dust suppressant shall be available on site and used, as necessary, to maintain compliance with the opacity limitations in Section II.A.4 and Section II.A.5.	ARM 17.8.752
SPE shall use a fabric filter baghouse to control process particulate emissions from surface crushing and screening operations.	ARM 17.8.752
SPE shall use a fabric filter baghouse to control process particulate emissions from coal cleaning operations.	ARM 17.8.752

Table 3.3-1 Conditions and Limitations of the Montana Air Quality Permit

Conditions and Limitations	Regulation
SPE may operate one ROM coal stockpile not to exceed a surface area of 11.9 acres (520,000 square feet (ft^2).	ARM 17.8.749
SPE may operate four coal stockpiles, Stockpiles #1, #2, #3, and #4, each not to exceed a surface area of 4.6 acres (200,000 ft^2).	ARM 17.8.749
SPE shall use watering and/or chemical dust suppressants and contouring techniques to control particulate emissions from the coal stockpiles.	ARM 17.8.752
Fall distance shall be minimized during the transfer of waste material and coal to storage piles and during all transfer of material to haul trucks, material traps, hoppers, bins, and conveyors.	ARM 17.8.752
SPE may operate one topsoil storage pile not to exceed a surface area of 2.3 acres (100,000 ft^2).	ARM 17.8.749
SPE shall employ watering and/or chemical dust suppressant, contouring, compaction techniques, and re-vegetation to reduce emissions from the topsoil storage pile.	ARM 17.8.752
SPE shall employ watering and/or chemical dust suppressant, contouring, compaction techniques, and eventual covering with soil and re-vegetation to reduce emissions from waste disposal activities.	ARM 17.8.752
SPE shall enclose all coal and waste material conveyors. Conveyors shall be enclosed on the top and sides with a partial opening on the bottom.	ARM 17.8.752
SPE shall use flexible chutes, enclosures, and fabric filtration to control emissions from all coal and waste material conveying transfer points and coal load-out operations.	ARM 17.8.752
SPE shall convey coal from Stockpiles #3 and #4 to either the product load-out conveyor directly or to product silos only.	ARM 17.8.752
SPE shall operate all crushers and screens within an enclosed building.	ARM 17.8.752
SPE shall not operate more than two crushers at any given time and the maximum rated design capacity of each crusher shall not exceed 3,500 TPH.	ARM 17.8.749
Crushing production is limited to 15 million tons during any rolling 12-month time period.	ARM 17.8.749
SPE shall not operate more than two screens at any given time and the maximum rated design capacity of each screen shall not exceed 3,500 TPH.	ARM 17.8.749
Screening production is limited to 15 million tons during any rolling 12-month time period.	ARM 17.8.749
SPE shall utilize a stacker-reclaim (underground) system for movement of product into and out of stockpiles during the primary phase of operations.	ARM 17.8.752
SPE shall incorporate a radial stacker with an adjustable chute at the discharge end for both the clean coal and reject stockpiles during the development phase.	ARM 17.8.752
SPE shall incorporate a fixed stacker for both the ROM and clean coal stockpiles during the primary phase of the project.	ARM 17.8.752
SPE shall develop, implement, and maintain good housekeeping practices to keep coal and waste material transfer locations clean.	ARM 17.8.752
SPE shall not cause or authorize the use of any street, road, or parking lot without taking reasonable precautions to control emissions of airborne particulate matter.	ARM 17.8.308
SPE shall clean up all spilled material from road surfaces.	ARM 17.8.752
SPE shall treat all unpaved portions of the haul roads, access roads, parking	ARM 17.8.749

Table 3.3-1 Conditions and Limitations of the Montana Air Quality Permit

Conditions and Limitations	Regulation
lots, or general plant area with water and/or chemical dust suppressant, as necessary, to maintain compliance with the reasonable precautions limitation in Section II.A.22.	
SPE shall not operate more than two boilers at any given time and each boiler shall not exceed a maximum design capacity of 35,000 British thermal units per hour (Btu/hr) each.	ARM 17.8.749
Total coal combustion in 35,000 Btu/hr boilers shall be limited to 26 tons during any rolling 12-month time period.	ARM 17.8.749
SPE shall comply with all applicable standards and limitations, and the reporting, recordkeeping, and notification requirements contained in 40 CFR 60, Subpart Y, and Standards of Performance for Coal Preparation Plants.	ARM 17.8.340 and 40 CFR 60, Subpart Y

The conditions above include several measures for controlling airborne particulates. The Best Available Control Technology (BACT) analysis attached to the 2009 revision of the air quality permit (MAQP #3179-01) concluded that emissions of NO_x, CO, and SO_2 by the proposed facilities would be negligible and that proper operation and maintenance of onsite sources would be adequate to achieve appropriate emission standards. However, control measures and monitoring are specified for airborne particulates.

Air quality is characterized by the concentration of various pollutants and their interaction in the atmosphere. Pollution effects on receptors are a measure of the degradation of air quality. The nearest receptor is a residence located approximately 0.5 miles to the south of the surface facilities complex. Measurements of pollutants are expressed in parts per million (ppm) or micrograms per cubic meter ($\mu g/m^3$). Both long-term climatic factors and short-term weather fluctuations are considered part of the air quality resource, because they affect the dispersion and concentrations of pollutants. Prevailing winds are a key element of local climate that affects the dispersion of pollutants.

Baseline data on wind patterns was collected for the mine permit in 1989 (SPE 2009 Volume 5, Section 304(8)). **Table 3.3-2** presents a tabular frequency distribution of wind direction by wind speed class. This information is also displayed graphically in **Figure 3.3-1**. Average wind speeds range from 2.5 to 6.0 m/sec (5.6 to 13.4 mph) with a mean speed of 3.9 m/sec (8.7 mph). The wind speeds were the highest from the west and west-northwest due to the stronger synoptic level forces. Hence, the westerly components can be attributed to the synoptic flow in the region. Minimum wind speeds are from the south and southeast indicating that the flow from that direction is associated with weak drainage flow.

The dominant wind flow throughout the period (February through December 1989) is northerly to westerly with an additional southeasterly component. Morning wind (0800-1200), as solar heating becomes more significant, has a more dominant flow from the southerly to westerly directions but still continues to have significant occurrences in the other directions except from the east. During the afternoon (1200-1600) the prevailing winds continue to be west-northwest but again significant flows occur from the other directions. During the late evening (2000-2400), the flow characteristics return back to those seen in the early morning hours with both northwesterly and southeasterly components being present.

Table 3.3-2 Frequency of Winds by Direction and Speed, February through December 1989

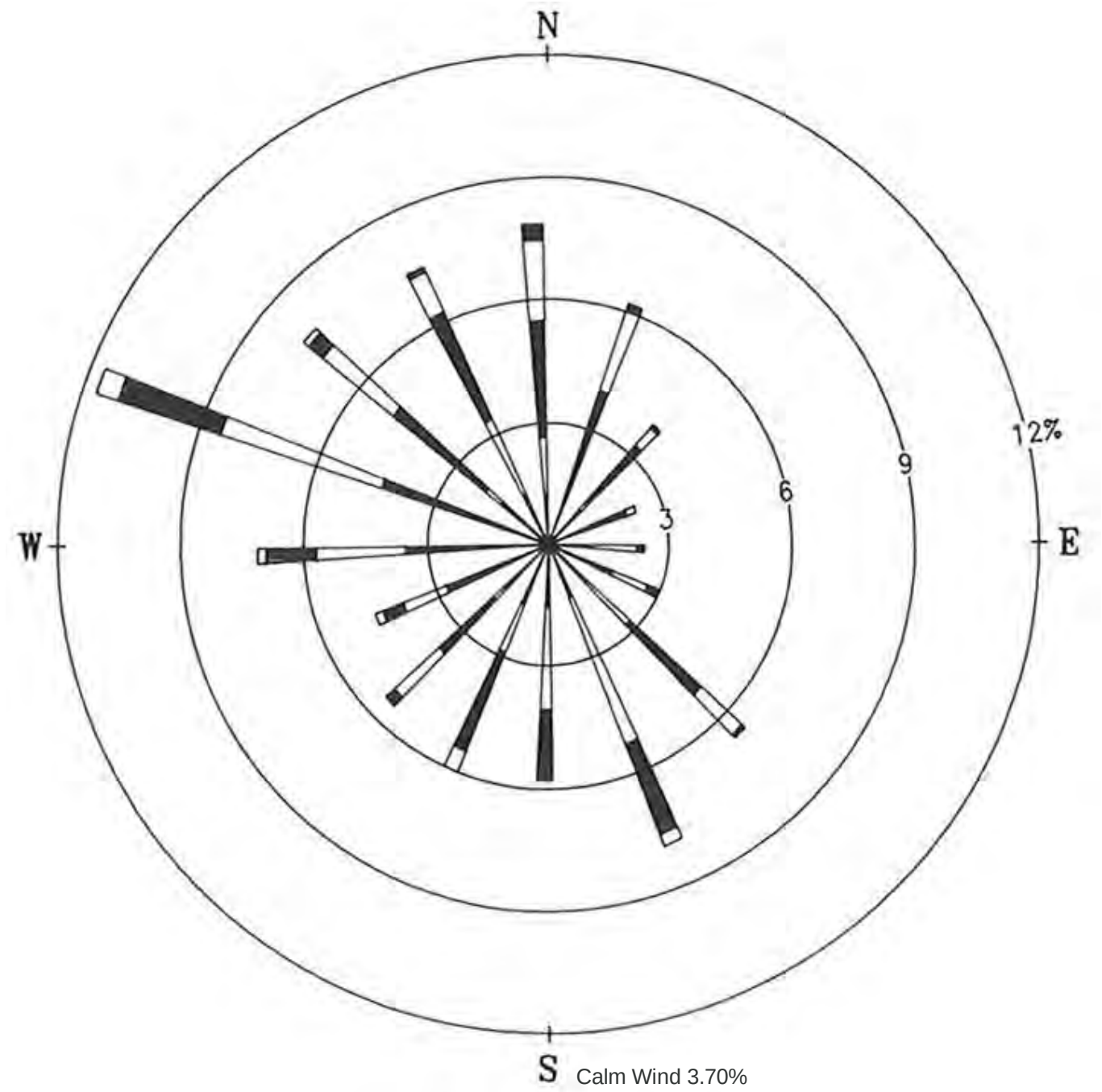
Direction	1<1.5	1.5<3	3<5	5<8	8<11	>11	Sum	Mean Speed
N	0.45	2.83	3.80	3.07	.45	.07	10.66	4.3
NNE	0.34	1.49	2.62	1.65	.13	.00	6.24	4.0
NE	0.21	1.55	1.88	.86	.08	.01	4.59	3.7
ENE	0.34	.83	.97	.56	.09	.00	2.79	3.6
E	0.29	1.08	1.42	.74	.20	.00	3.73	3.9
ESE	0.32	.95	1.56	1.19	.24	.00	4.26	4.3
SE	0.70	2.41	2.71	1.03	.00	.00	6.85	3.3
SSE	0.75	5.57	2.26	.19	.00	.00	8.77	2.6
S	0.71	3.88	1.89	.05	.00	.00	6.53	2.5
SSW	0.44	2.13	1.30	.11	.01	.00	3.98	2.7
SW	0.32	1.03	1.40	.52	.04	.00	3.31	3.5
WSW	0.21	.93	.91	.77	.13	.05	3.00	4.2
W	0.30	.81	1.06	1.72	.54	.25	4.68	5.4
WNW	0.36	1.49	2.14	3.06	2.10	.60	9.75	6.0
NW	0.40	2.31	3.03	1.59	.34	.07	7.74	4.0
NNW	0.60	3.32	3.65	1.47	.38	.00	9.42	3.6
All	**6.75**	**32.62**	**32.59**	**18.56**	**4.75**	**.04**	**96.31**	**3.9**

Speed class intervals are meters per second (m/sec) Table entries are expressed as percent of period.
Calm (less than one meter per second) = 3.7 percent To convert from meters per second to miles per hour multiply by 2.24.
Period mean wind speed = 3.8 m/sec

In general, measured wind speeds are low, averaging about 3.9 m/sec (8.7 mph). Winds are somewhat more common and somewhat stronger from the northwest quadrant. This would result in a slightly greater tendency for airborne pollutants to be dispersed to the south and east. There is no development south and east of the surface facilities.

Air quality standards specify upper limits of pollutant concentrations and duration of exposure. The principal standards for comparison of air quality are the National Ambient Air Quality Standards (NAAQS). Additional standards may be established for states or regions. Montana air quality standards have been established for ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, particulate matter smaller than 10 micrometers in diameter, lead, hydrogen sulfide, settled particulates (dust-fall), and visibility. An area is designated by the Environmental Protection Agency as being in attainment for a pollutant if ambient concentrations of that pollutant are below the NAAQS. An area is not in attainment if violations of NAAQS for that pollutant occur. The lease areas are all within areas considered in attainment of all National and Montana ambient air quality standards.

The Federal Prevention of Significant Deterioration (PSD) program is implemented through increments and area classifications that define significance of deterioration for individual pollutants. The Clean Air Act (CAA) area classification scheme defines three classes of geographic areas and applies different increments to each class. Class I includes area of special national concern where the need to prevent significant deterioration is greatest. The nearest Class I area is the Northern Cheyenne Indian Reservation, about 75 miles to the southeast (MDEQ 2009). Class II areas are all PSD areas that are classified as in attainment or unclassified and are not Class I. Most of south-central Montana, including the project area, is classified as Class II.



Notes:
- This diagram illustrates the frequency of occurrence for each wind direction.
- Wind direction is the direction from which the wind is blowing.
- Bull Mountains example-wind is blowing from the north 8.1% of the time.
- Source for the diagram and notes: MDSL 1992.

BULL MOUNTAIN COAL LEASING ENVIRONMENTAL ASSESSMENT

Figure 3.3-1
Wind Rose for Bull Mountains
(Period: 1990)

ANALYSIS AREA: Musselshell & Yellowstone Counties, Montana

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Prepared By: JC | Reviewed By: EC

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The nearest non-attainment area is the Billings metropolitan area which is in non attainment for carbon monoxide maintenance. The Town of Laurel, about 10 miles southwest of Billings, is non-attainment for SO_2. The Class III designation consists of specific areas designated by states for higher levels of industrial development and emissions. Montana has not designated any Class III areas. As noted above, the BACT analysis (MAQP #3179-01) concluded that onsite CO and SO_2 emissions would be negligible. Furthermore, prevailing winds are to the southeast (**Figure 3.3-1**) and would not carry these negligible emissions toward Billings or Laurel.

Baseline Monitoring Data

MAQP # 3179-04 requires that SPE monitor total suspended particulates (TSP) and fine particulates less than 10 microns (PM-10) near the surface facilities, upwind of the surface facilities, and downwind of the surface facilities on a regular basis. Baseline air quality data is adopted from data collected by SPE for an earlier proposed mine plan. A meteorological station was established near the surface facilities area during February 1989. This station gathered baseline information through 1992 on precipitation, wind direction and speed, temperature, TSP, and PM-10. Three precipitation gages were installed; one at the Johnson Ranch house; one on Dunn Mountain; and one adjacent to the Old Divide Road 1.5 miles south of the surface facilities. Current local sources of air pollution in the area in addition to the Bull Mountains Mine No.1 surface facilities include vehicle traffic (unpaved roads), agricultural activities, and home heating.

Baseline air quality (suspended particulates) was monitored in the project area. The measurements included both TSP and PM-10. The period of record submitted with the application for MAQP # 3179-03 is from March 1989 through March 1992 shown in **Table 3.3-3**. All values are well below applicable ambient air quality standards.

Table 3.3-3 Baseline Particulate Data for the Surface Facilities Area (values reported in µg/m^3)

Year	Parameter	24-Hour High Reading	24-Hour Second Highest	Annual Average	No. of Samples
1989	TSP	39	33	14	51
	PM-10	53*	19	9	51
1990	TSP	59	58	13	59
	PM-10	29	27	9	57
1991	TSP	42	39	14	56
	PM-10	24	21	9	57

*This high PM-10 value was recorded on June 27; no TSP value was recorded on that date.

Particulate data had been collected in the project area previously in 1981. LL&E collected data for 11 months at a monitoring site just south of the PM Coal Mine in Section 13 of Township 6 North, Range 26 East. The primary SPE monitoring station is located about 1.5 miles south of the LL&E site in the extreme southeast corner of Section 23.

The state and federal PM-10 standards are Annual Average of 50 µg/m^3 and 24-hour of 150 µg/m^3 (State of Montana, Air Quality Rules, Section 16.8.821).

The LL&E data collection program consisted of three samplers, one was located just south of the PM Mine pit at the meteorological station, another located closer to the PM Mine itself, and the third was located at the PM Mine pump house. During the period of sampling, the PM Mine produced approximately 50,000 tons of coal per year. The highest measured concentration for TSP was 107 µg/m^3 measured at the PM Mine site with that site recording an arithmetic mean of 36 µg/m^3 and a geometric mean of 24 µg/m^3. This site was probably influenced by local activity. The other two sites were located farther away from the mining activity. The arithmetic mean for the met station site and the pump house site were 18 and 16 µg/m^3, respectively, while the geometric means were 14 and 12 µg/m^3, respectively. LL&E did not collect any PM-10 data.

The primary SPE monitoring station was not located near any current mining activity or any significant particulate sources. A statistical analysis of both TSP and PM-10 was performed for the months of February through December 1989. For this station, the TSP arithmetic mean was 14 µg/m^3 and the PM-10 mean was 9 µg/m^3 while the geometric mean was 12 and 9 µg/m^3, respectively. The maximum TSP concentration was 39 µg/m^3 while the maximum PM-10 was 53 µg/m^3. On the date of the maximum PM-10 reading, the TSP filter was damaged, probably during removal from the sampler, and therefore the TSP concentration could not be calculated. Ratios of PM-10 to TSP were also calculated and the average ratio for the period was 0.62 with the maximum at 1.0 and a minimum of 0.29. This average ratio indicates that 62 percent of the TSP is PM-10.

In comparing these two different locations, the LL&E sites that were located far from the activity compared quite favorably to the SPE site. The PM Mine site had much higher concentrations than the SPE site. In fact, the TSP geometric mean at the PM Mine site is almost double the mean at the SPE site. After taking the above comparisons and analyses into consideration, it is felt that the LL&E site was being influenced to some degree by the PM Mine open pit and, therefore, was not representative of the background concentrations of particulates in the area. The SPE station, the LL&E met station site, and the pump house site (being located away from any significant particulate sources) are more representative of background concentration of particulates in the project area.

3.3.2 Climate Science

Though the terms “global warming” and “climate change” are often used interchangeably, they are two distinct concepts as described in the sections below (US CCSP 2009).

3.3.2.1 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). 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 (CO_2), methane (CH_4), nitrous oxide (N_2O), water vapor, 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).

3.3.2.2 Climate Change

Climate is defined as the average weather or the regular variations in weather in a region over a period of years as exhibited by temperature, precipitation, and wind velocity (Merriam-Webster's 2009). 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). 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). 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).

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.

3.3.2.3 Climate Change Cause and Effect

Although the effects of GHG emissions and other contributions to climate change in the global aggregate are estimable, it is currently impossible to determine what effect any given amount of GHG emissions (or other contribution to climate change) resulting from an activity might have on the phenomena of global warming, climate change, or the environmental effects stemming there from (US CCSP 2009). It is therefore not currently possible to associate any particular action with the creation or mitigation of any specific climate-related environmental effects. However, it is known that certain actions may contribute in some way to the phenomenon (and therefore the effects of) climate change, even though specific climate-related environmental effects cannot be directly attributed to them.

3.3.2.4 Bull Mountains Mine No. 1 GHG Emissions

An inventory of sources tied to mining of the federal coal lease includes both gasoline- and diesel-powered machinery and vehicles. An analysis of CO_2 emissions based on total annual gasoline and diesel consumption includes this inventory or sources.

During 2008, the Bull Mountains Mine No. 1 operations consumed 181,000 gallons of diesel and 11,000 gallons of gasoline fuel, which is considered to be representative annual consumption for

the life of the mine. Carbon dioxide emissions from mobile sources can be determined by using the average carbon content in the fuel. The Code of Federal Regulations (40 CFR 600.113) provides values for carbon content per gallon of gasoline and diesel fuel which EPA uses in calculating the fuel economy of vehicles. Gasoline carbon content is 2,421 grams per gallon and diesel carbon content is 2,778 grams per gallon. EPA uses IPCC guideline for calculating CO_2 emissions (EPA 2009a). Carbon dioxide emissions from a gallon of gasoline equal 19.4 pounds/gallon and CO_2 emissions from a gallon of diesel equals 22.2 pounds/gallon (EPA 2009a). Given these emissions, the Bull Mountains Mine No. 1 generated approximately 100 tons of CO_2 from gasoline consumption and 2000 tons CO_2 from diesel fuel consumption in 2008. The EPA calculations and the supporting data have associated variation and uncertainty, such as fuel economy of the engine. There are no other significant sources of combustion at the mine facility. Methane emissions from the mine are monitored and at this point of the mine are either at or below detection limits. All coal mining and handling operations are powered by electricity and any GHG emissions associated with electric generation are calculated by those operations.

Emissions of CO_2 during 2009 are estimated to be about the same as estimated for 2008. Fuel consumption would not have been significantly greater. The new rail facility reduced truck traffic and implementation of all new facilities would have reduced fuel consumption over the increase in coal production.

Black carbon is also emitted by sources at the mine. Black carbon, a component of soot, is a by-product of incomplete combustion and stays in the atmosphere for days or weeks (as compared to CO_2 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 (Jacobson testimony 2007).

There is a strong possibility that black carbon is the second leading cause of global warming after CO_2 and that reducing black carbon is the fastest way to reducing global warming (Jacobson testimony 2007).

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). However, the addition of a trap can decrease mileage and slightly increase CO_2 emissions (Jacobson testimony 2007). 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) and 181,000 gallons consumed at the mine in 2008, black carbon emission is calculated at 217,200 grams or 0.24 tons.

Given that the US emits 6.1 percent of the globally-emitted black carbon, it is reasonable to assume that the contribution of black carbon from sources related to mining of the federal coal

would have an insignificant impact on global climate change. Additionally, control of black carbon from diesel sources at the mine would not have significant impact.

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. 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 found at many underground coal mines in other regions. It is not anticipated that methane would contribute to GHG emissions.

3.4 Water Resources

This section contains a description of the hydrologic regimes within and adjacent to the Bull Mountains Mine No. 1 LOM area. The project area includes the existing permit area, LOM area, and adjacent areas. The adjacent area is defined as that region located within 3 miles in a downgradient direction of the LOM area and one mile in all other directions. Information from this larger area is used to adequately characterize the hydrologic regime of the coal lease area.

Hydrologic baseline conditions for the project area are defined including descriptions of hydrogeologic units in terms of baseline water levels and flow, aquifer hydraulics, and water quality. Conclusions are drawn using a conceptual hydrogeologic model that explains the interaction of hydrogeologic units and the controlling mechanisms for occurrences of springs and other surface water resources.

3.4.1 Precipitation

Precipitation data have been collected at the Billings Airport since June 1946 and since June 1914 at the Montana State Cooperative station in Roundup, Montana. For the period of record, the long term average annual precipitation for the Billings station is 13.55 inches and 12.07 inches for the Roundup station. Most of the precipitation falls between April and October. Slagle (1986) has used an average annual precipitation amount of less than 14 inches for the Bull Mountains area, which corresponds favorably with the long term data records for Billings and Roundup. Within the project area, precipitation data are collected continuously at the meteorological monitoring station located at the Dunn Mountain site, installed in July 1991.

3.4.2 Regional Groundwater

The regional aquifers of primary concern to the mining operation are the Tongue River Member of the Fort Union Formation, which contains most of the currently used water resources in the project area, and the Madison Group, currently used as a source of water for the Bull Mountains Mine No. 1 surface and underground mining facilities. The Fox Hills and Hell Creek Formation aquifers are present in the area, but are not used for mine purposes. A brief description of these aquifers is provided in the following sections.

Tongue River Member: Groundwater flow is complex in the shallow Tongue River Member aquifers, as it radiates outward from an apparent local recharge area in the Bull Mountains region (Slagle 1986). Within the project area, groundwater flow in these aquifers is predominantly to the north-northwest, following the synclinal structure. The hydraulic gradient ranges from 0.002 to 0.008 feet/feet (ft/ft).

The Tongue River Member exhibits the greatest potential for water production, as it lies at the shallowest depth, and contains the largest percentage of sandstones and coals (Slagle 1986). Heterogeneities within this member make depth to water and probable yields difficult to predict however, well yields average approximately 8 gpm (Slagle et al. 1985). The overburden, the Mammoth coal, and the underburden are all included in the Tongue River Member. Generally, they are all low yielding zones.

Madison Group: Throughout the northern Rocky Mountains, the deeply buried carbonate rocks of the Madison Formation are a significant, though little used, regional aquifer. The principal recharge areas for the Madison Formation are the Little Belt, Big Snowy, Pryor, and Bighorn Mountains. The hydraulic gradient slopes away from these recharge areas and toward the northwest, north, and northeast. In the project area, groundwater flow in the Madison Formation is to the east (Feltis 1980a).

Studies by the United States Geological Survey (USGS) and Montana Bureau of Mines and Geology (MBMG) (Feltis 1980a) have resulted in a series of maps showing the aquifer potentiometric surface, and the concentration of dissolved solids and the ratios of various anions and cations in the groundwater in the Madison Group of Montana. In the project area, the potentiometric surface for the Madison Formation is approximately 3500 to 3600 feet above sea level, while ground surface is approximately 3700 to 4750 feet above sea level. Concentrations of dissolved solids range from 3000 to 5000 milligrams per liter (mg/L). The combined total of the sodium, potassium, and chloride ions constitutes approximately 25 to 50 percent of the dissolved solids. Sulfate is the dominant anion.

In 1978, the USGS cooperated with several agencies to construct a test well that fully penetrated the Madison Group (USGS 1979). This well, known as Madison Limestone Test Well 3, is in Section 35 T2N R27E, Yellowstone County, Montana, about 15 miles northeast of Billings and approximately 26 miles south of the Bull Mountains Mine No. 1. The analytical results from water samples collected during drill stem testing indicated that water from this formation is calcium - sulfate, or calcium - sodium - sulfate, type water. Dissolved solids ranged from 3100 to 4000 mg/L and pH from 6.9 to 7.0. Temperature ranged from 46.5° to 49.5° Celsius (C). While it should be noted that the samples were collected before field parameters had stabilized and that the USGS suspected possible drilling fluid contamination of the samples, the dissolved solids concentrations reported are consistent with that indicated by MBMG (Feltis 1980b). Another water sample, obtained from the upper Mission Canyon Formation of the Madison Group, was collected following the perforation of the well and after the field parameters for water quality had stabilized. The laboratory analysis for this sample also showed it to be calcium - sulfate type water with dissolved solids concentration of only 2660 mg/L.

Alluvium: On a regional basis, the silts, sands, and gravels that comprise the alluvium of the Musselshell and Yellowstone River valleys do yield significant amounts of water to wells for

irrigation and domestic purposes. Alluvium in the tributaries of these rivers yields variable amounts of water for livestock and domestic use. Terrace deposits along these valleys generally are well drained and not considered to be significant aquifers (Slagle 1986). Alluvium present in small drainages in the project area is not considered a major regional aquifer because of its variable thickness, degree of saturation, and hydraulic characteristics. However, the local alluvial deposits have been monitored extensively as part of the baseline hydrologic investigation.

Fox Hills - Lower Hell Creek: The Cretaceous Fox Hills and lower Hell Creek Formation aquifers range from zero to approximately 750 feet in thickness (Slagle et al. 1985). The Fox Hills Formation consists of marine sandstones, while the lower Hell Creek Formation is a continental deposit composed of interbedded shale, siltstones, and fluvial sandstones. The shale in this sequence generally do not yield adequate water for any use, while the sandstones can yield an adequate water supply for domestic and stock use. Wells completed in this aquifer commonly yield about 5 gpm (Slagle et al. 1985). This unit is underlain by relatively impermeable claystones of the Bearpaw shale and is overlain by the upper Hell Creek Formation, which consists predominantly of claystones, siltstones, and shale. Slagle (1986) shows a hydraulic gradient of approximately 0.002 ft/ft to the east in the Fox Hills-lower Hell Creek aquifer in the vicinity of the project area.

The Tertiary-aged Tullock Member of the Fort Union Formation overlies the Hell Creek Formation and is another deep aquifer. This unit is overlain by the Lebo Member of the Fort Union Formation. The Lebo Member acts as an effective barrier between the deep and shallow aquifers, and should preclude any impact by mining activities to the deep aquifers not used for water production.

3.4.3 Site Specific Hydrogeology

Since 1981, substantial work has been done by MBMG, LL&E, Meridian, and SPE to interpret the hydrogeology of the project area. Work performed has included:

- The installation and development of monitoring wells, completed in the alluvium, overburden, Mammoth coal, and underburden.
- The performance of aquifer tests.
- The field investigation of recharge and discharge areas including springs.
- The collection of groundwater, spring, pond and stream samples for water quality analysis.
- The implementation of a groundwater and spring monitoring program, including water level and flow measurements.

These field programs and the data collected have given insight to the recharge and discharge characteristics, fluctuation of water levels, and the water quality of each of the hydrogeologic units. On the basis of these data, a conceptual hydrogeologic model has been developed to show the relationships between the various units.

3.4.3.1 Recharge

The primary source of recharge in the project area is infiltration of precipitation. No perennial streams occur within the project area although short reaches of several streams are fed by perennial spring flow. Surface water flow in the ephemeral stream channels is limited by the duration of periodic storms. Spring snowmelt probably provides the major source of recharge. To determine recharge for each of the hydrogeologic units, analysis of infiltration, and a water balance study were performed.

3.4.3.2 Infiltration Rates

It is possible to estimate the infiltration rates of soils within the project area using soil hydrologic properties defined by the Natural Resources Conservation Service of the U.S. Department of Agriculture. Approximately 90 percent of the soils fall into Hydrologic Soil Group C, which is characterized by a moderately high runoff potential and infiltration rates from 0.5 to 2.0 inches per hour (in/hr). Soil permeability is essentially all within the moderate range, varying from 0.6 to 2.0 in/hr.

3.4.3.3 Water Balance

To provide an estimate of annual groundwater recharge (which equals annual groundwater discharge for steady state conditions) a water balance analysis including estimation of Hydrologic Soil Groups (**Table 3.4-1**) are used for estimating runoff in watersheds. Soil properties are considered that influence the infiltration obtained from a bare soil after prolonged wetting. Groups include:

A - Low runoff potential (infiltration rate > 3.5 in/hr)

B - Moderately low runoff potential (infiltration rate 2.0 - 3.5 in/hr)

C - Moderately high runoff potential (infiltration rate 0.5 - 2.0 in/hr)

D - High runoff potential (infiltration rate <0.5 in/hr)

Table 3.4-1 Percent Distribution of Soil Hydrologic Properties

Hydrologic Soil Group	Percent of Mine Area
A	0
B	8.3
C	90
D	1.7
TOTAL	100
Permeability	**Percent of Mine Area**
Very Slow	-
Slow	-
Mod. Slow	-
Moderate	99.6
Mod. Rapid	-
Rapid	
Very Rapid	

Profile Permeability Class ratings are based on consideration to soil structure, texture, cracking, porosity, consolidation, drainage, weathering, bedding, and fracturing characteristics of the parent material. Infiltration rates for various classes are shown in **Table 3.4-2**.

Table 3.4-2 Permeability Class Ratings

Permeability Class	Infiltration Rates (in/hr)
Very Slow	<0.05
Slow	0.05 to 0.20
Moderately Slow	0.20 to 0.80
Moderate	0.80 to 2.50
Moderately Rapid	2.50 to 5.00
Rapid	5.00 to 10.00
Very Rapid	>10.00

In general, the quantitative recharge estimates from the surface water balance provide fairly wide bounds ranging from 0.0 to 1.1 inches/year (in/yr) depending on the value assumed for the evapotranspiration (ET) modifier coefficient. In a study of the central Powder River area of southeastern Montana, recharge was estimated to be one percent of the average annual precipitation. This would equal less than 0.14 inches of recharge per year in the Bull Mountains area. Recharge in the Bull Mountains can be expected to be higher than the central Powder River area because of the greater percentage of cross-strata exposure and better developed soils. Modeling based on water balance calculations and flow modeling of the project area suggests that the net recharge rate in this area is higher. Based on water balance results, net recharge estimates ranged from 0.1 to 1.1 in/yr, with a long term steady state recharge rate estimated to be on the order of 0.6 in/yr. Subsurface groundwater inflow likely provides minimal recharge to any of the hydrogeologic units since they are isolated by topographic relief.

Alluvium

Most of the recharge to the alluvium comes from direct infiltration and discharge from springs. A small portion of the recharge is derived from discharge from the deeper bedrock. A flow net analysis was used to determine the amount of discharge occurring from the Mammoth coal. Recharge is enhanced by burrowing animals and piping. As outlined above, alluvial soils fall into Hydrologic Soil Group C, which is characterized by a moderately high runoff potential and infiltration rates ranging from 0.5 to 2.0 in/hr.

Overburden

Like the alluvium, the overburden is recharged directly by infiltration along the outcrops, leakage from the alluvium in the valleys, and to a lesser extent vertical leakage. Based on the results of the water balance analysis it appears that infiltration rates at the weathered overburden outcrops are similar to those for alluvial soils.

Mammoth Coal

The Mammoth coal receives recharge along its western and southern outcrops in the project area. Some recharge occurs via leakage from the overburden. Based on the results of the water

balance analysis it appears that infiltration rates at the weathered Mammoth coal outcrops are similar to those for alluvial soils.

Underburden

The underburden is recharged both by infiltration at the outcrop and by some leakage from overlying units.

3.4.3.4 Discharge

Groundwater discharge from the Bull Mountains is primarily through springs, wells, groundwater outflow, and evapotranspiration. Little, if any, groundwater is discharged from the project area via surface water flow.

Springs

Springs are numerous throughout the Bull Mountains. Monthly or quarterly flow measurements have been made at 141 springs in the project area. The springs are grouped by stratigraphic interval and drainage basins, respectively.

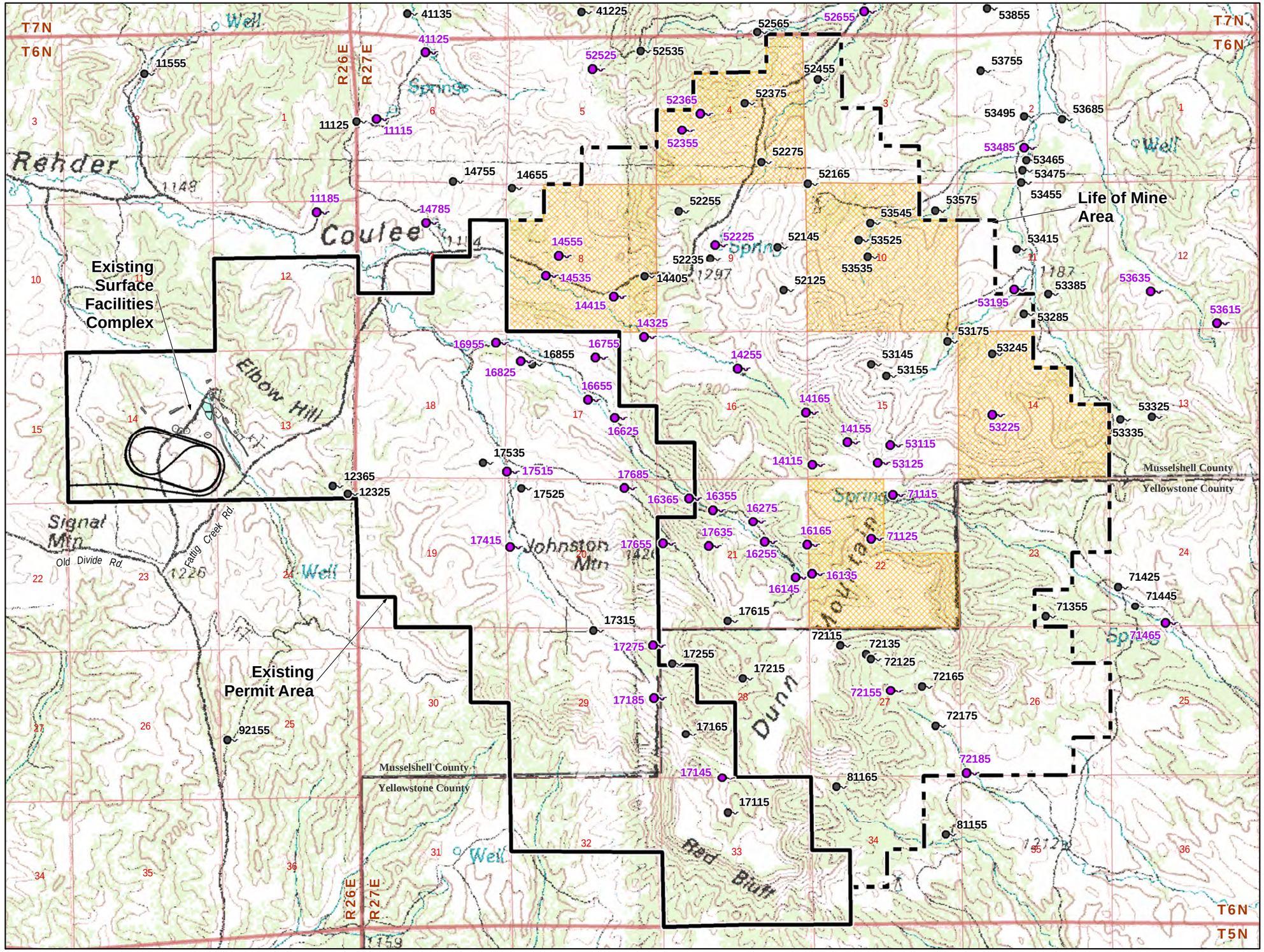
Of the 141 springs and seeps that are located in the project area, 15 of these are within the coal lease area (**Table 3.4-3**; **Figure 3.4-1**). **Table 3.4-3** also lists an additional 14 springs that are adjacent (within 1,000 feet) to the lease area. The springs supply water for livestock and wildlife, and support vegetation and local aquatic communities. Some springs have been enhanced through tank and pond installation and many discharge to local drainages. The springs vary widely in quantity and period of season of flow and were rated as to their relative importance for use (**Table 3.4-3**). Examples of these ratings include the following; High Spring (71115) located in lease Section 22 is considered very important because it feeds an extensive system of piping and stock tanks throughout a five section area and utilizes gravity flow (Charter 2010). Busse Spring (14325) is located outside of lease Section 8 and feeds two large ponds in the lease area. This spring is considered an important source of local water for wildlife and livestock. Spring 14415 and associated small pond, is located in Section 8, has a low flow rate, but it is considered moderately important. Spring 14535 in Section 8 also has a comparatively low and intermittent flow rate. This spring has no improvements, but provides some water for vegetation and wildlife. Many of the springs were not rated highly on the basis of field observations and rancher value, but provide some water for wildlife.

Alluvium

Springs emanate from the alluvium both as seeps and as measurable flow often enhanced by piping. Increases in flow rates occur in direct response to precipitation. A number of man-made ponds have been excavated into the alluvium, to intercept the water table. ET also causes discharge from the alluvial system and is a point of loss.

Overburden

The greatest number of springs and greatest total discharge emanates from shallow fractured portions of overburden Intervals 2, 4, and 5, with approximate annual volumes of 54, 80, and 67 ac ft/yr, respectively. Intervals 1, 3, and 6 produced the least water at approximately 0.6, 16, and 11 ac ft/yr, respectively. Total annual discharge through the spring system in the project area is approximately 293 acre feet.



NAD 83 MONTANA STATE PLANE, US FOOT

SOURCE: USGS 1:100,000 SCALE TOPOGRAPHIC QUADRANGLE - ROUNDUP (1982), MONTANA

BULL MOUNTAIN COAL LEASING ENVIRONMENTAL ASSESSMENT

Figure 3.4-1
Springs

ANALYSIS AREA: Musselshell & Yellowstone Counties, Montana

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Prepared By: JC | Reviewed By: EC

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Table 3.4-3 Relative Importance of Springs in Coal Lease Area

Spring Name, Number	Location (TRS)	Elevation	Flow Range (gpm)	Development	Relative Score*	Value to Ranchers**
14405	6N/27E 8 NESE	4075	Dry – 1.5	None	1	No
14415	6N/27E 8 SESE	4070	dry - 1.5	small pond	3	Yes
14535	6N/27E 8 NESW	4000	dry - 0.5	None	1	No
14555	6N/27E 8 NESW	4070	dry - 0.3	small pond	2	Yes
16135	6N/27E 22 NWSW	4486	1.0 - 18.0	stream channel flow	2	Yes
52275	6N/27E 4 SWSE	3960	Dry -1.5nd	None	1	Yes
52355	6N/27E 4 NESW	4038	dry - 2.0	None	2	Yes
52365	6N/27E 4 NESW	4028	dry	None	1	No
52375	6N/27E 4 SWNE	3950	dry - 0.8	Pond	2	Yes
53525	6N/27E 10 SENW	4040	dry - 0.5	None	2	Yes
53535	6N/27E 10 SENW	4040	seep - 0.3	small pond	2	Yes
53545	6N/27E 10 SENW	4000	dry - 0.1	None	2	Yes
53225	6N/27E 14 NESW	4113	dry - 0.5	None	2	Yes
53245	6N/27E 14 SENW	3980	dry - 0.5	None	2	Yes
71125	6N/27E 22 SENW	4460	seep - 1.0	None	2	Yes
Springs near the lease boundaries (within 1,000 feet)						
Red Fork 14115	6N/27E 16 SESE	4460	seep - 3.3	None	2	Yes
Busse 14325	6N/27E 17 NENE	4095	1.0 - 39.0	two large ponds in lease area Section 4	4	Yes
14655	6N/27E 8 NWNW	4040	seep - 1.0	Pond	2	Yes
16145	6N/27E 21 NESE	4480	0.3 - 3.5	stream channel flow	2	Yes
16165	6N/27E 22 SENE	4440	dry - 1.3	None	3	Yes
16955	6N/27E 18 NENE	3961	dry - 41.8	None	2	Yes
52165	6N/27E 3 SWSW	3980	pond - 3.3	2 small ponds	3	Yes
52455	6N/27E 3 NWNW	3840	15.4 – 46.6	Small Pond	4	Yes
52565	6N/27E 33 SWSE	3960	dry – 0.5	None	1	No
53125	6N/27E 15 SESW	4400	Seep – 1.0	None	2	Yes
53175	6N/27E 15 NENE	4038	pond - 12.0	large pond	3	Yes
53335	6N/27E 13 NWSW	4080	seep - 0.6	None	2	Yes
53575	6N/27E 10 NENE	3890	seep - 0.8	None	2	Yes
71115	6N/27E 22 NWNE	4416	1.3 - 9.0	extensive piping to stock tanks and storage impoundments	4	Yes

nd - no survey or no data

*Relative Score - An average derived from relative values (1 through 4) assigned to 12 qualitative observations and range variables relating to hydrology, aquatic ecology, vegetation, wildlife and use (adapted from MDSL 1992).

**The value to rancher information was obtained from each landowner interviewed in 1992 (SPE 2009 Volume 1C Section 304(5) Appendix 304(5-6) and 304(12) Appendix 304(12)-1). Updated information obtained in 2010 from Charter (2010) and field monitoring observations (SPE 2010).

Spring occurrence from any particular overburden unit is considered to be a near-surface feature associated with flow through a mantle of shallow fractured rocks in the valleys. Groundwater flow both downward toward the valleys and through this fractured mantle, which has a relatively high hydraulic conductivity. Discharge occurs where groundwater encounters less permeable shale and then moves laterally to a discharge point. Discharge water moves down slope and eventually re-infiltrates.

Wells

The well inventory was prepared by obtaining groundwater rights records from the Montana Department of Natural Resources and Conservation (MDNRC), by obtaining a well inventory from the MBMG, by contacting local landowners, field verification, and by cross-referencing a similar inventory conducted by LL&E in 1981.

The potential source for each private well was determined, where possible, using the total depth of the well, the elevation, and the location. Approximately 89 of the private wells were completed in the underburden and 11 wells in the overburden. Although state records indicate that 12 of the private wells were completed in the alluvium, it seems more likely that these wells were completed in the shallow bedrock. None of these "alluvial" wells are located in Rehder Creek, and most are located in East Parrot Creek and Fattig Creek. The source for 47 of the wells was not determined. A recent overburden solar well installation (2003) was drilled at the head of Railroad Creek to 165 feet and produces 9 gpm. This well provides high quality seasonal water for livestock operations in that drainage (Charter 2010). Total discharge via wells is estimated as 753 ac ft/yr. Very few supply wells were completed within the overburden, so pumpage is a small percentage of the total discharge. However, ET is a mechanism for discharge from near surface overburden.

Mammoth Coal

Although springs do emanate in the direct vicinity of the Mammoth coal outcrop on the eastern flank of the syncline, the percentage of flow due to discharge of groundwater from the coal is small. To determine the amount of discharge occurring at the outcrop as a result of through flow in the Mammoth coal within Basins 41, 52, 53, and 71, a flownet analysis was completed.

The flownet construction is based on the potentiometric head map for the Mammoth coal and the drafting of "flow tubes" in which equal flow are postulated. Contours of head are slightly modified so that head is equal to coal elevation at the indicated boundaries of saturation, although the latter boundaries are not well defined. The geometric mean of the Mammoth coal's hydraulic conductivities, as determined by testing, was also used in this analysis.

In the ideal case, where it is assumed that the coal is homogeneous and isotropic, and that vertical flow is nearly equal, the flowlines are drawn to construct squares with the potentiometric contours. The lengthening of the "squares" down the direction of flow indicates that the coal is losing net vertical flow to the northwest, or that permeability is increasing in that direction. Smaller "squares" in the southeast imply higher flow rates toward Fattig Creek, due to recharge on the limb of the syncline. The results indicate that there is very little discharge to the western drainages from the Mammoth coal in the project area as shown on **Table 3.4-4**.

Table 3.4-4 Discharge in Watersheds

Watershed	Discharge (GPD)	Discharge (GPM)
Fattig Creek	1,160	0.81
East Parrot Creek	110	0.08
West Parrot Creek	670	0.47
Halfbreed Creek	360	0.25
Rehder Creek	15	0.10

These discharge values for flow from the Mammoth coal are very low. The flow contribution predicted from the Mammoth coal to the Fattig Creek drainage basin (0.81 gpm), for example, is less than four percent of the average flow from all springs (23.6 gpm) that emanate in the vicinity of the Mammoth coal outcrop in this basin. The flow contribution from the coal is a small fraction of the total flow because where the coal outcrops in the valleys; it is only a small fraction of the fractured and weathered bedrock system in which most of the groundwater flows.

A few stock water wells were completed within the Mammoth coal and account for only a small amount of the total discharge from this unit. ET plays a discharge role only at outcrops.

Underburden

Springs that issue from the underburden discharge under the same mechanisms as those occurring in the overburden and the Mammoth coal, with discharge occurring mainly in valleys. Wells constitute another major source of discharge from the underburden. Approximately 157 private wells exist within the project area or immediately adjacent to it. Most were completed in units below the Mammoth coal or over large intervals that include the Mammoth coal. Of the 157 wells in the area, 62 are used for domestic purposes and 95 are used for stock water or domestic purposes.

The average potential discharge of stock wells in the region is about 10 gpm. Slagle (1985) estimates that stock wells average approximately 9.4 gpm and are in use about 50 percent of the time. If 95 wells are present and used at this rate, the annual discharge by stock wells is approximately 720 acre feet. Field observations indicate that actual usage is considerably less than this within the project area.

Annual pumpage for domestic use can be estimated using per capita consumption and the number of persons per household. Per capita consumption was estimated at 150 gallons per day with an average household size of 3.2 persons (Slagle 1985). If 62 domestic wells are present in the project area and used at this rate, the annual discharge would be 33 acre feet. Total discharge from wells, therefore, is estimated to be 753 ac ft/yr; twice the amount discharged by springs.

3.4.3.5 Baseline Groundwater Levels

Water level data from these wells were used to generate potentiometric surface maps and determine seasonal variability in water levels within the alluvium, overburden, Mammoth coal, and underburden. The maps show potentiometric surfaces that are roughly parallel. Areas along the flanks of the syncline (western and southern boundary of the project area) are unsaturated. Horizontal hydraulic gradients in the project area range from approximately 0.004 to 0.01 ft/ft toward the north-northwest. The horizontal gradient appears to level off to approximately 0.002 ft/ft in the northern part of the area, based on the structural contours on the base of the aquifers. Hydraulic heads in each unit increase from zero in the unsaturated portion, through a zone with water table conditions, to a maximum of approximately 100 feet of head in the center of the syncline.

Vertical hydraulic gradients have been calculated at four well pairs and eight nests of three wells using water level measurements. Vertical hydraulic gradients were calculated by dividing the

difference in water level elevation by the difference in the elevation at the base of the screened interval for neighboring pairs of wells.

All vertical gradients trend downward, and range between 0.065 and 0.998 ft/ft. In all cases, vertical gradients between wells in overburden Intervals 4 or 5 and wells in the Mammoth coal are greater than 0.6 ft/ft. Vertical gradients between wells screened in the Mammoth coal and wells screened in the upper portion of the overburden range from 0.06 to 0.3 ft/ft in all pairs.

Alluvium

The alluvium is present only in the valley bottoms of the larger ephemeral stream channels, and represents an unconfined aquifer within the project area. Twenty five monitoring wells were completed in the alluvium. The saturated thickness in the alluvial wells has ranged from zero feet in the dry wells to nearly 20 feet. The alluvium cannot be considered a major aquifer in the project area due to its limited thickness and areal distribution. However, it is considered important because of the recharge/discharge interaction with the shallow bedrock.

The flow direction in the alluvium is variable. Flow from bedrock into the alluvium occurs in the vicinity of springs, either by spring discharge and infiltration at the surface, or directly from shallow bedrock into the alluvium. Flow from the alluvium back into bedrock would be downgradient from many of the springs. Much of this water may flow in the shallow subsurface bedrock and subsequently discharge to the alluvium farther down the drainage. In areas where the alluvium is saturated, a significant component of flow would also be through the alluvium, down the valley. In areas where shallow bedrock is recharging the alluvium, there is a component of flow toward the stream axis, and in areas where the alluvium is losing water to the bedrock, there is a component of flow downward and away from the stream axis.

Overburden

The overburden has been divided into seven stratigraphic intervals. Water in the overburden is believed to exist under both confined and unconfined conditions depending upon the proximity to the outcrop and the occurrence of unsaturated zones in the overburden. Water level information for the overburden comes from wells, borehole packer tests, and lithological and geophysical logs. These data indicate that water in the overburden exists in perched aquifers, with intervening low permeability layers and unsaturated zones beneath. Twelve of the wells in the current monitoring program are screened in the lower portion of overburden Interval 5 (the sandstone above the Rock Mesa coal). These wells and springs would report from the lower portion of Interval 5. The water column height in the Interval 5 overburden wells range from zero to 64.7 feet. Flow in overburden Interval 5 is generally toward the north-northwest and tends to follow the axis of the synclinal structure at an average gradient of approximately 0.004 to 0.008 ft/ft.

Mammoth Coal

The edge of the unsaturated zone was delineated along the intersection of the contoured potentiometric surface and the structural elevation of the base of the Mammoth coal. Information from the dry Mammoth coal wells also was used to verify the extent of the unsaturated zone.

Groundwater in the Mammoth coal is known to exist under both confined and water table conditions. These wells are, or were, located within 4000 feet of the Mammoth coal outcrop. The overburden thickness in these wells range from a few feet to over 250 feet. Wells located near the outcrop have been dry for the entire period of baseline monitoring. The head in the Mammoth coal wells typically range from 20 to 100 feet.

Underburden

Flow in the underburden is to the north-northwest at a gradient ranging from 0.005 to 0.007 ft/ft. Groundwater in the underburden is generally under confined conditions. Natural water level fluctuations in wells appear to be less than 2 feet. However, due to the low hydraulic conductivity of some portions of the underburden, stabilization of water levels after well installation or bailing is slow, and perturbations occur on some of the hydrographs.

Seasonal variability is not readily evident in these hydrographs; however, slight fluctuations may be linked to barometric pressure or precipitation. Wells located near the underburden outcrop are more susceptible to seasonal effects.

3.4.3.6 Aquifer Characteristics

Aquifer tests have been conducted within the Bull Mountains Mine No. 1 project area by MBMG and SPE. In total, 75 aquifer tests have been performed (**Table 3.4-5**). Of these, 55 were performed by SPE within the project area as part of the baseline monitoring, and 20 were performed on selected LL&E wells by MBMG personnel.

Aquifer testing techniques, such as slug, pumping, and recovery tests, have been used to determine aquifer characteristics. Average hydraulic conductivity and storativity values in an aquifer are best represented as the geometric mean and arithmetic mean, respectively (Dagan 1989). Hydraulic conductivities (K) determined from the aquifer tests suggest that this characteristic tends to be lower in the deeper intervals than in the shallow fractured and weathered intervals.

Table 3.4-5 Summary of Hydraulic Conductivity (K) Results

Hydrogeologic Unit	No. of Tests	Geometric Mean of K (ft/day)	Min. K (ft/day)	Max. K (ft/day)
Alluvium	7	28	0.075	150
Shallow Fractured Overburden	7	6.1	1.5	23
Overburden	13	0.018	0.00061	0.6
Mammoth Coal	15	0.16	0.011	6.2
Underburden	33	0.013	0.0012	1.0

(ft/day = feet per day)

This is not meant to imply that there is a linear or other fixed mathematical relationship between permeability and depth below ground surface such that permeability continues to decrease with depth. But the hydraulic conductivity within the shallow bedrock generally is two to four orders of magnitude greater than that of the deeper bedrock. This shallow permeable zone may not exist in some areas where shale and claystones outcrop or sub-crop beneath saturated alluvium. Where

the zone does exist, its depth appears to range from 10 to more than 125 feet below the ground surface.

The available aquifer test data and the hydrogeologic field observations for five of the 1991 boreholes (62717-12, 62718-19, 62710-03, 62720-07, and 62721-10), and nearby wells and springs are grouped (**Table 3.4-6**) by location and listed in order of increasing depth from ground surface. Again, this presentation shows that in many places there are shallow zones of relatively high permeability. The rocks below this zone are unsaturated, and the deeper bedrock below the unsaturated zone is saturated. Hydraulic conductivities of the deeper bedrock generally are low, ranging from two to four orders of magnitude less than those measured in the shallower bedrock.

Table 3.4-6 Hydraulic Conductivity as a Function of Depth at Selected Sites

Well Borehole No.	Hydrogeologic Unit	Top of Tested Interval (ft)	Bottom of Tested Interval (ft)	Kh (ft/day)	Comments
Site 1 62717-11	Alluvium	8.1	13.1	DRY	
62717-13	Overburden	29.5	33.0	1.5E+00	
62717-12	Overburden	31.0	71.0	DRY	
62717-12	Overburden	65.0	190.0	1.6E-02	
62717-12	Overburden	217.0	274.0	5.1 E-03	
62717-12	Mammoth Coal	265.0	304.0	1.1 E-02	
62717-12	Underburden	304.0	367.0	5.6E-03	
62717-12	Underburden	362.0	414.0	1.2E-03	
62717-12	Underburden	362.0	414.0	1.5E-02	
62717-12	Underburden	414.0	466.0	6.3E-03	
62717-12	Underburden	466.0	518.0	3.5E-03	
62717-12	Underburden	466.0	518.0	1.3E-02	
62717-12	Underburden	518.0	570.0	1.8E-02	
62717-12	Underburden	518.0	570.0	9.8E-03	
62717-12	Underburden	583.0	614.0	1.6E-03	
62717-12	Underburden	614.0	645.0	3.5E-03	
62717-12	Underburden	645.0	676.0	8.7E-03	
62717-12	Underburden	676.0	707.0	2.6E-03	
Site 2 62718-21	Alluvium	9.5	14.5	DRY	
62718-22	Overburden	39.5	49.5	1.5E+01	
62718-22	Overburden	39.5	49.5	2.3E+01	
62718-19	Overburden	62.0	71.0	DRY	
62718-19	Mammoth Coal	144.0	155.0	7.0E-01	
62718-19	Underburden	159.0	195.0	1.6E-02	
62718-19	Underburden	316.0	327.0	2.8E-02	
62718-19	Underburden	326.0	443.0	9.8E-03	
Site 3 62720-03	Alluvium	0.0	13.0	Saturated	Not tested, interval cased during drilling; Spring 17315
62720-03	Overburden	29.0	99.0	DRY	
62720-03	Overburden	287.0	297.0	DRY	
62720-03	Mammoth Coal	299.0	309.0	DRY	
62720-03	Underburden	309.0	379.0	4.4E-03	
62720-03	Underburden	653.0	703.0	4.5E-01	

Table 3.4-6 Hydraulic Conductivity as a Function of Depth at Selected Sites

Well Borehole No.	Hydrogeologic Unit	Top of Tested Interval (ft)	Bottom of Tested Interval (ft)	Kh (ft/day)	Comments
62720-03	Underburden	653.0	703.0	2.9E-01	
Site 4 62720-07	Alluvium	0.0	0.0	DRY	
62720-07	Overburden	10.0	20.0	Saturated	Not tested; cascading water, interval cased during drilling; Spring 17685
62720-07	Overburden	69.0	77.0	DRY	
62720-07	Overburden	80.0	88.0	DRY	
62720-07	Overburden	117.0	234.0	1.3E-02	
62720-07	Mammoth Coal	345.0	356.5	1.8E-02	
62720-07	Underburden	360.0	371.5	1.7E-02	
62720-07	Underburden	448.0	522.0	2.8E-03	
Site 5 62721-10	Overburden	105.6	26.1	4.9E+00	Water cascading from interval
62721-10	Overburden	105.6	126.1	7.5E+00	
62721-10	Overburden	179.0	212.0	6.1 E-04	
62721-10	Overburden	219.0	241.0	2.3E-03	
62721-10	Overburden	241.0	251.0	Dry	
62721-10	Overburden	325.0	365.0	Dry	
62721-10	Overburden	365.0	407.0	Dry	

DRY=test section is dry

Alluvium

Hydraulic conductivity of the alluvium range from 0.075 to 150 ft/day based on six slug tests and one aquifer test. The geometric mean of the data is 28 ft/day. Transmissivity varies from 0.4 to 1420 ft^2/day due to variations in saturated thickness. The pumping test conducted in well 21-01 indicated that the alluvium in places could sustain a significant yield (greater than 10 gpm).

Overburden

Twenty aquifer tests have been conducted in the overburden. Seven tests were conducted in the shallow fractured and weathered system, and the remaining 13 were performed in the deeper overburden. Hydraulic conductivities in the shallow fractured and weathered system range from 1.5 to 23 ft/day. The geometric mean of these data is 6.1 ft/day. In addition, cascading water from this shallow zone has been observed in a number of boreholes. However, these zones were often cased-off to facilitate drilling and, therefore, not tested.

Generally, rocks in the deeper overburden have very low permeabilities. Hydraulic conductivities range between 0.00061 ft/day to 0.6 ft/day with a geometric mean of 0.018 ft/day.

The reported storativity values in the project area range from $1x10^{-3}$ to $1x10^{-6}$ with an arithmetic mean of $5x10^{-4}$. These values are typical of confined aquifers. Greater storativity values can be expected in the overburden, particularly in shallow fractured and weathered bedrock, where this system is often unconfined.

Mammoth Coal

Fifteen slug and aquifer tests have been performed on the Mammoth coal. Hydraulic conductivity varies from 0.011 ft/day to 6.2 ft/day. The geometric mean of these data is 0.16 ft/day. Higher values appear to occur near outcrops where the coal may be more fractured and weathered. Transmissivities vary (based on the thickness of the coal) from 0.21 ft^2/day to 28 ft^2/day.

Comparison of this average K value with the lower intervals of the overburden suggests that the coal is generally more permeable than the deeper overburden. Storativity values range from $1x10^{-3}$ to $6x10^{-6}$, which are typical for confined conditions (Freeze and Cherry 1979).

Underburden

Thirty-three slug and aquifer tests have been performed in the underburden. Values for hydraulic conductivities are generally low, ranging from 0.0012 ft/day to 1.0 ft/day. The geometric mean for these data is 0.013 ft/day.

Some of the massive, fluvial channel sandstones in the underburden have the potential to produce sustained yields exceeding 10 gpm. Aquifer recovery test data collected from well 62720-03 yielded a transmissivity of about 22 ft^2/day. The aquifer reached steady-state conditions during a 16-hour test.

Private wells nearby completed in the underburden also have the capabilities of producing sufficient water for stock watering and domestic purposes. Most of the private domestic and stock wells in the area were completed in the underburden. These wells are all considerably deeper than most of the monitoring wells, and they are screened across larger intervals. Thus, the private wells encounter more sandstone units, some of which are thicker and higher yielding than those immediately beneath the Mammoth coal.

Calculated storativity values range from 0.1 to $4x10^{-6}$ with a mean of 0.02. The typical storativity values for confined aquifers range from $5x10^{-3}$ to $5x10^{-5}$, while storativity values for unconfined aquifers usually range from 0.01 to 0.30 (Freeze and Cherry 1979).

3.4.3.7 Water Quality

Water quality data are available from numerous wells and springs located throughout the project area. With some exceptions, seasonal variability is not evident in the major ion concentrations, and in no case is it a factor in the suitability of water for various uses.

Springs

The water quality of the springs is quite variable and is dependent on the residence of time of the water in various lithologic units, the position of the spring in a particular drainage basin; and for some parameters, such as pH, carbonate, and potassium, the season during which the sample was collected.

Total dissolved solids (TDS) concentrations for all of the spring waters range from 226 mg/L to 6030 mg/L with a mean concentration of 1118 mg/L; sulfate concentrations range from 11 mg/L to 3020 mg/L with a mean concentration of 466 mg/L; and the laboratory pH range from 7.1 to 10.0 with a mean of 7.9. The pH of 10.0 represents a single reading from ponded waters at 41125

in July 1990, and is confirmed by field measurement. Except for this measurement, the highest laboratory pH measurement is 8.9.

Of the sampled springs, only 16135, 41215, 52525, and 71115 have met the National Secondary Drinking Water Standards of 500 mg/L for TDS and 250 mg/L for sulfate. Spring 41215 issues from overburden Interval 1. Springs 16135, 52525, and 71115 issue from overburden Interval 2. Water from all other springs, including all springs within the permit area, have exhibited TDS and sulfate concentrations in excess of these standards on at least one occasion, and are not suitable for domestic use.

Only six springs, including the four mentioned above, and 16355 and 16365 have met the criterion for Montana Class I groundwater (**Table 3.4-7**) with a specific conductance of less than 1000 micromhos/cm in all samples. Specific conductance of seven springs (11185, 41125, 41335, 41625, 51255, 53225, and 53485) has exceeded the criterion for Class II groundwater (specific conductance of 1000 to 2500 micromhos/cm) on at least one occasion, and is therefore Class III groundwater. Class III groundwater is not considered suitable for livestock or agriculture. With the exception of these springs, water from all other springs is classified as Class II groundwater.

Table 3.4-7 Classification of Groundwater (ARM 16.20.1002)

A.	Class I groundwater is generally suitable for public and private water supplies, culinary and food processing purposes, irrigation, livestock and wildlife watering, and for commercial and industrial purposes with little or no treatment. Class I groundwater has a specific conductance of less than 1000 micromhos/cm at 25° C.
B.	Class II groundwater is generally marginally suitable for public and private water supplies, culinary and food processing uses and are suitable for irrigation of some agricultural crops, for drinking water for most wildlife and livestock, and for most commercial and industrial purposes. Class II groundwater may be used for municipal or domestic water supplies in areas where better quality water is not readily available. Class II groundwater has specific conductance ranging from 1000 to 2500 micromhos/cm at 25° C.
C.	Class III groundwater is suitable for some industrial and commercial uses and as drinking water for some wildlife and using special water management practices. In some cases Class III groundwater is the only economically feasible source for municipal or domestic water supplies. Class III groundwater has specific conductance ranging from 2500 to 15,000 micromhos/cm at 25° C.
D.	Class IV groundwater may be suitable for some industrial, commercial and other uses, but are unsuitable or, for practical purposes, untreatable for higher class beneficial uses. This groundwater has specific conductance greater than 15,000 micromhos/cm at 25° C.

For the most part, the plotted cation/anion ratios for all samples from each individual spring show relatively little variation. Plots showing the variability of concentration over time for the major cations and anions (carbonate, bicarbonate, sulfate, sodium, potassium, magnesium, and calcium), and for pH and total dissolved solids. These plots illustrate both the wide range of compositions between springs, and the general consistency of water quality in individual springs over time.

A subtle, but consistent seasonal trend is evident in pH values, with the highest values seen in midsummer, and fluctuation over a range of approximately 0.4 pH units at individual springs. A corresponding trend is seen in carbonate concentrations, which were detected most frequently and at the greatest concentrations in the summer. All samples in which carbonate was detected

had a pH of 8.4 or greater. Seasonal fluctuations of less than 3 mg/L are also evident in potassium concentrations. Anomalously high potassium values were observed in several springs (11185, 41125, 17515, and 17315) in July and October 1990. Fluctuations in bicarbonate concentrations have been seen in some springs, particularly 11185, 17185, 17315, 17515, 41125, 52225, and 52355. These fluctuations do not appear to be seasonal and do not correlate with fluctuations in pH. Significant seasonal trends are not evident for other parameters, and do not affect the suitability of the water for various uses.

Some anomalous samples are evident in these plots. In particular, the anomalously high pH and $HC0_3$ values in July 1990 were observed at spring 41125, and anomalously low concentrations for multiple parameters were observed at spring 17315 and 17515 in July 1990. Some variability in composition should be expected from spring samples. In additions to changes in flow rate and conditions at the surface (some springs are variously flowing, ponded, or frozen) many springs are developed to some degree, and any recent activity near a spring is likely to stir-up sediment. Incomplete mixing of ponded waters and stirred-up sediments can be expected to be variable at each visit, and to affect water quality.

It is believed that spring water is a combination of water discharging from various strata and the alluvium, and local recharge from infiltration of precipitation. Spring water quality varies between surface water basins. Within a particular basin, ion concentrations tend to increase down gradient in response to increased residence time.

Alluvium

Alluvial water in the project area is generally of a magnesium-sulfate composition with relatively low TDS. TDS concentrations in the alluvium range between 493 mg/L and 1850 mg/L with a mean concentration of 1184 mg/L. Sulfate concentrations range from 143 mg/L to 1000 mg/L with a mean of 535 mg/L. The laboratory pH range from 6.5 to 8.3 with a mean of 7.8. TDS concentrations in all alluvial wells and sulfate concentrations in most alluvial wells exceed National Secondary Drinking Water Standards of 500 mg/L and 250 mg/L, respectively. Under the Montana Groundwater Classification, all water is suitable for livestock and agricultural uses (Class II or better). Magnesium is consistently the dominant cation, and bicarbonate and sulfate are the dominant anions. Concentrations of bicarbonate and sulfate are approximately equivalent in the other alluvial wells.

Extensive development of alluvial aquifers is limited by their areal distribution and saturated thickness.

Overburden

Twenty-two wells are currently used to monitor overburden water qualities. Historical baseline water quality analyses are also available. Water quality in the overburden is highly variable. No single cation is consistently dominant in the overburden water; sulfate anions tend to be present in slightly greater proportions than bicarbonate anions.

Water in most overburden wells is relatively poor in quality due to sulfate and/or TDS concentrations which exceed the National Secondary Drinking Water Standards of 250 mg/L sulfate and 500 mg/L TDS. Water in all of these wells is Class II groundwater. As a result, current baseline data TDS concentrations in the overburden range between 250 and 2700 mg/L

with a mean concentration of 1143 mg/L. Sulfate concentrations range between 12 mg/L and 1410 mg/L with a mean concentration of 457 mg/L. The pH values range between 6.8 and 8.7 with a mean value of 7.7.

Water in all of the deeper overburden wells is suitable for livestock and for most agricultural uses. Only a few wells contain water that is suitable for domestic use and is classified as Class I groundwater. Wells 30-2 and 62721-10W were constructed to intersect the upper portions of the overburden, in order to monitor the shallow sources of a number of springs (71115, 71125, 16135, and 16145). Wells 30-2 and 62721-10W, and Springs 71115 and 16135 exhibit similar good water quality. A pumping test conducted in well 62721-10W indicates that this portion of the shallow overburden is capable producing more than 10 gpm of water.

Water from other overburden wells should not be used for irrigation, as they exhibit high sodium adsorption ratios (SAR), in excess of the Montana limit of 18 for irrigation water. SAR has significance mainly in respect to the suitability of water for irrigation. Water with high values of SAR have a tendency to donate sodium to the soil and gain calcium and magnesium in exchange (Hem 1989). This process makes the soil progressively more unsuitable for agriculture, and therefore water with high SAR is not desirable for use in irrigation. Most wells in the project area have water suitable for irrigation.

The composition of water quality samples from overburden wells is diverse, even among wells screened in the same interval. The four wells screened in overburden Interval 5 (a thick sandstone overlying the Rock Mesa coal) all exhibit widely differing water qualities, ranging in composition from sodium-magnesium-bicarbonate to sodium-sulfate to calcium-magnesium-sulfate.

Mammoth Coal

Fourteen wells are being used to monitor the Mammoth coal. Historical baseline data are also available for twelve other Mammoth coal wells located within the project area. Generally, sodium and sulfate are the predominant ions in water obtained from most of the Mammoth coal monitoring wells. TDS and sulfate concentrations overall tend to be slightly greater than those observed in the overburden. Concentrations ranged from 862 mg/L to 2970 mg/L for TDS and 251 mg/L to 1690 mg/L for sulfate. All samples exceed the National Secondary Drinking Water Standards of 500 mg/L TDS and 250 mg/L sulfate. All groundwater samples from Mammoth coal wells are Class II or Class III groundwater types. The Class III wells are not suitable for livestock watering and high SAR values would limit the use of water from many of the wells for other agricultural purposes such as irrigation.

The mean TDS concentration in the Mammoth coal is 1608 mg/L. The mean sulfate concentration is 798 mg/L. The pH values range from 7.0 to 9.8 with a mean value of 8.1. It appears that calcium and magnesium concentrations tend to be greater in those wells closest to the coal outcrop. However, this is not a universal rule, and other factors such as possible fracture flow from overlying sources may also influence Mammoth coal water quality.

Underburden

Most of the underburden monitoring wells were installed to monitor the groundwater in rocks immediately below the Mammoth coal; therefore, most of the underburden water quality, data

are from this zone. Generally, the underburden in this stratigraphic position is composed of interbedded thin channel sandstones associated with crevasse splays, and overbank and floodplain deposits of siltstone and shale. Although saturated, these rocks have low hydraulic conductivities.

Monitoring well 62720-03, however, was completed in a massive fluvial channel sandstone encountered approximately 350 feet below the Mammoth coal. The hydraulic conductivity of this 50 foot thick sandstone is relatively high and a pumping test showed that this well is capable of sustaining a yield of more than 10 gpm. This well was installed to demonstrate the usability of the underburden as a source of replacement water for impact mitigation.

The quality of the water in the underburden is very similar to that in the Mammoth coal. Sulfate is the dominant anion while sodium tends to be the primary cation. Calcium and magnesium rich water also exists. These wells are located beyond the outcrop of the Mammoth coal and have very shallow completion intervals.

As with the coal water, TDS and sulfate concentrations in the underburden water exceed the National Secondary Drinking Water Standards of 500 mg/L and 250 mg/L, and they are classified as Class II and III type water. The iron standard of 0.3 mg/L has been exceeded in water samples from a number of the monitored wells; however, iron concentrations from some of these wells also have fluctuated to below the standard in other samples. For unknown reasons, both arsenic and mercury standards were exceeded, and lead was elevated in the sample collected from well 62719-1 by LL&E in 1981.

The water sample collected from 62720-03 has a TDS concentration of 1390 mg/L, conductivity of 1620 mmhos/cm, sulfate of 693 mg/L, and pH of 7.8. The TDS concentrations in water samples from the upper portion of the underburden range from 943 mg/L to 4520 mg/L with a mean concentration of 2139 mg/L. Sulfate concentrations range from 216 mg/L to 2680 mg/L with a mean of 1121 mg/L. The pH values range from 6.4 to 9.1 with a mean value of 7.8.

Many underburden wells can be classified as acceptable for livestock use only, but others are Class III. High SAR values in several of the wells limit their application for agricultural purposes. However, many wells have SAR values acceptable for irrigation use.

3.4.3.8 Conceptual Groundwater Model

The water geochemistry of the project area suggests that most groundwater flow occurs in the shallow fractured bedrock and the alluvium. It is uncertain as to why these shallow fractured zones exist. One explanation may be that the fracturing occurs due to the relief of compressional stress in valleys as overlying rocks are removed by erosion. Weathering then works to enhance the shallow fracturing. The extent of fracturing in any particular bedrock unit is dependent on the lithology of the unit. For instance, fractures in sandstone would have a greater tendency to remain open than fractures in a shale, which would tend to close due to shale's more plastic nature. Understanding groundwater flow in the shallow mantle of fractured bedrock, and the interaction of the groundwater in this zone and the alluvium are the keys to interpreting the groundwater flow system.

In the fractured bedrock mantle, groundwater derived from this zone, the alluvium, and the deeper bedrock units undergoes mixing. The mantle is also a conduit for groundwater flow. In general, groundwater from the shallow bedrock flows toward the fractured mantle and then flows down gradient in the fractured rock.

Water discharge via springs occurs where the downward flow is interrupted by shale which forms an impermeable barrier to prevent further downward migration. Spring flow occurring at these points recharges the alluvium. The discharged groundwater flow then continues as surface flow or as through flow in the shallow alluvium. Surface and shallow groundwater flow in the alluvium cease and the fractured mantle is recharged when the stream or saturated alluvium crosses a contact between underlying shale and a more fractured bedrock unit, especially in sandstone.

Nine hydrogeologic examples found in the field illustrate this conceptual model.

- The Litsky Spring (17415) area including the valley in the vicinity of monitoring wells 62718-21, and -22 provide examples of the alluvium being unsaturated because the groundwater has drained into the underlying more permeable bedrock. The alluvial wells at both of these locations are dry, while the shallow bedrock wells contain water. These shallow bedrock wells were completed in sandstones underlain by less permeable or dry claystones and shale.
- The pumping test conducted at shallow bedrock well 62718-22 indicated that this zone is capable of producing as much as 30 gpm (K of 23 ft/day). The value of 6.0×10^{-1} ft/day obtained by slug testing monitoring well 62720-09 is not representative of the shallow bedrock above Litsky Spring. Examination of the lithologic log and the well completion form shows that the well was completed with five feet of screen, and that most of the screen was placed opposite the underlying claystone, with only a couple of feet extending into the shallow sandstone aquifer. It is doubtful, therefore, that test results are representative of the aquifer's true hydraulic characteristics.
- Monitoring well 62721-10W was completed in the Fattig coal and the sandstone below it. Water in this zone is perched on shale that tested dry during the packer tests. Borehole 62721-09, drilled in 1990 in the vicinity of this well, encountered cascading water coming from the same shallow fractured bedrock unit. The pumping test conducted at well 62721-10W indicated that this zone is capable of producing approximately 10 gpm (K of 7.5 ft/day).
- At borehole 62717-12, the shallow bedrock (less than 41 ft) has hydraulic conductivity two to three orders of magnitude higher than the deeper bedrock units. The water in this shallow zone is perched above dry shale and discharges into nearby Cold Water Spring (16655).
- There are shallow zones of relatively high permeability, underlain by unsaturated rocks. Below this unsaturated zone all of the rocks are saturated. Hydraulic conductivities of the deeper bedrock generally are low, ranging from two to four orders of magnitude less than those measured in the shallower bedrock.
- Discharge at Cold Water Spring (16655) issues from the sub-crop of the Matt coal and an overlying sandstone.

- The Matt coal varies in degree of saturation. The Matt coal is dry at a depth of 75 feet below ground surface (fbgs) in monitor well 62720-07W, and a packer test on the Matt coal in borehole 62721-10W showed it was dry at a depth of 365 fbgs. The Matt coal is saturated in monitor well 2-02 at a depth of 217 fbgs with a hydraulic conductivity of only 0.01 ft/day; however, at 62717-13 the Matt coal is part of the shallow fractured and weathered bedrock. It has a K value of at least 1.5 ft/day.
- Spring 17315 includes a man-made pond excavated into the alluvium, which intercepts the water table. During the drilling of the borehole for well 62720-03, water was encountered at the contact of the alluvium and the bedrock, as would be expected given the presence of alluvial spring 17315. The geophysical and the geologist logs for this hole indicate that the shallow bedrock in this area is composed of interbedded shale and siltstones. The packer test of this bedrock interval showed it to be unsaturated.
- The distribution of groundwater quality parameters indicates that spring water originates from recharge to a basin and is controlled by local rather than regional groundwater flow. The dissolved constituents in the spring water increases down gradient in both basins. However, comparison of water quality of intra-basinal springs indicates a similarity in overall type of water and dissimilarity to the water quality of springs in other basins.
- The chemical evolution of the groundwater indicates that there is considerable mixing of water in the shallow bedrock and within the alluvium.
- The most direct evidence of fracture controlled permeability comes from observations made at a number of locations where water cascaded into boreholes from narrow zones encountered during drilling. A direct visual example of this was documented in November 1991, during the drilling of the monitoring piezometers.
- Piezometers 72716-01 through 72716-03 were installed in one borehole. These piezometers are located beyond the outcrop of the Mammoth coal, therefore, 72716-01 and 72716-02 were completed in the underburden. During the drilling of this borehole, water was seen gushing from fractures in the shallow underburden bedrock. The observation supports the theory that groundwater flow may be controlled by flow through fractures in the shallow bedrock (in this case underburden)
- Piezometer 72716-03 was completed in the alluvium, and was dry; piezometer 72716-02 was completed across the fractured underburden zone; and piezometer 72716-01 was completed in the massive sandstone beneath the fractured zone.

To further verify this conceptual groundwater model, several baseline modeling efforts were undertaken. These were:

- A water balance or catchment yield model. This model estimated evapotranspiration and runoff for a gauged basin to characterize infiltration to bedrock.
- A groundwater mass balance model. This was a spreadsheet model which balanced infiltration or recharge rates, withdrawal from wells, and spring flow against flow calculated from hydraulic assumptions. The results of this model were used to predict infiltration recharge to the mine, and define baseline conditions for modeling of mine impacts.

- A MODFLOW numeric model to simulate steady state conditions and predict impacts of dewatering the flow into the mine (see Chapter 4 discussion).
- A flow net analysis of the Mammoth coal. This evaluated steady state flow through the Mammoth coal and provided estimates of discharge along the coal's sub-crop in major drainages in the project area.

Conclusions from the various baseline modeling efforts are:

- Recharge of the bedrock occurs horizontally along the outcrops and vertically through this material. Under the Groundwater Mass Balance assumption that all recharge is vertical, approximately 35 percent to as high 65 percent of the recharge would flow through the entire vertical section. The remaining recharge moves through the system laterally.
- Lateral flow in overburden is approximately 10 times the vertical flow with horizontal hydraulic conductivities being three orders of magnitude higher than vertical. This allows for discharge of groundwater into the shallow weathered, fractured, mantle and to springs.
- Parts of the overburden hydrogeologic system are unsaturated and this reduces the effective vertical permeability of the system. The modeling suggests that vertical flow rates are higher in some areas than others. This is due the unsaturated nature of the overburden including the clinker and the presence of some perched systems.
- The difficulty in calibrating the numerical model, MODFLOW, to the site conditions is consistent with the site conceptual model or having a shallow flow system with horizons of unsaturated bedrock.

Finally, horizontal flow in the Mammoth coal is generally along the syncline axis toward the northwest. Flow rates are small (between 150 to 1160 gpd depending on the drainage) and suggest that springs which appear to originate from the coal are fed from the shallow fractured system which comprise the valleys.

3.4.4 Surface Water Resources

The proposed coal lease area lies within the upper reaches of Rehder, Fattig and Railroad Creek drainage basins. All of the existing mine facilities are located in Rehder Creek. No other drainages would be affected by the proposed federal mining activities within the project area.

The streams of the coal lease area are ephemeral drainages which may be classified as prairie streams. The topography of the project area is characterized as mountainous terrain with broad valleys. The surrounding elevations range from 4750 feet at the top of Dunn Mountain to 3700 feet in the lower reaches of Rehder Creek. Average annual precipitation and snowfall for the period 1914 to 2008 at Roundup and Billings are 12.07 and 13.55 inches, respectively.

3.4.4.1 Drainage Basin Characteristics

Drainage networks in the project area display dendritic drainage patterns characteristic of flow through relatively flat-lying strata. The watersheds contain both forested and open grassland slopes. The coal lease area contains drainage basins in Rehder, Fattig and Railroad creeks and

the project area contains drainage basins in Halfbreed, East Parrot, Dutch Oven, Pompey's Pillar, and Razor creeks.

Table 3.4-8 is a list of basin characteristics for major drainage basins within the project area. Drainage basins or portions of drainage basins identified within the project area range in size from 30 acres for Dutch Oven Creek to 23.1 mi^2 (14,825 acres) for Rehder Creek. Within the coal lease area, Rehder Creek and Fattig Creek have the largest drainage areas, greatest stream lengths, lowest basin slopes, greatest sinuosity indexes, and greatest times of concentration. These observations indicate that relative to the other drainage basins, Rehder Creek and Fattig Creek have the greatest degree of meandering and the slowest response to precipitation events.

The lower segments of these two creeks are best characterized as mature channels formed in alluvial valleys and are formed by deposition of sediments eroded from the upper portions of the drainage.

3.4.4.2 Stream Classification

There are no perennial streams within the project area. The nearest perennial stream of consequence is lower Halfbreed Creek which flows into the Musselshell River approximately 18 miles to the north. However, some drainages within the project area contain perennial, intermittent and ephemeral reaches, which vary from year to year depending upon precipitation received in the drainages. These perennial reaches are associated with significant spring flow which originates from the upper overburden zones surrounding Dunn Mountain. Outcrop of springs provide water to the surface, and depending on the channel morphology at the outcrop location, the water may flow on the surface for some distance or is absorbed into the alluvium/colluvium. Generally, surface drainage from the project area may be classified as ephemeral flow.

3.4.4.3 Channel Morphology

Channel morphology cross-sections were measured at each of the twelve surface water gaging stations. Channel morphology for various drainages within the project area can best be described by channel width/depth ratios as reported in **Table 3.4-9**. Mature drainage basins such as lower Rehder and Fattig creeks have stream channels with high width/depth ratio values and are relatively stable in terms of channel erosion. These streams are characterized as shallow, wide channels which dissipate their energy by eroding laterally to form larger and new meanders. Young drainage basins such as upper Railroad Creek (station 71426) have lower width/depth ratio values and are relatively unstable in terms of channel erosion. Streams in these drainages are characterized as deeper, narrow channels which dissipate their energy by eroding downward rather than laterally. These younger basins are characterized by steep-walled, V-shaped valleys that contain streams with a current flowing down a steep irregular slope, often over riffles and rapids. The channels are rocky and contain little sediment.

General observations within the project area indicate that erosion (scouring) has taken place along the steeper drainages within the project area (such as in the headwater drainages of upper Rehder and Fattig creeks) while the deposition of fine grained sediment is occurring along the flat drainages in lower Rehder Creek. The classification of recent stream deposits in lower

Table 3.4-8 Study Area Drainage Basin Characteristics

Drainage Basin Subbasin	Drainage Area (acres)	Basin Relief (feet)	Stream Relief (feet)	Stream Length (miles)	Mean Slope %	Mean Slope ft/mile	Time of concentration	Sinuosity index	Weighted Curve #
Rehder Cr. Basin	14,825	1,080	1,080	9.09	2.25	119	2.26	1.16	78
Subbasin 11	4,760	805	238	5.25	0.84	45	1.30	1.24	73
Subbasin 12	3,300	640	400	4.28	1.77	93	1.16	1.15	77
Subbasin 13	311	260	150	1.06	2.68	142	.33	1.0	78
Subbasin 14	2,388	840	780	4.55	3.25	171	1.12	1.0	78
Subbasin 15	583	395	255	1.74	2.78	147	.49	1.0	79
Subbasin 16	1,240	800	780	3.52	4.20	222	.85	1.0	84
Subbasin 17	2,986	814	770	4.17	3.50	238	1.03	1.0	76
Halfbreed Cr. Basin	2,110								
Subbasin 21	1,230	NA	NA	NA	NA	NA	NA	NA	78
Subbasin 22	880	NA	NA	NA	NA	NA	NA	NA	78
East Parrot Cr. Basin	5,998								
Subbasin 41	5,998	NA	NA	NA	NA	NA	NA	NA	78
Fattig Cr. Basin	11,898	NA	NA	NA	NA	NA	NA	NA	76
Subbasin 51	4,298	NA	NA	NA	NA	NA	NA	NA	78
Subbasin 52	2,832	885	825	3.79	4.12	218	.89	1.04	73
Subbasin 53	4,768	910	690	4.28	3.05	161	1.01	1.0	78
Dutch Oven Cr. Basin	30								
Subbasin 61	30	NA	NA	NA	NA	NA	NA	NA	78
Railroad Cr. Basin	3,315								
Subbasin 71	2,377	NA	NA	NA	NA	NA	NA	NA	84
Subbasin 72	938	NA	NA	NA	NA	NA	NA	NA	84
Pompey's Pillar Cr. Basin	210								
Subbasin 81	210	NA	NA	NA	NA	NA	NA	NA	84
Razor Cr. Basin	2,057								
Subbasin 91	359	NA	NA	NA	NA	NA	NA	NA	84
Subbasin 92	1,428	NA	NA	NA	NA	NA	NA	NA	84
Subbasin 93	270	NA	NA	NA	NA	NA	NA	NA	73

Rehder Creek is a silt loam indicating high percentages of silt and clay. The classification for stream deposits in the headwaters of upper Rehder Creek is sandy loam and gravel indicating an environment of erosion as opposed to deposition.

Site observations and results of the channel morphology study indicate that the landforms and drainage networks within the project area appear to be stable under existing environmental conditions. There is little evidence of widespread accelerated erosion except in the steep areas of Dunn Mountain. The major stream channels do not appear to be undergoing extensive active gullying except around dams placed across an alluvial channel.

3.4.4.4 Drainage Basin Sediment Yields

An analysis of baseline sediment loss within the affected drainage basins was attempted using the Modified Universal Soil Loss Equation (SPE 2009). The mean suspended solids values collected from these samples were 994 mg/L. A relative measure of sediment yield can also be made through determination of soil erodibility. The affected area drainage basins were ranked from low to high in soil erodibility based on weighted K factors. The K factors were determined from the Musselshell County Soil Survey (SCS 1989). All of the drainage basins examined in the Rehder, Fattig, and Railroad Creek drainages have been classified as having high soil erodibilities (**Table 3.4-9**).

3.4.4.5 Spring Outcrop Flow

Approximately 141 springs and seeps are monitored for the Bull Mountains Mine No. 1 program in the project area. **Figure 3.4-1** shows locations of these water resources. The shallow alluvium or colluvium and bedrock outcrops in the project area are generally conducive to natural spring discharges. As discussed in the groundwater section above, these springs are an expression of groundwater as the geologic units outcrop. At these outcrops, surface flow is initiated. The length of the surface expression is dependent on a number of variables, including amount of flow, width and depth of alluvium/colluvium, and landowner manipulation of the drainage for livestock use. This landowner manipulation has a dominate effect on surface flow as indicated at the major springs in the project area including 14325 (Busse Water), 17415 (Litsky), and 16655 (Cold Water). At these locations, embankments have been constructed across the drainages to form ponds which impound water for livestock. These ponds control downstream drainage and in some cases (17415 Litsky) the ponds are large enough to eliminate downstream flow. Spring flow contribution has been measured from each of the springs in the project area.

3.4.4.6 Surface Water Flow

Flow at all of the surface stations is seasonal and limited to snowmelt runoff during the April/May period and significant rainfall events during the summer months. This limited flow indicates the ephemeral nature of the drainages in the project area.

Baseline peak flow and runoff volumes for drainage basins were estimated utilizing multiple regression equations developed by Omang et al. (1986) for the project area. The values reported in **Table 3.4-10** were determined using procedures outlined in the report. Peak flow and runoff volumes were determined for each of the drainage basins for the 24-hour storm with recurrence intervals of 2, 5, 10, 25, 50, and 100 years. Results of this analysis are presented in **Table 3.4-10**.

Table 3.4-9 Channel Morphology Characteristics

	Station Number	Channel Width (ft)			Channel Depth (ft)			Width/Depth Ratio	Cross Sectional Area (ft^2)	Weighted K Factor	Soil Erodibility
		Min	Max	Avg	Min	Max	Avg				
Lower Rehder	11756	14	200	92	.89	4.68	2.94	31.29	225.66	.37	high
Lower Rehder	11256	24	40	32	.41	4.08	2.15	14.88	45.19	.37	high
Lower Rehder	12456	12	16	13	.43	1.86	1.07	12.15	9.45	.37	high
Upper Rehder	12186	6	20	14	.46	2.19	1.08	12.96	9.25	.37	high
Upper Rehder	15116	12	24	17	.17	2.44	1.05	16.19	17.96	.37	high
Upper Rehder	16956	16	30	21	.32	2.19	1.43	14.69	16.42	.37	high
Upper Rehder	17516	10	30	18	.92	2.19	1.54	11.69	8.66	.37	high
Upper Fattig	52786	6	150	34	.55	2.41	1.43	14.89	12.67	.37	high
Lower Fattig	52996	17	250	48	.66	4.53	2.84	26.90	26.76	.37	high
Upper Fattig	53486	12	48	18	.43	3.65	1.27	15.63	19.21	.37	high
Upper Fattig	53796	14	150	23	.36	3.28	1.53	19.71	22.46	.37	high
Railroad	71426	4	25	11	.40	1.95	1.18	9.32	6.55	.37	high

Table 3.4-10 Estimated Peak Flow for Study Area Gaging Stations

Gaging Station Data				
Gaging Station	**A (SQ MI)**	**E (FT)**	**S**	**Gf**
11756	19.98	3680	0.62	0.9
11256	12.43	3800	0.74	0.9
12456	2.68	3800	0.860.9	0.9
12186	1.04	3880	1.34	0.9
16956	1.88	3960	1.88	0.9
17516	4.04	4000	0.77	0.9
52786	4.22	3730	1.00	0.9
52996	11.93	3680	1.10	0.9
53486	3.72	3780	1.90	0.9
53796	7.02	3700	0.70	0.9
71426	1.36	3940	1.84	0.9
A=Drainage Area	E=Avg Basin Elev S= Slope Gf=Geographical Factor			

Peak Discharge Estimates (CFS)						
Gaging Station	**Recurrence Interval**					
	50	**20**	**10**	**4**	**2**	**1**
11756	97.0	290.3	498.9	838.6	1155.9	1543.8
11256	81.7	241.2	412.6	693.6	956.0	1276.8
12456	47.1	132.6	223.4	375.4	517.5	691.2
12186	33.5	91.7	153.0	257.1	354.4	473.3
16956	41.4	115.5	193.8	325.8	449.1	599.8
17516	54.5	155.6	263.2	442.4	609.9	814.5
52786	55.4	158.3	267.8	450.2	620.6	828.8
52996	80.5	237.4	405.9	682.3	940.5	1256.0
53486	52.9	150.7	254.7	428.1	590.1	788.1
53796	66.6	193.0	328.3	551.9	760.7	1016.0
71426	36.9	101.8	170.3	286.2	394.6	526.9

Lower flows appear to be somewhat over-estimated in comparison to those actually calculated for the gauging stations. The primary reason for this over-estimation is land owner manipulation of the drainages to retain surface and spring flow in surface impoundments.

Analysis of historic surface water flow data was examined for drainages in the project area. Slagle (1986) examined various drainages within south-central Montana and northern Wyoming. The Rehder Creek drainage was included in this analysis. For the 1978 to 1981 period of record, no flow was measured at station 06126450 established at the mouth of Rehder Creek. The nearest perennial stream to the project area is lower Halfbreed Creek (Rehder Creek receiving stream).

Floodplains may exist within the upper reaches of Rehder Creek in T6N, R27E, sections 7, 13, 17, and 18. Floodplains can be defined as that surface of relatively flat land adjacent to a stream channel, constructed by the present stream in its existing regime and covered with water when the stream overflows its banks. They consist of alluvium carried by the stream during floods and deposited in the sluggish water beyond the influence of the swiftest current. Some remanent terrace deposits have been mapped in the Rehder Creek drainage and soil pit analyses indicate shallow stream-laid deposits in areas along the existing channel. Analysis of the peak discharge routing through the channel cross-sections surveyed for the channel morphology study indicates

that during a 100-year runoff event, water flow could be outside of the Rehder Creek channel banks. However, landowner manipulation of nearly all of tributary drainage basins through the use of spreader dikes and impoundments to catch and hold water for livestock has reduced the normal floodplain area. Slagle (1986) identified 100-year floodplains within the region and did not identify the project area as a flood-prone area as defined by the National Flood Insurance Act of 1968 or the Flood Disaster Protection Act of 1973.

3.4.4.6 Ponds

Most ponds in the project area are associated with springs and runoff water catchments. Spring ponds maintain a relatively stable water level as provided by the consistent spring flow. This is a result of the springs issuing immediately above the pond or into the dugout area of the pond. The location of these ponds is either in the drainage bottom or higher on the side slopes where the springs issue. These ponds are directly related to the groundwater/surface water interface and exhibit water table expression.

Perennial/intermittent ponds are located in the drainage bottoms and intercept surface flow originating from either springs or precipitation runoff. These ponds exhibit extensive variation in water levels which is dependent upon their location in the drainage with respect to springs and precipitation received during a given year. These ponds retained water throughout or for the majority of the year.

Ephemeral ponds are also located in the drainage bottoms and are utilized to retain surface runoff from major storm events. Retention of surface water promotes availability of water from livestock and wildlife and infiltration of water which is utilized for alluvial aquifer recharge and spring flow. Several of these ponds are located directly above developed springs and are utilized for protection and infiltration enhancement of the springs. These ponds have been dry except following major precipitation events.

3.4.4.7 Surface Water Quality

Surface water quality for the project area is detailed in the Bull Mountains Mine No. 1 Permit Document (SPE 2009). Limited water quality data was collected from monitoring stations located on Halfbreed Creek at sites approximately 10 and 15 miles downstream of the project area, at the mouth of Rehder Creek, and just north of the study area on Fattig Creek. This geochemistry data is representative of prairie streams which have elevated conductivity, TDS and pH concentrations during low flow. In contrast to low flow, direct runoff from rainfall or snowmelt typically has lower concentrations of these parameters. During direct runoff, water is routed quickly into stream channels with little opportunity for leaching of minerals from the soil. The larger volume of water present during runoff also has a diluting effect. Trace metal concentrations of analyzed samples was low.

There are twelve surface water quality monitoring stations currently being monitored by SPE in the project area. These waters are classified as a calcium-bicarbonate with lower conductivity and TDS than the adjacent springs. These surface water samples are also lower in ionic composition but higher in suspended solids due to high flow and erosion of soils during runoff events. Elevated quantities of aluminum and iron were also observed in these samples. Since limited surface water runoff samples have been collected during the monitoring program, water samples collected from springs were examined. Spring and seep water quality in the project area is predominantly a calcium-magnesium carbonate-bicarbonate water with elevated

hardness or secondary alkalinity. A detailed discussion of spring quantity and quality is presented in the groundwater section above.

A total of 26 perennial/intermittent and ephemeral ponds exist within the project area. Analysis of water chemistry of the ponds indicates qualities similar to that of springs and seeps discussed above.

3.4.4.8 Surface Water Use

Surface water rights in the project area are summarized in **Table 3.4-11**. The majority of these rights are related to spring flow which outcrop at the surface. Site identification numbers are also cross-referenced on the table. The Rehder Creek drainage basin is contained within the project area and includes seven surface water rights. These surface rights are within T6N, R27E, sections 17, 18, and 20. Five of the seven rights are associated with springs 16655, 16755, 17415, 17515, and 17685. The other two rights are associated with surface water pond sites 17517 and 17417, one of which has a decreased flow of 2.50 cfs for irrigation use. No irrigation techniques are currently being utilized in this area. Surface station 17516 was located at this approximate location to monitor surface flow and use. Usage of water from the other six rights is designated as stock water.

3.5 Soils

Detailed soil information for Musselshell County has become available relatively recently and is available through the on line Web Soil Survey (NRCS 2008). Eleven soil units have been mapped in the federal coal lease area (**Table 3.5-1**). The two Korchea loams occur only on nearly level terrain along the bottoms of Rehder Creek. Barvon-Cabba-Shambo loams, Doney-Cabba-Macar loams, and Cabba-Barvon loams occur on gentle to moderate slopes (4 to 15 percent) in many parts of the lease area, but not on Dunn Mountain (Section 22). Cabba-Doney loams occur on moderate to very steep slopes (8 to 45 percent) from Rehder Creek north (sections 4, 8, and 10). The remaining five loams and channery loams occur in most of the lease area on rocky plateaus or on moderate to extremely steep (4 to 65 percent) rocky slopes. With the exception of the limited areas of Korchea loams along Rehder Creek, these Cabba and Lamedeer-Ringling loams are comparatively coarse to channery loams associated with steep or rocky terrain.

Table 3.5-1 Soil Units in Lease Area

Soil Map Unit	Map Unit Description	Sections
245C	Lamedeer-Ringling channery loams, 2 to 8 percent slopes	8, 10, 14, 22
245F	Lamedeer-Ringling channery loams, 4 to 45 percent slopes	4, 8, 10, 14, 22
246F	Lamedeer-Ringling channery loams, moist, 4 to 45 percent slopes	4, 8, 10, 14, 22
255C	Shambo-Korchea-Barvon loams, 2 to 8 percent slopes	8
255D	Barvon-Cabba-Shambo loams. 4 to 15 percent slopes	4, 8, 10
281D	Doney-Cabba-Macar loams, 4 to 15 percent slopes	4, 8, 10
283F	Cabba-Rock outcrop complex, 8 to 45 percent slopes	4, 8, 10, 14, 22
284D	Cabba-Barvon loams, 4 to 15 percent slopes	8, 10, 14
285F	Cabba-Doney loams, 8 to 45 percent slope	4, 8, 10
289F	Cabba-Barvon loams, 15 to 65 percent slopes	4, 8, 10, 14, 22
292A	Straw-Korchea loams, 0 to 2 percent slopes	8

Source: NRCS 2008.

Table 3.4-11 Surface Water Rights

Location	Water Right ID	Owner	Priority Date	Source Name	Flow Rate[1]	Trib[2]	Use[3]	Meridian Station
06N 26E 12 AAB	40A-W-197948-00	Schenk Family Trust	06/23/04	Rehder Creek	0.72 C	UT	IR	11185
06N 26E 25 CBA	43Q-W-108654-00	Glacier Park Co	08/06/50	Razor Creek			AR	92155
06N 26E 27 ADC	43Q-C-014317-00	Van Luchene M Rosa	07/27/77		50.00 G		WI	Drainage
06N 26R 27 BCB	43Q-W-198337-00	Majerus Ranch Inc	06/01/48	Razor Creek			ST	Drainage
06N 27E 02 ABC	40C-W-188740-00	Charter Ranch Inc	12/31/58	Fattig Creek		UT	ST	53757
06B 27E 02 BBD	40C-W-188754-00	Charter Ranch Inc	12/31/20	Fattig Creek		UT	ST	53755
06N 27E 02 DAB	40C-W-188756-00	Charter Ranch Inc	12/31/20	Fattig Creek		SP	ST	53685
06N 27E 02 DBB	40C-W-188758-00	Charter Ranch Inc	12/31/20	Fattig Creek		SP	ST	53495
06N 27E 02 DCB	40C-W-188755-00	Charter Ranch Inc	12/31/20	Fattig Creek		SP	ST	53485
06N 27E 03 BBD	40C-W-108668-00	Glacier Park Co	12/31/14	Fattig Creek		SP	ST	52455
06N 27E 03 CBD	40C-W-108667-00	Glacier Park Co	12/31/14	Fattig Creek		SP	ST	Spring
06N 27E 03 CCC	40C-W-108669-00	Glacier Park Co	06/30/73	Fattig Creek		UT	ST	52165
06N 27E 05 ABC	40C-E-064815-00	Yellowstone Basin Properties Inc	00/00/25	Groundwater	10.00 G		ST	52525
06N 27E 06 CBA	40A-W-188417-00	Glacier Park Co	12/31/10	Rehder Creek		SP	ST	11115
06N 27E 07 AAA	40A-W-188413-00	Glacier Park Co	12/31/10	Rehder Creek		SP	ST	14655
06N 27E 07 ABC	40A-W-188412-00	Glacier Park Co	12/31/10	Rehder Creek		SP	ST	14785
06N 27E 07 BDC	40A-W-212187-00	Glacier Park Co	06/23/04	Rehder Creek	0.50 C	UT	IR	Drainage
06N 27E 07 BDD	40A-W-188410-00	Glacier Park Co	12/31/57	Rehder Creek			ST	Drainage
06N 27E 08 CAB	40A-W-188405-00	Glacier Park Co	12/31/10	Rehder Creek		SP	ST	14555
06N 27E 08 CAB	40A-W-188407-00	Glacier Park Co	12/31/10	Rehder Creek		SP	ST	Spring
06N 27E 08 CAC	40A-W-188404-00	Glacier Park Co	08/31/72	Rehder Creek		UT	ST	14535
06N 27E 08 DDC	40A-W-188409-00	Glacier Park Co	12/31/20	Rehder Creek			ST	14415
06N 27E 09 ABC	40C-W-108666-00	Glacier Park Co	12/31/14	Fattig Creek		SP	ST	Spring
06N 27E 09 ADC	40C-W-108665-00	Glacier Park Co	06/30/73	Fattig Creek		UT	ST	52145
06N 27E 09 DAD	40C-W-106923-00	Glacier Park Co	06/30/73	Fattig Creek		UT	ST	52125
06N 27E 10 AAD	40C-W-188762-00	Charter Ranch Inc	12/31/20	Fattig Creek		SP	ST	53575
06N 27E 10 CAC	40C-W-188761-00	Charter Ranch Inc	12/31/20	Fattig Creek		SP	ST	53525
06N 27E 13 ADB	40C-C-052558-00	Glacier Park Co	09/12/83		1.00 G		ST	53615
06N 27E 14 CAA	40C-W-188760-00	Charter Ranch Inc	12/31/20	Fattig Creek		SP	ST	53225
06N 27E 15 AAA	40C-W-108662-00	Glacier Park Co	12/31/14	Fattig Creek		SP	ST	53175
06N 27E 15 AAA	40C-W-108663-00	Glacier Park Co	09/01/50	Fattig Creek		UT	ST	53175
06N 27E 15 CBB	40A-W-106925-00	Glacier Park Co	12/31/14	Rehder Creek		SP	ST	14165
06N 27E 17 AAA	40A-W-188401-00	Glacier Park Co	12/31/20	Rehder Creek		SP	ST	14325
06N 27E 17 ABC[4]	40A-W-188402-00	Glacier Park Co	12/31/10	Rehder Creek		SP	ST	16755
06N 27E 17 ACC[4]	40A-W-188403-00	Glacier Park Co	12/31/10	Rehder Creek		SP	ST	16655
06N 27E 18 DDA[4]	40A-W-188421-00	Glacier Park Co	04/10/03	Rehder Creek	2.50 C	UT	IR	17517
06N 27E 18 DDD[4]	40A-W-188400-00	Glacier Park Co	12/31/03	Rehder Creek		SP	ST	17515
06N 27E 20 AAB[4]	40A-W-188416-00	Glacier Park Co	12/31/10	Rehder Creek		SP	ST	17685
06N 27E 20 BCB[4]	40A-W-188419-00	Glacier Park Co	12/31/50	Rehder Creek		UT	ST	17417

Table 3.4-11 Surface Water Rights

Location	Water Right ID	Owner	Priority Date	Source Name	Flow Rate[1]	Trib[2]	Use[3]	Meridian Station
06N 27E 20 BCC[4]	40A-W-188418-00	Glacier Park Co	12/31/10	Rehder Creek		SP	ST	17415
06N 27E 20 DCC	40A-W-188764-00	Glacier Park Co	07/09/03	Rehder Creek		SP	ST	17315
06N 27E 20 DCC	40A-W-188766-00	Glacier Park Co	06/21/03	Rehder Creek	1.52 C	UT	IR	17315
06N 27E 21 BBD	40A-W-188414-00	Glacier Park Co	12/31/10	Rehder Creek		SP	ST	16355
06N 27E 22 ABC	43Q-W-108658-00	Glacier Park Co	00/00/14		10.00 G		ST	71115
06N 27E 22 CBB	40A-W-188763-00	Two Lazy Two Ranch Inc	12/31/20	Rehder Creek		SP	ST	16135
06N 27E 23 BB	43Q-T-021782-00	Two Lazy Two Ranch Inc	00/00/00	Railroad Creek			ST	71156
06N 27E 23 BB	43Q-T-023341-00	Burlington Northern Railroad Co	00/00/00	Railroad Creek			ST	Drainage
06N 27E 23 BDC	43Q-C-060354-00	Glacier Park Co	08/27/85		1.00 G		ST	Drainage
06N 27E 23 DCD	43Q-C-052557-00	Glacier Park Co	09/12/83		0.50 G		ST	71355
06N 27E 24 CCB	43Q-W-188739-0	Two Lazy Two Ranch Inc	00/00/50	Railroad Creek	1.60 C	UT	ST	71425
06N 27E 24 CDC	43Q-W-188731-00	Two Lazy Two Ranch Inc	00/00/20	Lower Rr Creek Spring		10.00 G	ST	71445
06N 27E 24 CDD	43Q-T-023344-00	Two Lazy Two Ranch Inc	00/00/00	Railroad Creek			ST	71456
06N 27E 24 CDD	43Q-T-021783-00	Charter Ranch Inc	00/00/00	Railroad Creek			ST	Drainage
06N 27E 25 CCC	43Q-W-106427-00	Glacier Park Co	06/30/73	Railroad Creek		UT	ST	Pond
06N 27E 27 BAC	43Q-W-195687-00	Pfister Serena L	00/00/42	Mountain Spring	1.10 G		ST	72125
06N 27E 27 BBA	43Q-W-195677-00	Pfister Serena L	00/00/59	Tractor Wheel Spring	1.00 G		ST	72115
06N 27E 28 CBD	40A-W-195704-00	Pfister Serena L	09/20/14	Rehder Creek		UT	ST	17165
06N 27E 28 CBD	40A-W-195676-00	Pfister Serena L	06/05/15	Rehder Creek		SP	ST	17165
06N 27E 29 AAA	40A-W-188408-00	Glacier Park Co	12/31/10	Rehder Creek		SP	ST	17275
06N 27E 29 ABA	40A-W-188415-00	Glacier Park Co	12/31/65	Rehder Creek		UT	ST	17317
06N 27E 29 ADD	40A-W-188406-00	Glacier Park Co	12/31/10	Rehder Creek		SP	ST	17185
06N 27E 29 ADD	40A-W-188411-00	Glacier Park Co	12/31/65	Rehder Creek		UT	ST	17187
07N 26E 25 CAC	40C-W-109286-00	Wheeler Sallie Busch Trust	12/31/11	East Parrot Creek		SP	ST	41425
07N 26E 36 BAC	40C-W-025839-00	Montana, State Of Board Of Land	08/01/70	East Parrot Creek		UT	ST	Drainage
07N 26E 20 DAC	40C-W-109288-00	Wheeler Sallie Busch Trust	12/31/30	East Parrot Creek		SP	ST	Spring
07N 26E 21 BDB	40C-W-108653-00	Glacier Park Co	07/31/69	East Parrot Creek		UT	ST	Drainage
07N 26E 21 DDD	40C-W-108652-00	Glacier Park Co	08/31/69	East Parrot Creek		UT	ST	41817
07N 26E 24	40C-W-185054-00	Twin Beaches LLC	02/12/06	Fattig Creek			ST	Drainage
07N 26E 24 BDB	40C-W-183597-00	Twin Beaches LLC	12/31/00	Fattig Creek		SP	ST	Spring
07N 26E 25 BAC	40C-W-183594-00	Twin Beaches LLC	12/31/61	Fattig Creek		SP	ST	Spring
07N 26E 25 BAC	40C-W-183593-00	Twin Beaches LLC	12/31/27	Fattig Creek		SP	ST	Spring
07N 26E 25 CCA	40C-W-182442-00	Twin Beaches LLC	12/31/72	Fattig Creek		UT	ST	Drainage
07N 26E 28 BCA	40C-W-109306-00	Wheeler Sallie Busch Trust	12/31/40	East Parrot Creek		UT	ST	41635
07N 26E 28 BCA	40C-W-109294-00	Wheeler Sallie Busch Trust	12/31/00	East Parrot Creek		SP	ST	41625
07N 26E 28 DDC	40C-W-109305-00	Wheeler Sallie Busch Trust	09/23/70	Fattig Creek		UT	ST	51117
07N 26E 29 ABB	40C-W-108647-00	Wheeler Sallie Busch Trust	06/30/73	East Parrot Creek		UT	ST	41545
07N 26E 30 DBB	40C-W-109290-00	Wheeler Sallie Busch Trust	12/31/12	East Parrot Creek		SP	ST	41335

Table 3.4-11 Surface Water Rights

Location	Water Right ID	Owner	Priority Date	Source Name	Flow Rate[1]	Trib[2]	Use[3]	Meridian Station
07N 26E 31 AAA	40C-W-109295-00	Wheeler Sallie Busch Trust	12/31/11	East Parrot Creek	10.00 G	SP	ST	41275
07N 27E 31 ABA	40C-W-109293-00	Wheeler Sallie Busch Trust	12/31/11	East Parrot Creek	10.00 G	SP	ST	41175
07N 27E 31 ABB	40C-W-109300-00	Wheeler Sallie Busch Trust	12/31/11	East Parrot Creek	10.00 G	SP	ST	41165
07N 27E 31 CDD	40C-W-109289-00	Wheeler Sallie Busch Trust	12/31/12	East Parrot Creek			ST	41135
07N 27E 33 DCC	40C-W-108651-00	Wheeler Sallie Busch Trust	12/31/14	Fattig Creek		SP	ST	52565
07N 27E 34 CAD	40C-E-064817-00	Yellowstone Basin Properties Inc	00/00/25	Groundwater	10.00 G		ST	Drainage
07N 27E 34 CDA	40C-W-188759-00	Charter Ranch Inc	12/31/20	Fattig Creek		SP	ST	52655
07N 27E 34 DBC	40C-W-188757-00	Charter Ranch Inc	12/31/20	Fattig Creek		SP	ST	Spring
07N 27E 36 DBD	40C-W-042865-00	Montana, State Board Of Land	05/15/65	Fattig Creek		SP	ST	51255

1 G = Gallons per minute. C = Cubic feet per second.

2 SP = Spring. UT = Unnamed tributary

3 ST = Stock water. IR = Irrigation water. WI = Wildlife Water

4 Water rights within the permit area

* Updated Montana DNRC Water Right Query System 08/17/2010

Soils in the lease area are predominantly loams, ranging from silty loams to channery loams. As would be expected, soils are shallower along upper slopes and fans and deeper on lower terraces and drainage bottoms. The lease areas away from Rehder Creek are predominantly areas of upper slopes and fans. Observed soils in these upland areas are predominantly Cabbart soils. These soils are well-drained, have limited available water capacity, and are easily eroded. Above the slopes and fans, sandstone and clinker characterize plateaus and rims.

3.6 Vegetation

Vegetation of the project area is characteristic of the Eastern Sedimentary Plains of Montana in the 10 to 14 inch precipitation zone (SPE 2009). Vegetation cover varies from ponderosa pine and Rocky Mountain juniper forests on uplands, rock outcrops, and ravines at higher elevations, to sagebrush and mixed prairie grassland communities on benches, slopes, and drainages where soils are deeper.

Existing influences on local distribution of plant communities include soils, topography, surface disturbance, availability of water, management boundary fence lines, and soil salinity. Livestock grazing, fire suppression, and a large wildfire in 1984 have substantially affected plant succession in the project area. For over a century there have been localized disturbances by farming, mining, and road-building. These disturbances are more extensive to the west in the area of the surface facilities complex.

3.6.1 Vegetation Communities

Eight broad vegetation communities plus disturbed areas were identified for the project area: silver sagebrush-mixed grassland; mixed grassland; ponderosa pine-mixed grassland; burned ponderosa pine-mixed grassland; improved pasture; agriculture; alkali-saltgrass; wetlands; and disturbed. These eight broad types summarize 19 vegetative communities (SPE 2009).

Silver-sagebrush-mixed Grassland

The silver-sagebrush-mixed grassland community occurs on lower valley slopes near drainages, especially where soils are deeper. This setting is absent or very limited in extent in the lease area.

Mixed Grassland

The mixed grassland community is interspersed with the ponderosa pine-mixed grassland community in the higher elevations on upland plateaus and benches with deeper soils. Due to this topographic positioning, it has received limited grazing, resulting in a perennial grass dominance and relatively high forage production. In this community, western wheatgrass, needle-and-thread, green needlegrass, blue grama, and prairie junegrass typically account for over 60 percent of total vegetative cover and 75 percent of total production. Forbs account for 29 percent of cover and 18 percent of production.

Ponderosa Pine-mixed Grassland

The ponderosa pine-mixed grassland community generally occurs on moderate-to-steep upland slopes on shallow soils. Ponderosa pine is a minor component of the community canopy cover, but is characteristic of the type. Fifty-two percent of canopy cover is provided by grasses, including bluebunch wheatgrass, western wheatgrass, and prairie junegrass, with forbs comprising about 41 percent of cover and 50 percent of herbaceous production.

Burned Ponderosa Pine-mixed Grassland

The burned ponderosa pine-mixed grassland community is a transitional community resulting from a wildfire in 1984. Grasses and forbs have proliferated in the post-fire community, while ponderosa pine reproduction is not evident. This burned community differs from ponderosa pine-mixed grassland and mixed grassland by the greater occurrence of colonizers such as crested wheatgrass, Japanese brome, cheatgrass brome, Kentucky bluegrass, and common dandelion as well as diverse shrub and forb components.

Improved Pasture

The improved pasture community consists of several cultivated areas planted to introduce grasses (crested and intermediate wheatgrass) or alfalfa. They are grazed and are limited to very small areas in the bottoms of the Rehder Creek drainage basins.

Agriculture

The agriculture community is not present in the lease area.

Alkali-saltgrass

The alkali-saltgrass community occurs on saline-alkaline soils in lower basins southwest of the Bull Mountains and outside the lease area.

Wetland Vegetation

The wetland vegetation community accounts for less than 0.1 percent of the project area communities, but is important in local ecosystems. Wetlands provide watering points for wildlife and livestock and provide habitat diversity. Species include several sedges, rushes, bulrush, cattail, western rose, and snowberry. At higher elevations, such as the majority of the lease area, they are associated primarily with springs, seeps, and intermittent streams. Precipitation-dependent wetland sites fluctuate annually, in a range from dry to wet, in direct response to seasonal moisture, temperature, and wind.

Disturbed Vegetation

The disturbed type includes subdivision home sites, ranch sites, industrial, commercial, roads, powerlines, and other manifestations of human use. These areas are more common near the mine facilities and in the western portion of the project area, and are very limited in extent in the lease area. Localized residential development is occurring in Section 4 in the northern lease tract along Fattig Creek Road and several roads that branch from it. Several home sites are proposed in this subdivided area.

3.6.2 Sensitive Plant Species

Information from the Montana Natural Heritage Program website (MNHP 2009) indicates that there are no known occurrences of federal sensitive plant species in or near the coal lease area, nor are there any known occurrences within Musselshell County itself. The BLM further confirmed that there are no known BLM specific sensitive species in the coal lease area (Taylor 2009). USFWS (2009) sensitive species lists also do not indicate any known occurrences in the project area. Further, no USFWS threatened or endangered plant species are known to occur in Musselshell County (USFWS 2009).

The Montana Natural Heritage Program (MNHP 2009) also indicates that there are no known occurrences of *state sensitive* plant species (vascular and non-vascular) within Musselshell County. NatureServe (2009) database recognizes one species within Musselshell County: Poison Suckleya (*Suckleya suckleyana*). This species has a state S1 status (critically imperiled in the State of Montana). However, an associated footnote explains that this species is likely extirpated from the area, thus explaining the lack of known occurrences as indicated by the Natural Heritage Program.

3.6.3 Invasive, Non-Native Species

Competition from invasive, non-native plants constitutes a potential threat to native plant species and wildlife habitat within the project area. Several invasive, non-native plant species occupy the LOM area including crested wheatgrass (*Agropyron cristatum*), Japanese brome (*Bromus japonicas*), cheatgrass (*Bromus tectorum*), intermediate wheatgrass (*Thinopyrum intermedium*), and foxtail barley (*Hordeum jubatum*). Crested wheatgrass and intermediate wheatgrass occur in the area as a result of being planted to increase forage production to cattle. Cheatgrass, Japanese brome, and foxtail barley are all aggressive invasive species that out-compete desirable vegetation for water and soil nutrients. These species also reduce cattle grazing performance. Cheatgrass is an invasive species well known for completely replacing native vegetation and changing fire regimes.

Several noxious weed infestations are also prevalent and appear to be actively spreading in the LOM area, particularly within the alkali/saltgrass community (SPE 2009). Literature is not available indicating which species of noxious weeds are actively spreading within this community; however several species are known to occur in Musselshell County and that may occur within the LOM area.

3.7 Wildlife

Wildlife and preferred habitats are influenced by vegetation composition, structure, spatial management, recreational use of roads and trails, and management activities. This section describes the affected environment of wildlife related to the coal lease area in the project area.

The eight broad vegetation communities described in the Vegetation Section provide wildlife habitat in the project area. These communities are generally synonymous with wildlife habitat types (SPE 2009). Ponderosa pine-mixed grasslands and burned ponderosa pine-mixed grasslands are most common at higher elevations, with mixed grasslands occurring at intermediate elevations. Relatively small areas of wetlands occur near springs, seeps, or intermittent drainages throughout the area. Larger springs and associated wetlands are of high importance to wildlife, particularly those of Rehder and Fattig creeks (SPE 2009).

Mining-related wildlife studies have occurred extensively for many years in the Bull Mountains area, beginning in the early 1970s (Dusek and McCann 1973; Bergeron 1978). More recently, SPE has conducted annual wildlife monitoring in the project area (WESTECH 2003-2008). The following information is derived from baseline data compiled for the Bull Mountains Mine No. 1 and subsequent data in these annual monitoring reports.

3.7.1 Big Game

Four species of big game have been recorded in the Bull Mountains area, including mule deer (*Odocoileus hemionus*), elk (*Cervus elaphus*), pronghorn (*Antilocapra americana*), and white-tailed deer (*Odocoileus virginianus*). Mule deer and elk are the most abundant game species in the project area (MFWP 2008). Pronghorn and white-tailed deer are relatively less abundant in the area (SPE 2009). **Table 3.7-1** includes the numbers of big game observed by habitat types in the Bull Mountains during annual monitoring in 2007 (WESTECH 2007).

Mule Deer

Mule deer are the most abundantly observed game species in the project area (Butts 1997). Mule deer in this area are essentially non-migratory, making modest seasonal movements in response to changes in forage conditions and weather (Jay Newell, wildlife biologist, Montana Department of Fish, Wildlife and Parks (MFWP), personal communication, January 29, 2002; Butts 1997). In the winter, populations concentrate in the Rehder Creek, Elbow Hill, and Fattig Creek areas during inclement weather; but are typically more widespread during mild winter conditions.

In general, mule deer follow a clumped or aggregate group pattern, using all vegetation communities during all seasons in the area (WESTECH 2008; SPE 2009). In lower elevations, mule deer use agricultural lands, particularly crop fields where cover is tall and dense. In higher elevations, mule deer use the ponderosa pine-mixed grassland community (SPE 2009). WESTECH (2008) has suggested that mule deer are less common in the western portion of the project area, due to the paucity of forested cover (a consequence of the 1984 fire), less topographic relief than central and eastern portions of the area, and a relatively greater concentration of homes and associated human activities.

Elk

As discussed previously, elk are the second-most common big game species in the project area (WESTECH 2008; SPE 2009). Elk are migratory within the area; and although populations have increased considerably in recent years, their migratory distribution has not changed dramatically (Dusek 1978; WESTECH 2008).

Elk are most commonly observed from spring through autumn at higher elevations that are removed from human activity and livestock, using habitats that provide abundant forage and security cover (Butts 1997). Portions of the Rehder and Fattig Creek drainages as well as ponderosa pine and grass/burned pine habitats are used as summer range. Railroad and Pompeys Pillar Creek drainages and portions of Dunn Mountain serve as occasional winter range, where elk concentrate on south-facing slopes or other slopes blown free of snow (SPE 2009). BLM (Parks 2009) is not aware of any elk migration corridors. The coal lease area should be considered elk winter range.

Table 3.7-1 Big Game Sightings by Habitat Type

Species	Habitat[a]													Total
	001 Rock	002 Water	122 Pipo/Jusc	123 Pipo/Grass	212 Artr	222 Arca	231 Rhtr	260 Breaks	410[b] Grass	530 Pasture	610 Recl	630 Barren	640 Bldg	
Elk			1(1)	2(26)[c]					7(103)					10(130)
Mule Deer			2(2)	5(12)[c]					8(16)					15(30)
Pronghorn		1(1)		1(1)[c]		1(2)			10(22)	1(1)				14(27)

[a] Habitat types:
Rock = rock outcrops, cliffs, etc.
Water = includes riparian and mesic shrub habitat adjacent to ponds, dams, stream courses, etc.
Pipo/Jusc = Ponderosa pine/Rocky Mountain juniper
Pipo/Grass = Ponderosa pine/grassland
Artr = Big sagebrush
Arca = Silver sagebrush
Rhtr = Skunkbush sumac
Breaks = Highly eroded areas, often with complex vegetative cover
Grass = Dominated by native sod-forming and bunchgrass grasslands
Pasture = Dominated by introduced grass and forb species
Recl = Mine reclamation
Barren = Mine pits, waste areas, etc.
Bldg = Building sites
[b] Includes burned Ponderosa pine stands
[c] No. groups (no. individuals)

Pronghorn Antelope

The central Bull Mountains are marginal pronghorn habitat. Pronghorns are migratory in the area, using open habitat such as silver sagebrush-mixed grassland, mixed grassland, and agriculture communities that are fragmented and interspersed with the ponderosa pine-mixed grassland communities. Pronghorn distribution in the project area is both seasonal and relatively dispersed, occurring in the spring, summer, and early fall (Butts 1997; SPE 2009). No critical pronghorn habitat types have been identified, but they use most major drainages in the area. Higher elevations in the area generally lack suitable habitat and cover for antelope. The western portion of the area has regular pronghorn use of agricultural and crop fields. In summer and particularly winter, pronghorn tend to be concentrated in large herds in the more open areas of the Hay and Comanche basins about 10 miles southwest of the mine surface facilities.

White-tailed Deer

White-tailed deer have been observed in low numbers and recorded infrequently in the project area (Butts 1997). There have been past observations in the vicinity of Fattig Creek in the ponderosa pine-mixed grassland and grassland communities (WESTECH 2008).

3.7.2 Predators

Five species of predators have been observed in the project area: coyote, red fox, mountain lion, badger, and bobcat (WESTECH 2008). Coyotes are the most common predator in this area and have been recorded in almost all habitats. Coyotes are relatively more tolerant of human activity than the other described predators (WESTECH 2008).

Red fox and mountain lion activity have been confirmed in the project area; however, it has been infrequently recorded. Mountain lions are a secretive species, which is likely a causing factor to this infrequency (WESTECH 2007 and 2008). In 2007, a mountain lion was observed in Section 4 of the lease area (WESTECH 2008). This area likely constitutes the predator's territory. Bobcats have been observed in low numbers throughout the history of wildlife monitoring in the project area. Badgers, on the other hand, are more frequently observed and reported in the area. This species is widespread and uses a variety of habitats in the area (WESTECH 2007).

3.7.3 Raptors

Eighteen raptor and owl species have been observed in all major habitat types within the project area. A wildlife monitoring survey conducted in 2007 observed eight of these species as shown on **Figure 3.7-1** (WESTECH 2008). Most of these species are migratory and are protected under the Migratory Bird Treaty Act (MBTA). The MBTA provides that it is unlawful to pursue, hunt, take, capture or kill; attempt to take, capture or kill; possess, offer to or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried or received any migratory bird, part, nest, egg or product, manufactured or not (16 U.S.C. 703-712; Ch. 128; July 13, 1918; 40 Stat. 755). Executive Order (EO) 13186, signed January 10, 2001, lists responsibilities of federal agencies for protection of migratory birds. **Table 3.7-2** lists raptor species that have been observed in the project area. Many of these species are state listed Species of Concern and are indicated by an asterisk.

The greatest numbers of raptor species typically occur during spring and fall migration. Common spring and summer residents include red-tailed hawks (most commonly observed), American

kestrels, and great-horned owls (SPE 2009). Recently, in 2006, active red-tailed hawk and great-horned owl nests were located in coal lease area (WESTECH 2007). Rough-legged hawks are the most common winter raptor species. Other comparatively infrequently observed raptors include prairie falcons, ferruginous hawks, Cooper's hawks, turkey vultures, northern harriers, sharp-shinned hawks, Swainson's hawks, bald eagles, short-eared owls, and burrowing owls (SPE 2009).

Table 3.7-2 Raptor Species Observed in the Bull Mountains Area

Common Name	Species
American Kestrel	*Falco sparverius*
*Bald Eagle	*Haliaeetus leucocephalus*
*Burrowing Owl	*Athene cunicularia*
Cooper's Hawk	*Accipiter cooperii*
*Ferruginous Hawk	*Buteo regalis*
Golden Eagle	*Aquila chrysaetos*
Great-horned Owl	*Bubo virginianus*
Merlin	*Falco columbarius*
Northern Goshawk	*Accipiter gentilis*
Northern Harrier	*Circus cyaneus*
*Peregrine Falcon	*Falco peregrines*
Prairie Falcon	*Falco mexicanus*
Red-tailed Hawk	*Buteo jamaicensis*
Rough-legged Hawk	*Buteo lagopus*
Sharp-shinned Hawk	*Accipiter striatus*
Short-eared Owl	*Asio flammeus*
*Swainson's Hawk	*Buteo swainsoni*
Turkey Vulture	*Cathartes aura*

*State Listed Species of Concern
Source: (WESTECH 2003 – 2007).

Golden eagles have been observed at all times of the year. In recent years, three golden eagles southwest of Dunn Mountain have been observed. Bald eagles are occasionally observed during winter and seasonal migrations as well. Both golden and bald eagles are protected under the Bald and Golden Eagle Protection Act (WESTECH 2008).

3.7.4 Upland Game Birds

There are two primary species of upland game birds in the project area: wild turkey (*Meleagris gallopavo*) and sharp-tailed grouse (*Tympanuchus phasianellus*). Other species such as ring-necked pheasant (*Phasianus colchicus*), gray partridge (*Perdix perdix*), and greater sage-grouse (*Centrocercus urophasianus*) may be present in low numbers (WESTECH 2008).

Wild turkeys are year-round residents of the project area. These turkeys were introduced in 1958 and have since spread throughout the area. Their preferred habitat is the ponderosa pine-mixed grassland, as well as the agricultural community (SPE 2009). The ponderosa pine-mixed grassland community provides roosting trees year-round, thermal cover during cold weather and food during all seasons. Many have been observed in this vegetation community along the Fattig Creek Road (WESTECH 2008).

Sharp-tailed grouse are also year-round residents of the project area, but use somewhat differing vegetation communities seasonally and are comparatively uncommon (SPE 2009; WESTECH 2007). Sharp-tailed grouse use silver sagebrush-mixed grassland and mixed grassland communities for courtship, nesting, and brood rearing in the spring and summer, and use the other communities to some degree for food cover during the fall and winter. One Lek (breeding grounds) has been identified (SPE 2009) as shown on **Figure 3.7-1**.

Non-native gray partridges and ring-necked pheasants are not observed frequently in the area, but are present in the western agricultural community. With about 50 percent of agricultural land converted to Conservation Reserve Program (CRP), both species should benefit from increased, undisturbed permanent cover and respond with an increase in numbers and area occupied (WESTECH 2008).

Sage grouse are sagebrush obligate species, and their habitat is very limited in the project area due to their habitat being converted to agriculture land in past years. Existing habitat is in valleys that are primarily dominated by silver sagebrush. A few sage grouse have been seen in the area; however, due to the dependency this bird has on sagebrush (particularly in the winter), there is little potential for the lease areas support this species (WESTECH 2008). Sage Grouse are State Species of Concern and BLM Sensitive Species (MNHP 2008).

3.7.5 Other Birds

One hundred sixty other bird species, including waterfowl, shorebirds, and land birds (including migratory birds) are known to inhabit the project area, using all vegetation communities (SPE 2009 Volume 7 Section 26.4.304(10)). The burned ponderosa pine-mixed grassland community provides an extraordinary abundance of snags as nesting habitat for cavity-nesting small birds such as woodpeckers, swallows, bluebirds, and wrens.

Habitat for shorebirds, waterfowl, and other wetland species is relatively limited and confined to small wetlands in the project area. According to mine-related wildlife monitoring surveys (1989-2006), 14 shorebirds, waterfowl, or species associated with wetlands have been documented in the area (WESTECH 2007). Land bird species diversity was comparatively higher in respect to these monitoring surveys; species of the Passeriformes family were the most documented (WESTECH 2007).

3.7.6 Bats

Acoustic and capture sampling for bats has been conducted in the project area (Butts 2006). During this sampling effort, 12 bat species were detected. Big brown bat (*Eptesicus fuscus*) and western long-eared myotis (*Myotis evotis*) were the most commonly observed species. Three lactating pallid bats (*Antrozous pallidus*) were observed, indicating that the species was reproducing in the project area. Townsend's big-eared bat (*Corynorhinus thownsendii*), a state Species of Concern and BLM sensitive species, was also observed in Section 8 of the lease area. A variety of other species were recording during this survey effort and preceding surveys, including: silver-haired bat (*Lasionycteris noctigagans*), hoary bat (*Lasiurus cinereus*), spotted bat (*Euderma maculatum*), small-footed myotis (*Myotis ciliolabrum*), long-legged myotis (*Myotis volans*), eastern red bat (*Lasiurus blossevellii*), fringed myotis (*Myotis thysanodes*), northern long-eared bat (*Myotis septentrionalis*), and little brown bat (*Myotis lucifugus*) (Butts 2006; SPE 2009).

3.7.7 Amphibians, Reptiles, and Aquatic Species

Aquatic habitat in the area includes streams, ponds, springs, seeps, and areas associated with the wetland community. The Rehder, Fattig, and Railroad Creek drainages are ephemeral; however, there are perennial ponds and stream reaches created by flow from springs. Approximately 15 acres of wetland habitat occurs in the project area, 3 acres of which are open water. A number of wet sites remain relatively undisturbed by current land use practices; however, many aquatic sites have been modified by livestock grazing or development of livestock watering facilities. Additional disturbances to the aquatic environment of the area include the 1984 fire and subsequent loss of insulating cover, and increases in siltation from runoff and cattle disturbance. All animals found in the area use streams, ponds, springs, and related habitat to a greater or lesser degree (SPE 2009).

The aquatic invertebrate community is characterized by low-to-moderate species diversity, densities, and productivity. Species are predominantly those typically of standing water; however, a number of the taxa represented are found only in lotic (flowing water) habitats. The dominant invertebrate species are generally tolerant of widely varying conditions and are typically transient in nature or bottom dweller that prefer standing water. Species from the midge (*Chironomidae*), mayfly (*Ephemeroptera*), and fly (*Diptera*) families dominate the invertebrate community, with aquatic earthworms (*Oligochaeta*) and amphipods also well represented. The periphyton communities (e.g. algae, bacteria, and protozoa) present in the springs, ponds, and streams are not common in eastern Montana, and indicate a higher water quality than is usually encountered in this part of the state. Tiger salamanders are common in pond sites associated with springs. No fish species are known to exist in the project area.

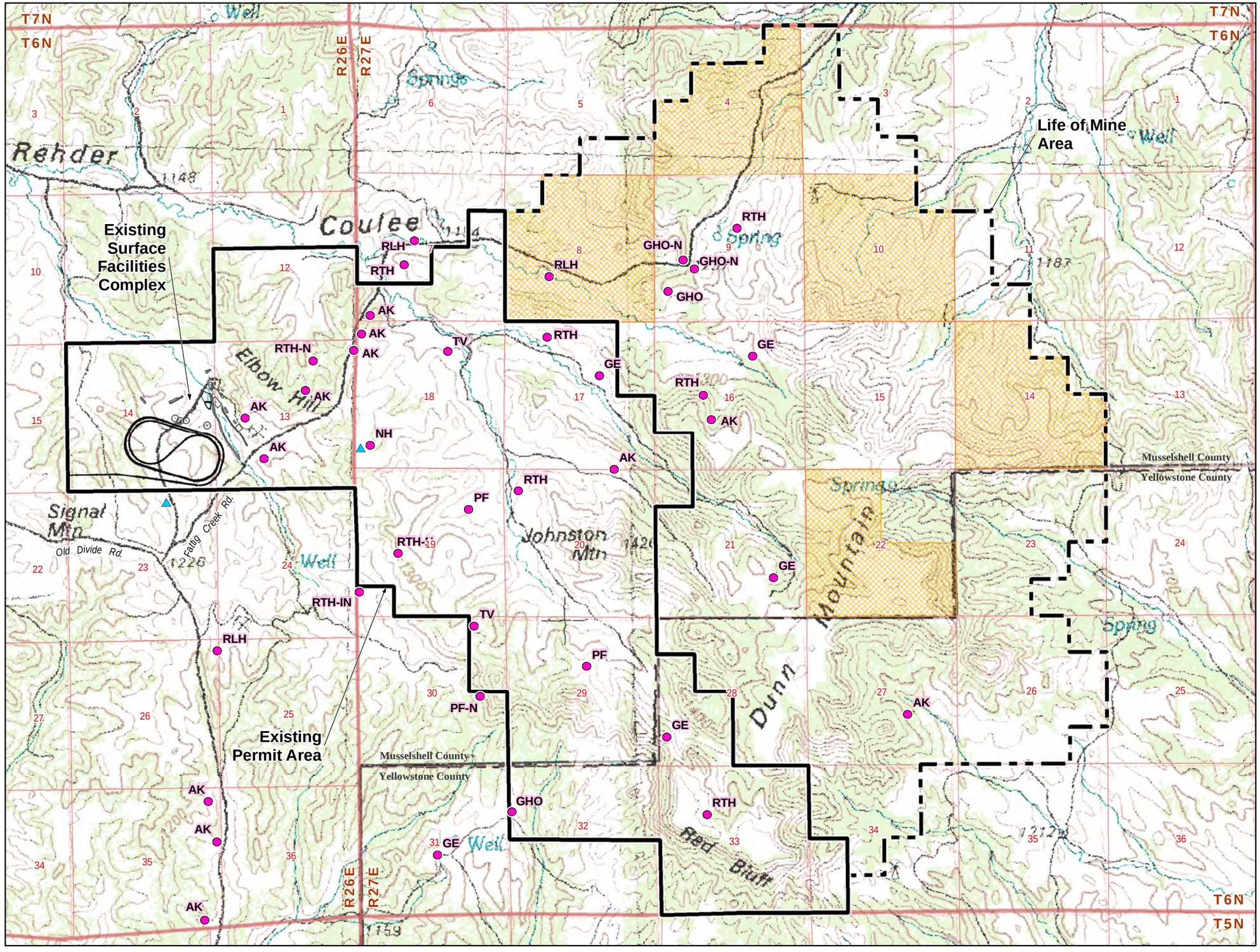
3.8 Threatened or Endangered Species and Special Status Species

3.8.1 Federally Threatened or Endangered Species

The US Fish and Wildlife Service (USFWS) provided a list and regular updates federally threatened or endangered species with potential to occur in Musselshell and Yellowstone counties, Montana (USFWS 2008). According to this list, the black-footed ferret (*Mustela nigripes*) and Whooping Crane (*Grus americana*) have potential habitat in these counties. However, wildlife monitoring surveys (1989 to 2008) have not indicated the presence of these species in the project area (Butts 1997; WESTECH 2003-2008; MTNHP 2008). It is not expected that either species would occur in the lease areas.

3.8.2 Special Status Species

The State of Montana regularly updates a Species of Concern list. Species of Concern include taxa that are at-risk due to rarity, restricted distribution, habitat loss, or other factors. The term also encompasses species that have a special designation by organizations or land management agencies in Montana (e.g. BLM). **Table 3.8-1** lists Special Status Species that have been documented during mine related studies in the project area. Some are also listed as BLM Sensitive Species, and are indicated by an asterisk.



LEGEND

- Sharp-Tailed Grouse Sightings
- Raptor Sightings
- Existing Permit Area
- Life of Mine Area
- BLM Coal Lease Area

Rapter Label Explanation

GHO	-	Great Horned Owl
RLH	-	Rough-Legged Hawk
RTH	-	Red-Tailed Hawk
AK	-	American Kestral
GE	-	Golden Eagle
BE	-	Bald Eagle
NH	-	Northen Harrier
PF	-	Prairie Falcon
TV	-	Turkey Vulture
N	-	Nest Active
IN	-	Nest Inactive

0 3,000 6,000 Feet

NAD 83 MONTANA STATE PLANE, US FOOT

SOURCE: USGS 1:100,000 SCALE TOPOGRAPHIC QUADRANGLE - ROUNDUP (1982), MONTANA

BULL MOUNTAIN COAL LEASING ENVIRONMENTAL ASSESSMENT

Figure 3-.7-1
Raptor Sightings and
Grouse Lek Locations

ANALYSIS AREA: Musselshell & Yellowstone Counties, Montana

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Table 3.8-1 Special Status Species Documented in the Project Area

Species	1989-1996[a]	2001[b]	2002[b]	2003[c]	2004[d]	2005[e]	2006[f]
Birds							
*Bald Eagle (*Haliaeetus leucocephalus*)	X			X			X
*Swainson's Hawk (*Buteo swainsoni*)	X						
*Ferruginous Hawk (*Buteo regalis*)	X						
*Peregrine Falcon (*Falco peregrinus*)							X
*Greater-sage Grouse (*Centrocercus urophasianus*)	*has been observed in the Bull Mountains area (MDSL 1992)*						
*Long-billed Curlew (*Numenius americanus*)	✓						
*Burrowing Owl (*Athene cunicularia*)	*has been observed in the Bull Mountains area (MDSL 1992)*						
Lewis' Woodpecker (*Melanerpes lewis*)	✓						✓
*Red-headed Woodpecker (*Melanerpes erythrocephalus*)	✓	✓	✓	✓	✓	✓	✓
Cassin's Kingbird (*Tyranns vociferans*)	✓		X				✓
*Loggerhead Shrike (*Lanius ludovicianus*)	✓						
Brewer's Sparrow (*Spizella breweri*)	✓						
Lark Bunting (*Calamospiza melanocorys*)	✓			✓			
Grasshopper Sparrow (*Ammodramus savannarum*)	✓		✓				✓
*Chestnut-collared Longspur (*Calcarius ornatus*)	✓						
Gray-crowned Rosy Finch (*Leucosticte tephrocotis*)	✓						
Mammals							
Bats							
*Townsend's Big-eared Bat (*Corynorhinus townsendii*)	✓						✓
*Spotted Bat (*Euderma maculatum*)	✓						✓
*Northern Myotis (*Myotis septentrionalis*)							✓
*Fringed Myotis (*Myotis thysanodes*)							✓
Amphibians							
*Great Plains Toad (*Bufo cognatus*)	✓[g]						
*Northern Leopard Frog (*Rana pipiens*)	✓	✓	✓	✓	✓	✓	
Reptiles							
Sagebrush Lizard (*Sceloporus graciosus*)	✓						

Sources: [a] Butts (1997), [b] Westech (2003), [C] Westech (2004), [D] Westech (2005), [E] Westech (2006), [F] Westech (2007), [g] MTNHP (2008)

* BLM Sensitive Species

3.9 Ownership and Use of Land

The proposed lease area is both federal and private surface with underlying federal mineral reserves administered by the BLM. Approximately 22 percent of the land overlying the federal coal lease area is federal land administered by the BLM. Lands and minerals surrounding the federal coal lease area are privately owned. Musselshell County and nearby Yellowstone County are predominantly agricultural, including rangeland, forest areas including commercial forest, cropland, and pasture. Land in the lease area is dominated by forest and rangeland with limited areas of dispersed residential development. Section 4 of the proposed lease area has been subdivided into parcels for home sites. Several of these sites have homes or cabins and others are

proposed in the future. Some out-buildings and fences have also been built. Other structures that have been built to enhance land use include livestock fences in all five lease tracts, improvements to spring sites (such as ponds, water tanks, and piping) in all five lease tracts, water conveyance systems for livestock in all five lease tracts, and roads and trails in all five lease tracts. Ranch improvements in Section 22 of the lease area consist of development of High Spring (71115) and a solar well that distribute water to an extensive system of three lined storage pits, about 8 miles of pipeline and 29 reliable water points (with a mixture of permanent and portable stock tanks) serving approximately 5 sections of land in the Railroad Creek drainage. Identified structures in the coal lease area are shown on **Figure 3.9-1**.

The ARM defines "land use" as the specific uses or management-related activities for particular parcels of land. These parcels may have a single use. However, they may also serve other uses.

All but one of the land uses identified in the ARM presently apply to the project area. They occur singly or in combination, although commercial forest land, as defined in the ARM, has not been identified in the project area. Minimally, land within the project area is capable of supporting this use. All land uses in the project area are described below.

3.9.1 Current Uses of Land within the Project area

Land uses presently occurring within the project area have been classified into the following eight groups.

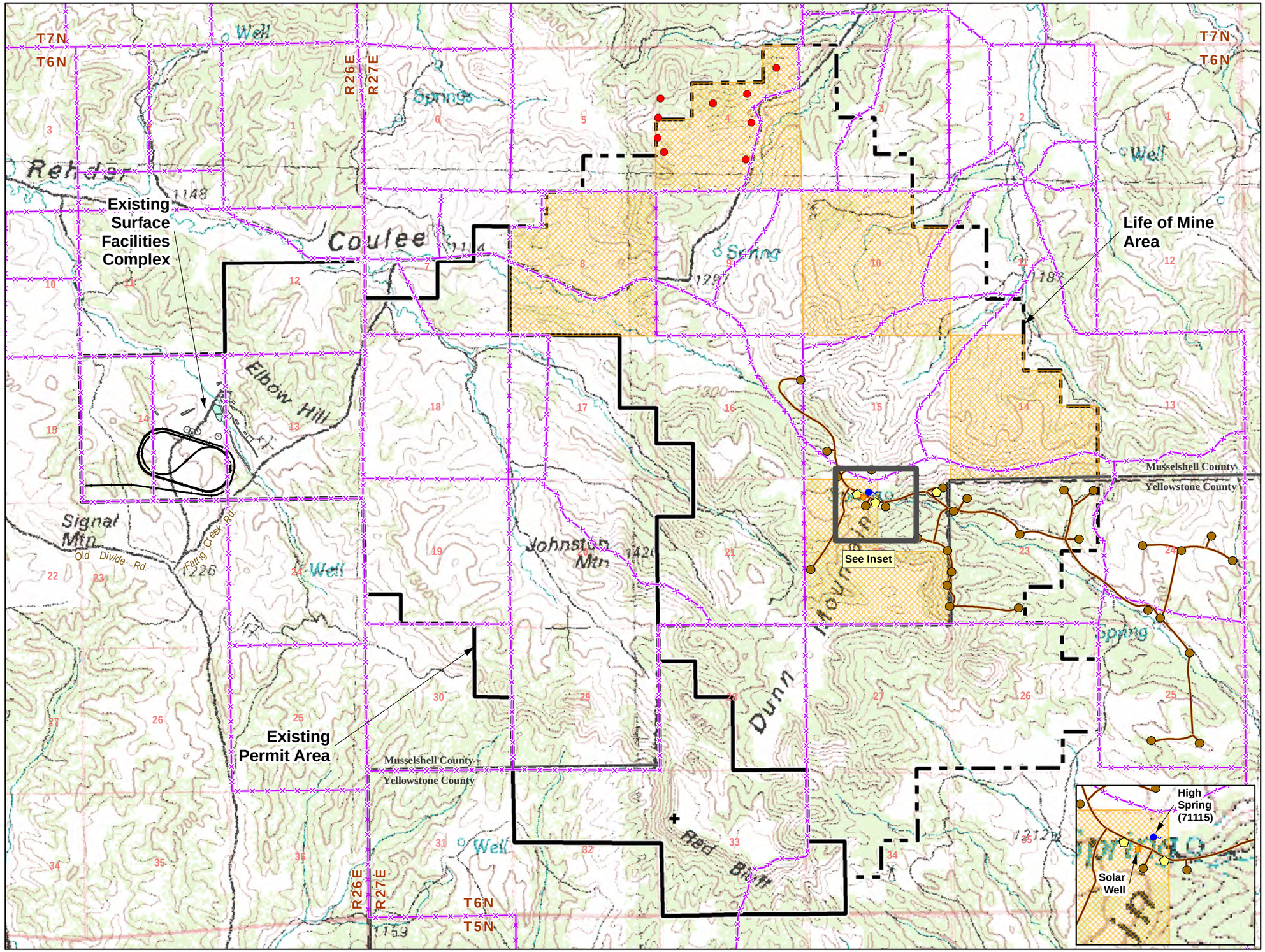
The Grazing Land, Fish and Wildlife Habitat, and Recreation Land Use Type

The grazing land, fish and wildlife habitat, and recreation land use type can be considered the most important type within the project area. Comparatively, it occupies more of the project area than all the other types combined. It also serves three land use functions.

Livestock grazing is the primary use of land classified under this type. The principal use of the federal land in sections 8 and 10 is livestock grazing. Within the project area, livestock grazing principally involves cattle. A few horses are raised by some landowners. Sheep are not present. Details concerning cattle production and grazing management are provided in the land productivity discussion below.

Although land placed in this category provides fish and wildlife habitat, none is specifically managed as fish and wildlife habitat. Wildlife species are allowed to exist throughout this type as long as they do not interfere with livestock operations. Therefore, this type functions secondarily as fish and wildlife habitat.

Like the fish and wildlife habitat use, areas identified as grazing land, fish and wildlife habitat, and recreation provide some dispersed and undeveloped human recreation. Hunting is essentially the only recreational activity occurring in areas designated with this land use type. No developed recreational facilities exist. Additionally, none of the landowners manages their property for recreation.



LEGEND

- High Spring
- Solar Well
- Storage Pit for High Spring and Solar Well
- Stock Tank off High Spring and Solar Well
- Man-Made Structures
- Communication Tower
- Pipelines
- Fences
- BLM Coal Lease Area
- Existing Permit Area
- Life of Mine Area

0 3,000 6,000 Feet

NAD 83 MONTANA STATE PLANE, US FOOT

SOURCE: USGS 1:100,000 SCALE TOPOGRAPHIC QUADRANGLE - ROUNDUP (1982), MONTANA

BULL MOUNTAIN COAL LEASING ENVIRONMENTAL ASSESSMENT

Figure 3.9-1
Man-Made Structures

ANALYSIS AREA: Musselshell & Yellowstone Counties, Montana

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The Residential, Fish and Wildlife Habitat, and Recreation Land Use Type

The residential, fish and wildlife habitat, and recreation land use type occurs only in the north-central portion of the project area. None of the acreage occupied by this type is located near the mine surface facilities. The residential, fish and wildlife habitat, and recreation acreage consists of a subdivision being developed in Section 4 of the lease area. The subdivision is north of Rehder Creek and is accessed from Fattig Creek Road.

Because the development of the subdivision is relatively dispersed, it still serves as fish and wildlife habitat. A variety of species occupy the area, including elk and mule deer. However, because the ultimate goal is to develop the properties, none of the acreage is managed for fish and wildlife.

The subdivided parcels are also presently used for recreational activities. As with the grazing land, fish and wildlife habitat, and recreation type, hunting is essentially the only recreation activity. However, as more residences are developed, hunting would likely cease to be a recreational activity.

Development of the subdivision's parcels is likely to bring forth another form of leisure-time recreation. Based on an examination of Musselshell County records, many of the new landowners are from outside of Montana. For these people, the land may serve as a summer or vacation site. These parcels would provide relaxing recreation for their owners. Thus, the subdivision would still function as private recreation.

The Special-Use Pasture, Fish and Wildlife Habitat, and Recreation Land Use Type

This land use type occurs over a relatively small portion of the project area. Special-use pasture is the primary land use. However, the acreage also functions as fish and wildlife habitat and provides for human recreation.

Within the project area, areas of special-use pasture have been tilled and seeded to improve vegetative production. This increased production is used directly and indirectly for livestock. Indirectly, portions are harvested as hay and put up for winter livestock feed. The rest is left uncut and directly grazed by cattle. Intermediate and crested wheatgrass are the primary introduced species in the special-use pastures.

This land use type also functions as the secondary uses of fish and wildlife habitat and recreation. Wildlife species, such as elk and deer, often use the special-use pastures for grazing. People also hunt on these areas, so they serve limited recreational uses.

The Industrial or Commercial Land Use Type

Within the project area, there is one general area that has been used for industrial or commercial purposes. This area has two components. One is the PM Coal Mine. The other is the Meridian test pit. The Bull Mountains Mine No.1 surface facilities have also been developed in the same general area.

The primary use of land in this land use type is for extraction of coal. However, this use of land by SPE was relatively recent. Before being opened in 1990, the Meridian test pit acreage located

south of the Fattig Creek Road would have been placed in the grazing land, fish and wildlife habitat, and recreation land use type.

The Special-Use Pasture, Fish and Wildlife Habitat, and Industrial or Commercial Land Use Type

This land use type occurs solely within the area of the PM Mine. This includes areas within the PM Mine that were tilled and seeded and are used for livestock grazing. This acreage has only experience limited direct mine-related disturbance.

As is the case with the special-use pasture, fish and wildlife habitat, and recreation land use type, this type is accessible to and used by wildlife. Therefore, fish and wildlife habitat is considered to be a secondary use.

The Grazing Land, Fish and Wildlife Habitat, Industrial or Commercial Land Use Type

This land use type occupies all areas within the PM Mine and the Meridian test pit permit boundaries not defined as either of the two land uses described above. These areas have not been disturbed by mining activities and have not been tilled or seeded to improve vegetative production.

The Cropland and Grazing Land - Land Use Type

This land use type occupies a relatively small portion of the project area. Landowners seed these fields with alfalfa or wheat. Between the season's final cutting and the following spring's seeding, the landowners allow cattle on the fields to graze the un-harvested vegetation. Thus, the fields function secondarily as grazing land.

The Developed Water Resources Land Use Type

Many of the landowners within the project area have created ponds to catch and store water. Because these ponds serve a beneficial use for livestock, they are considered developed water resources. However, these resources are relatively small and widely scattered. In addition, they collectively occupy the smallest portion of the project area.

3.9.2 Capability of the Land within the Life of Mine area to Support Other Uses before Mining

One of the primary land use types identified in the ARM was not identified as presently existing in the project area. This use is commercial forest. Although several of the landowners in the project area occasionally have the ponderosa pine on their property harvested, SPE does not believe this activity qualifies the area as commercial forest.

To qualify as commercial forest land, the land must produce or be managed to produce stands of industrial wood that would be used as such. None of the landowners manages their land to produce these stands. Consequently, none of the permit or mine plan areas qualifies as commercial forest land based on management.

The only other way land within the two areas could qualify as commercial forest land is if it produces more than 20 cubic feet of industrial wood per acre annually. Actual production is

presently unknown. However, data from similar environments in the Rocky Mountains suggest that this level of production is unlikely in the project area.

The land within the project area is generally most suitable for rangeland or, in areas of gentle slopes and adequate available moisture, non-irrigated cropland. Soil series in the project area include the Bainville, Blackhall, Cabbart, Delpoint, Havre, Rentsac, Travessilla, Yamac, and Yawdim series. The majority of the project area is characterized by Cabbart, Delpoint, and Yamac soils, with the other three series forming relatively minor components of the area.

The majority of upland within the project area, which include the Blackhall, Cabbart, Delpoint, Rentsac, Travessilla, and Yawdim, and portions of the Bainville series, possess significant limitations for most of the potential land uses. In general, steep slopes and a minimal depth to bedrock preclude most alternative land uses in much of the project area. Within most of the above soils, as steeper slopes are encountered, the capability of the land to be utilized for building development, water development, recreational development, and other uses is greatly reduced. Areas with the greatest potential for utilization for alternative land uses are the Yamac, Delpoint, or Havre (areas with low flooding potential) soils where slopes are relatively gentle and soils are deeper. However, the relatively low annual precipitation of the area is the major climatic factor limiting land use.

The most appropriate use of the majority of lands within the project area is for rangeland. Potential rangeland production in the project area varies with the soil series from approximately 800 to 1,800 pounds per acre dry weight in a normal year.

The following section describes the productivity of the project area with respect to forage, livestock, and agricultural crops. Since grazing management techniques have a considerable influence on livestock productivity, a description of grazing management and operational systems used by local ranchers is also presented.

3.9.3 Forage and Livestock Productivity

Table 3.9-1 shows the estimated Animal Unit Months (AUMs) for cattle for the various vegetation communities in the project area, respectively, based upon estimated forage production. Productivity estimates for the native vegetation communities are based on field survey data. The productivity estimate for improved pasture is based on discussions with landowners throughout the mine plan area. AUMs were calculated assuming a 50 percent utilization rate and 1,000 pounds of dry forage per animal unit. Total AUMs in the project area are approximately 3,932 and 1,794, respectively. Mean AUMs per acre for the project area for all vegetation communities combined are 0.36 and 0.43, respectively.

Landowners in the project area achieve varying levels of livestock productivity on area lands. This is due to the variability in grazing management techniques implemented by area ranchers, as well as differences in land characteristics (slope, soils, available forage and water, etc.). A total of about 2,060 to 2,120 animal units (cattle) are maintained annually by landowners operating at least partially within the project area. Lands located both within and adjacent to the project area are included in the support of these animal units.

Table 3.9-1 Forage Productivity and Animal Unit Months (AUMs) in the Project Area by Vegetation Type

Vegetation Type	Acreage	Production	AUMs/Acre	Total AUMs
Silver Sagebrush-Mixed Grassland	1,257	515.6 lbs/acre	0.26	326.8
Mixed Grassland	3,090	834.9 lbs/acre	0.42	1,297.8
Ponderosa Pine-Bluebunch Wheatgrass	2,866	424.6 lbs/acre	0.21	601.9
Burned Ponderosa Pine-Mixed Grassland	3,192	723.4	0.36	1,149.1
Wetland	9	5,421.6	2.71	24.4
Improved Pasture	266	4,000.0	2.0	532.0
Disturbed Types	174	0.0	0.0	0.0
Open Water	2	0.0	0.0	0.0
Total	**10,856**	**n/a**	**n/a**	**3,932.0**

Information from a limited number of landowners indicates that approximately 25 to 30 acres are required to support one animal unit, with supplemental feeding in winter. Average annual weight gain of calves appears to be about 575 to 625 pounds on most lands grazed from early spring to late fall. However, an average of about 665 pounds per calf is achieved on lands along the western Rehder Creek drainage. For landowners grazing native vegetation during summer and early fall only, weight gains average approximately 1.5 to 2.0 pounds per day during summer.

3.9.4 Grazing Management

Livestock grazing in the project area is primarily limited to the vegetative growing season because of the winter snow cover and cold temperatures. Grazing management in the project area generally follows a deferred rotation system. This system is the recommended long term grazing management system because deferred rotation grazing provides benefits to livestock gains, pasture improvement (both vegetation and soils), and net returns.

The savory or intensive grazing management system is also utilized in the project area by a few ranchers. As mentioned above, this system involves intensive management and grazing of the available forage. This method promotes better utilization of the forage and, when managed correctly, would benefit the range condition by the removal of the standing crop that promotes root and plant development during the non-grazing periods. The disadvantage of this system is the high level of management by the operator, increased fencing costs, and the added stress to the animals during pasture rotation.

Grazing management in the project area is influenced primarily by the weather. Snow cover and cold spring temperatures would sometimes delay utilization of the spring pastures. However, precipitation is the primary factor for determining pasture utilization. During moist years, pastures would sustain longer and heavier use. During dry years, livestock would be moved more frequently or be grazed at a lesser stocking rate.

All ranching currently being conducted in the project area is for cattle production with the cow-calf operation being the most popular. In general, calves would be born during the period of January to March in the winter pasture or winter feeding areas. From March to May, the cow-calves are transferred to the spring-summer pasture which begins the grazing season rotation. Calves would be removed from the summer-fall pastures during October or November and sold at market. General weight gains during the grazing season for a calf would be 550 to 650 pounds

for a full grazing period and 450 to 550 pounds for a shorter grazing period which may be conducted on the higher elevation areas or for cattle which are trucked in from other areas.

The areas of federal surface are managed by the BLM under the Standards for Rangeland Health and Guidelines for Livestock Grazing Management (BLM 2009b). These areas are shown on **Figure 3.9-2** and the associated acreage is shown on **Table 3.9-2**. These standards apply primarily to rangeland health and only indirectly address by-products of healthy rangeland such as higher livestock productivity and healthy wildlife. The standards must meet the Fundamentals of Rangeland Health listed at 43 CFR 4180 and conform to other applicable federal regulations and guidelines. The fundamentals of rangeland health include:

- Maintain or promote adequate amounts of vegetative ground cover;
- Maintain or promote subsurface soil conditions;
- Maintain, improve or restore riparian-wetland functions;
- Maintain or promote stream channel morphology;
- Maintain or promote appropriate kinds and amounts of soil organisms, plants and animals;
- Promote the opportunity for seedling establishment;
- Maintain, restore, enhance water quality;
- Restore, maintain or enhance T&E habitat;
- Restore, maintain, enhance T&E candidate and special status species habitat;
- Maintain or promote native populations and their communities;
- Emphasize native species in the support of ecological function; and
- Only incorporate the use non-native plant species when native species are not available or are incapable of achieving proper functioning condition.

Table 3.9-2 Grazing Allotment Acreages within the Project Area

Grazing Allotments	Acres
Within Project Area	**7,587.9**
Montana State Trust Land Surface Ownership	606.2
BLM Surface Ownership	600.0
Private Ownership	6,381.7
Within Bull Mountains Mine No. 1 Permit Area	**4,694.4**
Montana State Trust Land Surface Ownership	31.5
BLM Surface Ownership	336.1
Private Ownership	4,326.8
BLM Coal Lease Area	**2,195.4**

3.9.5 Agricultural Productivity

Cultivated croplands are relatively scarce in the project area. Primary crops include wheat, alfalfa, and hay (grass). Areas under cultivation vary from year to year, and crops are sometimes rotated. Production information has been obtained from local landowners throughout the project area.

Crop production varies with annual precipitation as well as the local moisture regime. In the relatively moist Rehder Creek bottom, annual alfalfa production range from 1.5 tons per acre (one cutting) during dry years to a maximum of about 5 tons per acre (three cuttings) in relatively wet years. Alfalfa production along the PM Road, where conditions are considerably drier, have averaged approximately 700 pounds per acre. These are the only known locations where alfalfa is grown or has recently been grown in the project area.

Wheat is also grown in the Rehder Creek drainage. Production averages approximately 45 bushels per acre. Yields over the last 30 years have ranged from a low of about 32 bushels per acre to a maximum of 74 bushels per acre.

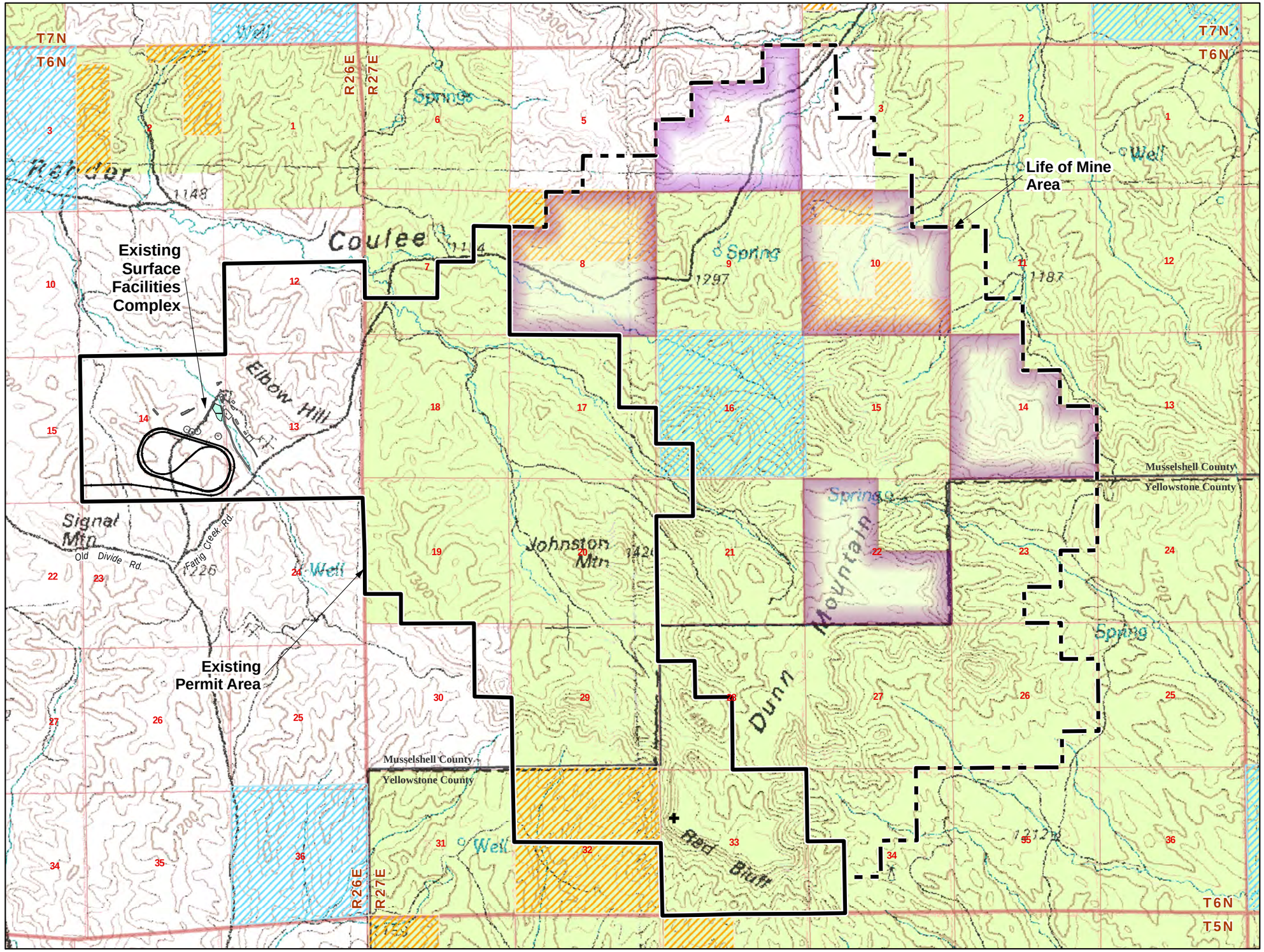
The most common crop harvested in the project area is grass hay on areas of special-use pasture. Landowners vary the management of special-use pasture from year to year. Portions are harvested as hay, while other areas are left standing and grazed or cut and then grazed. As with other crops, yields vary with available moisture. Production probably averages about 2 tons of hay per acre annually in most of the project area. A minimum yield of about 1.5 tons per acre per year generally results during dry years or on drier sites. Wetter sites such as the Rehder Creek drainage produce greater yields, with an average of about 3 tons per acre annually. A maximum known yield in the project area of about 4.5 tons per acre has been harvested in the Rehder Creek drainage during wet years.

Development of land in the project area is not occurring under the direction of a comprehensive land use plan. Musselshell County does not have land use regulations. Although land use regulations have been proposed in the past, they were rejected by voters (most recently in November 1988). Neither Yellowstone County nor Musselshell County currently has land use regulations.

3.10 Cultural Resources

3.10.1 Prehistoric and Historic Resources

Prehistoric resources are artifacts and features resulting from human activity predating written records. These are identified either as isolated artifacts or as sites. Typically, prehistoric sites in the region consist of scatters or clusters of artifacts such as stone tools and pottery sherds; features such as hearths, stone circles, or rock art; or plant and animal remains. Depending on their age, complexity, integrity, and association, sites may be important for the information that they contain and their potential to contribute to our understanding of past cultures and settlement patterns. Prehistoric site types in the Bull Mountains area include camps, log structures, limited activity loci, rock art, rock cairns, lithic quarries, and workshops. Prehistoric pottery is not common in the Bull Mountains area.



LEGEND

- Communication Tower
- Existing Permit Area
- Life of Mine Area
- Grazing Allotments
- BLM Coal Lease Area

Surface Ownership

- BLM Land
- State Trust Land

0 3,000 6,000 Feet

NAD 83 MONTANA STATE PLANE, US FOOT

SOURCE: USGS 1:100,000 SCALE TOPOGRAPHIC QUADRANGLE - ROUNDUP (1982), MONTANA

BULL MOUNTAIN COAL LEASING ENVIRONMENTAL ASSESSMENT

Figure 3.9-2
Grazing Allotments

ANALYSIS AREA: Musselshell & Yellowstone Counties, Montana

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Prepared By: JC | Reviewed By: EC

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Historic resources are artifacts, features, buildings, and structures that were created within the period of historic written records. Historic sites include buildings and structures such as dams and bridges, and historical archaeological features such as artifact scatters, building foundations, landscape modifications, and trails. Historic resources may also include known locations of historic events that may not retain physical traces of those events. Historic resources may have the ability to yield information in the same manner as prehistoric sites, but are more often considered important for their association with important historical persons or events, or as examples of distinctive architectural, engineering, or artistic styles.

Cultural resource surveys have been conducted in areas of planned surface disturbance within the project area (Rood 1990; Tetra Tech, Inc. 1991) and of 19 springs that may be affected by subsidence (Pool 1992). These surveys were predominantly outside the lease area. The 19 springs that were surveyed included three that are within or near the lease area (16135, 16145, and 16165). Prehistoric lithic scatters were found at four of the 19 springs, including one found at a spring adjacent to one of the lease area. The latter site (24ML667) is currently listed by the SHPO as unevaluated for the National Register of Historic Places (NRHP).

More recently, cultural resource surveys were conducted on the surface within the lease area that are above proposed areas to be mined and may be affected by subsidence (Ferguson 2009). Five sites and three isolated finds were recorded during this survey. Four newly recorded sites and one previously documented site were addressed in this study. Sites included one possible prehistoric campsite (previously recorded site 24ML667), a historic homestead (24ML835), a historic graffiti site (24ML836), prehistoric lithic reduction site (24ML837), and a prehistoric lithic source (24ML838). All of the isolated finds are prehistoric artifacts. Site 24ML667 is unevaluated for the NRHP because of the potential for deeply buried cultural deposits. All other sites recorded during this survey were not eligible for the NRHP.

3.10.2 Native American Religious Concerns

Native American religious concerns are sites, areas, and materials important to the ongoing culture of Native American groups for religious or heritage reasons. Sensitive resources may include some types of prehistoric resources, features and artifacts, contemporary sacred sites, traditional use areas such as traditional plant gathering areas, and sources of materials used to produce sacred objects and traditional tools. Some prehistoric or historic archaeological sites that are also Native American traditional concerns may be considered eligible for the NRHP because of their association with Native American traditions and cultural identity and may be considered Traditional Cultural Properties (TCPs). Although archaeologists may identify sites as potential TCPs, the evaluation of these sites must be done through government-to-government consultation. Sensitive places in the area may include mountain peaks or springs that are elements of cultural traditions or beliefs.

Native American groups with traditional ties and concerns in the Bull Mountains area include the Crow, Blackfeet, Gros Ventre, Sioux (or Lakota), Northern Cheyenne, Assiniboine, Shoshone, and Arapaho. Contacts for consultation were made with representatives of the Crow, Eastern Shoshone, Assiniboine, Gros Ventre, Oglala Sioux, Blackfeet, Flathead, and the Medicine Wheel Alliance (Kooistra-Manning and Deaver 1993). These studies were baseline data gathering and did not include government-to-government consultation. Several locations have been identified in the general area of the project that may contain resources sensitive to these groups. There are

three broad classes of sensitive cultural concerns that may apply to the project area: sites that may qualify as TCPs; locations with intangible spiritual attributes (ISAs); and contemporary prayer and offering locales. Sensitive site types that may qualify as TCPs may include burials, rock art, vision quest and fasting sites, large rock features, dance grounds and associated lodges, large or complex stone circle sites, sweat lodges, and historic battle sites (Kooistra-Manning and Deaver 1993). Culturally significant geological or landscape features and traditional resource gathering areas may also qualify as TCPs or be sensitive to these groups. Sites with ISAs are locations or features recognized as culturally or spiritually important by Native American groups, but cannot be defined as TCPs. These sites are protected under the American Indian Religious Freedom Act, and respectful treatment is appropriate to avoid adverse impacts to the spiritual qualities of these sites. The third class of sensitive localities includes traditional prayer and offering localities that are currently in use for ceremonial purposes. Tribal representatives also expressed concern that underground mining disturbs the quiet zone of the deep earth and disrupts or destroys elements of the spiritual environment. They were particularly concerned about disruption to springs and the spirits that dwell in these waters. The mining may also indirectly impact resources through subsidence.

Several potential TCPs were identified during consultation for the project area and railroad corridor. None of these were within the lease area. Archaeological sites at springs and the springs themselves were identified as potentially culturally sensitive, but locations in the lease area were not addressed in consultation.

3.11 Visual Resources

The project area is characterized by wooded rolling hills and low mountains, and areas of open, flat grasslands and farmlands. The highest mountain in the project area is Dunn Mountain with an elevation of about 4,750 feet south of the lease area. Within and near the lease area, flat open grasslands are restricted to the bottom of the Rehder Creek valley and portions of open mesas. In general, the project area is a mix of rural scenery that is fairly common to the region.

The project area is characterized by low mountains and sloping valleys covered in a mix of upland grasslands, ponderosa pine, and rock outcrops. The visual features in the project area itself are fairly common to the region. More distant vistas from the project area, especially from portions of Dunn Mountain, are the Snowy, Big Horn, Pryor, Beartooth, and Crazy mountains. Within the lease area, there are no identified areas of special, critical, or unique scenic significance and no National Landmarks.

Structurally, the project area occupies a shallow basin, with no outstanding features or unique surface expressions. Faults are rare, and none occur in the project area. SPE contacted the MBMG regarding any "unique geologic formations and special characteristics" in the project area. The MBMG has no knowledge of any unique or special geologic features. In addition, no such features have been observed by professional geologists while working in the project area.

The project area is about 1 mile east of U.S. Highway 87. U.S. Highway 87 is the closest major road and the most likely perspective that the project area may be seen from. The project area is not a common recreational destination. There are no public recreational areas in the project vicinity. The mine surface facilities are shielded from the highway by Signal Mountain and a

series of low ridges. Fattig Creek Road is a maintained county road that crosses through the northern portion of the lease area. This road crosses from U.S. Highway 87 by way of Old Divide Road to U.S. Highway 12 near Delphia. The road runs along Rehder Creek in Section 8, then swings north through Section 4 across the divide to Fattig Creek. Minor roads branch off Fattig Creek Road to dispersed residences in the project area. Principal views of the project area would be from Fattig Creek Road and the scattered private residences in the project area.

3.12 Noise

Noise can be characterized as unwanted or unpleasant sound. Noise, as a physical phenomenon, consists of sound pressure variations audible to the ear. Sound level is expressed in decibels (dB), a logarithmic unit borrowed from electrical engineering. The dB is a dimensionless unit related to the logarithm of the ratio of the measured level to a reference level. A derivative measure of dB, the dBA, has been developed to express sound levels in a manner that reflects how people perceive sounds. The U.S Environmental Protection Agency (EPA) has adopted a measure of the effect of noise on people called the day-night average sound level (DNL). EPA has identified a range of yearly DNL sufficient to protect public health and welfare. In this scheme, maintaining an outdoor noise level at or below 55 dBA should insure adequate protection for indoor living. Current noise levels in these areas are generated by wind and traffic on local roads, typical of rural areas.

Meridian collected readings of the noise levels at the PM Mine. Construction and heavy equipment operation noise levels ranged from about 72 to 95 dBA near the preparation facility to an ambient noise level of about 35 to 40 dBA. SPE anticipates that noise levels at the Bull Mountains Mine No. 1 facilities would be comparable. Monitoring of noise levels is not required by the current mine permit.

3.13 Transportation Facilities

The Bull Mountains Mine No. 1 mine facilities are served by U.S. Highway 87 which connects Billings, which is along Interstate 94 and Roundup, which is along U.S. Highway 12. Principal local roads include Fattig Creek Road, which connects U.S. Highway 87 by way of Old Divide Road near the mine facilities to U.S. Highway 12 to the northeast at Delphia. Mine employees travelling to work and other mine-related traffic use these roads. U.S. Highway 87 and Old Divide Road are asphalt, all-weather, two-lane highways maintained by the Montana Department of Transportation, and Fattig Creek Road is an unpaved two lane road maintained by Musselshell County. Several smaller local roads branch off of these main roads. Produced coal is currently delivered to markets by the railroad spur to Broadview. This rail spur will continue to carry traffic as long as the mine is in operation. The level of production from the mine results in three coal trains per day from the mine to Broadview and then on mainline railroads to the eastern United States and possibly to the west coast.

3.14 Hazardous and Solid Waste

The Bull Mountains Mine No. 1 is an underground longwall facility and there will be no surface activities in the coal lease area that would generate any hazardous or solid waste. Solid and liquid waste would continue to be produced at the mine facilities and, as the mine advances,

waste materials would result from activities associated with mining the leased coal. Procedures are in place for handling solid and liquid waste produced by mining activities, and these procedures would continue to be used for the lease area.

3.15 Socioeconomics

The social and economic project area includes Musselshell and Yellowstone counties. The majority of mine facilities and the coal lease area are in Musselshell County, but employees also commute to the mine from Yellowstone County. Activities on the public lands in Musselshell and Yellowstone counties have the potential to affect social and economic resources in communities near the project area. Public scoping identified effects to employment, local economy, and tax base as the primary issue related to the development of the proposed project area. Effects to social characteristics were not identified as an issue from public scoping efforts, as coal mining has historically been part of county economies. Many residents of the counties depend on resource extraction-based employment for their livelihood and lifestyle.

3.15.1 Local Economy

The local economy in this portion of rural Musselshell County and adjacent portions of Yellowstone County is dominated by mine and ranching-related employment. Closer to Billings in Yellowstone County, an increasing number of individuals are employed in the Billings area. This rural area and Roundup are significantly affected by employment levels at the mine, whether by direct employment or other mine-related businesses and services.

From 1995 to 2008, approximately $125,000,000 has been spent on the Bull Mountains Mine No. 1 project. That number includes over $30,000,000 that has been applied to the purchase of property in Musselshell County from individuals, which in turn has generated millions of dollars of tax revenue for the state and county.

3.15.2 Population

Population in Musselshell County from 1980 to 1990 dropped from 4,428 to 4,106. Most of the decrease in county population occurred in Roundup. By 2000, the population had rebounded to 4,497 and it remained roughly at that same level through 2007. In the 1980s, the population in Yellowstone County was growing, and the proportion of the population that lived in urban areas (Billings) was growing even more rapidly. From 1980 to 1990 the county population grew from 108,035 to 113,419, a 5 percent increase. In that same period, the population of the Billings area increased from 66,842 to 81,151, a 21 percent increase. Not only was the population of the county increasing, but much of the rural population was moving into urbanized areas. By 2000 the county population had increased to 129,352, and it continued to increase, reaching 141,022 in 2007. Through 2007, Yellowstone County showed a continued population growth rate of about 1.3 percent annually and continued urbanization. These trends in population roughly parallel trends in employment as discussed in the Employment Section below. In the 1980s, Musselshell County had a sharp drop in mining-related employment, reflected by less extreme drops in other sectors. In the same period, Yellowstone County also showed a drop in mining-related employment, but showed strong rises in retail trade, finance and real estate, and service sectors, predominantly in the urban areas in and around Billings.

3.15.3 Employment

The Bull Mountains Mine No. 1 surface facility complex is in the south central portion of Musselshell County. Rural Musselshell County, Roundup, and other communities in the county contribute to the labor force of the Bull Mountains Mine. The PM Surface Mine was in operation on a small scale as a surface mine from 1973 through 1993. Consequently, the mine was a minor contributor to the employment statistics over that period. In 1993, the Bull Mountains Mine No. 1 was issued a permit for underground operations. The mine was closed from 1994 through 1995, resumed operation briefly in 1996 and 1997, and closed again until resuming operation in 2003 under new ownership. Mining operations have been expanding since 2003 to full levels of production.

Based on the data presented in the Bull Mountains Mine No. 1 FEIS (MDSL 1992), employment in Musselshell County was dropping in the late 1980s and was dominated by ranching-related jobs. The overall employment figures for Musselshell County given in that FEIS show a 5 percent drop in employment from 1980 to 1989 (1,944 and 1,850). The corresponding labor force statistics (**Table 3.15-1**) show an 8 percent drop in employment over the same period, and a 3 percent drop in the labor force. In 1989, mining accounted for 6 percent of the employment in the county and farm-related employment accounted for 18 percent. Department of Labor and Industry figures for the years 2000 and 2007 (MDLI 2008) show employment in the county rebounding and dropping slightly again. Annual employment in 2000 was 1,969 with a 6.1 percent unemployment rate, and in 2007 had dropped to 1,924 with a 4.8 percent unemployment rate. Information on employment by sector indicates that employment in mining had risen to 8 percent of employment in the county, while ranching-related employment had dropped to only 3 percent. The Bull Mountains Mine No. 1 resumed operation in 2003 and contributed to the proportional increase in employment in the mining sector.

Table 3.15-1 Labor Force Statistics, Montana, Musselshell and Yellowstone Counties, 1990, 2000, and 2007

State of Montana or County/Category	1990[1]	2000[2]	2007[2]
Montana			
Labor Force	402,000	468,865	501,348
Employed Persons	379,000	446,552	485,615
Unemployed Persons	23,000	22,313	15,734
Unemployment Rate	5.7	4.8	3.1
Musselshell County			
Labor Force	1,696	2,096	2,021
Employed Persons	1,564	1,969	1,924
Unemployed Persons	132	127	97
Unemployment Rate	7.8	6.1	4.8
Yellowstone County			
Labor Force	64,473	71,487	81,464
Employed Persons	61,395	68,572	79,532
Unemployed Persons	3,078	2,915	1,932
Unemployment Rate	4.8	4.1	2.4

1 From MDSL 1992

2 From MDLI 2008

The southern portions of the project area are in Yellowstone County, and Yellowstone County contributes to the labor force of the Bull Mountains Mine No. 1. Based on the data presented in the Bull Mountains Mine No. 1 FEIS (MDSL 1992), employment in Yellowstone County was rising in the 1980s. The overall employment figures for Yellowstone County show a 14 percent increase in employment from 1980 to 1989 (60,286 to 68,964). The corresponding labor force statistics show an 11 percent increase in employment over the same period, and 11 percent increase in the labor force. In 1989, mining accounted for less than 1 percent of the employment in the county and farm-related employment accounted for approximately 2 percent. Department of Labor and Industry figures for the years 2000 and 2007 (MDLI 2008) show employment in the county continuing to rise. Annual employment in 2000 was 68,572 with a 4.1 percent unemployment rate, and in 2007 had risen to 79,532 with a 2.4 percent unemployment rate. In 2007, farming and mining related employment together accounted for less than 1 percent of the employment in the county. In 1989, employment sectors that tend to cluster in urban areas including retail trade, finance and real estate, services, and government accounted for 72 percent of the employment in Yellowstone County. The greatest growth in Yellowstone County in the 1980s was in services.

Current operations at Bull Mountains Mine No. 1 provide employment for approximately 200 workers. In 2007, mining employment was 51 in Musselshell County, and 366 in Yellowstone County, for a total of 417 workers (BLM 2009); however, this employment number does not reflect recent hires made by the mine. The mine recently expanded the operations workforce by 50 workers, of which 20 percent were estimated to have migrated into the counties from other regions. The effects to social and economic conditions in the counties from the additional 10 workers and their families would be very small. The relatively small number of in-migrating workers did not cause a discernible effect to permanent and temporary housing stock, or to community and municipal services.

The county mining employment includes oil and gas operations as well as other non-coal mining jobs. Employment in coal mining operations is not available for the counties, as disclosure of this data violates state and federal confidentiality criteria. The majority of mining employees in Yellowstone County are employed in the oil and gas industry, so it is likely that current mining employment for both counties utilizes most, if not all, of the available mining labor force in the counties; however, in the event that non-specialized mining jobs become available, workers employed in other sectors would likely shift to mining jobs that pay high wages relative to other employment sectors. The 200 workers at Bull Mountains Mine No. 1 include management and other support staff as well as workers employed for mining activities.

3.15.4 Housing

Year-round housing in Musselshell County, including the project area, increased from 1,997 to 2,183 from 1980 to 1990, an average increase of 0.9 percent annually. However, over the same period the vacancy rate rose substantially. Year-round housing units include both occupied units (households) and vacant units. Housing construction may reflect an anticipated increase in population, but does not mean that population is actually increasing. By 2007, the total number of households in the county was only 1,895, and the vacancy rate of year-round housing was still high.

In Yellowstone County, year-round housing increased from 42,689 in 1980 to 48,781 in 1990, and average increase of 1.1 percent annually. Like Musselshell County, there was an increase in vacant housing, but the increase was not nearly as great. By 2007, the total number of households in the county was 57,305. Over this period, new housing has not increased as rapidly as the population and the housing and rental markets have become increasingly active.

3.15.5 Local Government Facilities and Services

Public services, which are typically provided by local governments (cities, counties, and special service districts), include police and fire protection, emergency medical services, schools, public housing, parks and recreation facilities, water supply, sewage and solid waste disposal, libraries, and roads and other transportation facilities. There are no public housing facilities, public parks and recreational areas, or public transportation facilities in the project area. Tax revenues generally fund public services, although there may be other sources of revenue such as user or franchise fees. The tax base of the county or community is often a key factor in the level of the public services.

The federal rents and royalties would be determined following the decision to lease the coal. The estimated royalties would be 8 percent of the revenue realized from sale of the federal coal. The estimated amount and distribution of these royalties would be determined at a later date, however, a percentage is returned to state and local agencies.

Property taxes have traditionally been the most important source of funding for Musselshell County, accounting for nearly two-thirds of annual revenues. Property taxes are based on taxable valuation of the county, which has not varied greatly over the last few decades. In Yellowstone County, property taxes are only about half of all revenues.

Taxes in Musselshell County contribute to the maintenance of county roads, such as Fattig Creek Road and Old Divide Road, while U.S. Highway 87 is maintained by the Montana Department of Transportation. Prior to 1988, school funding was entirely the responsibility of the local school district and was limited by the county property taxes, but in 1988 the state legislature shifted the funding of general fund budgets from local districts to state and county equalization.

Law enforcement in the project area is provided by the Montana Highway Patrol, and the Musselshell and Yellowstone County Sheriff's departments. The Highway Patrol concentrates on traffic patrol and traffic-related incidents, primarily along U.S. Highway 87. The sheriff's departments concentrate on criminal activities in their respective counties. The Musselshell County Sheriff's Department is consolidated with Roundup city law enforcement. The joint department is understaffed and their facilities are antiquated and inadequate. The Yellowstone County Sheriff's Department is also understaffed. Currently, all rural fire departments are volunteer organizations. The Musselshell County Rural and Roundup Fire Department has been maintaining an adequate number of volunteers and firefighting equipment for existing demand. The Bull Mountains Volunteers was organized in 1988 to provide initial response fire protection in the project areas. Fire-fighting equipment is limited and the volunteers rely on county support for more serious incidents.

The Musselshell County Ambulance Service in Roundup is a volunteer organization that serves the county. The organization has maintained an adequate volunteer staff, but their equipment is

aging. There is a single 17-bed county hospital in Roundup with limited medical facilities and two larger hospitals, both 280-bed facilities, in Billings.

The project area does not currently have public water supplies or wastewater treatment. Residential solid waste collection and disposal in Musselshell County are provided by the Musselshell County Refuse District. Refuse is picked up and hauled to the Roundup transfer station and then hauled by a private contractor to the Billings landfill. Solid and liquid wastes produced at the Bull Mountains Mine No. 1 surface facilities complex are handled by the mine and private contractors. Some of the non-hazardous materials make their way to the Billings landfill, and procedures are in-place at the mine for the handling and disposal of these wastes.

3.15.6 Social Environment

The social characteristics of the project area counties are strongly tied to traditional natural resource-based industries, such as agriculture and extractive industries. Area residents recognize the importance of public lands in providing a natural resource base for economic activities, as well as supporting a particular way of life.

Local values of rural residents in the BLM Billings Resource Area (now Field Office) are described in the Billings Resource Area Final EIS (BLM 1983). Residents value the rural character of the region, specifically wide open rural landscapes, naturalness, fresh air, and solitude. Residents of the Billings area exhibit more diversity of lifestyles and interest, contributing to a wide range of values and attitudes. Residents expressed support for the leasing and development of coal, if the coal is needed and developed in a careful manner with reclamation. Some individuals expressed opposition to coal development because of possible impacts to the environment and the agrarian way of life.

3.16 Environmental Justice

Environmental justice issues are concerned with actions that unequally impact a given segment of society as a result of physical location, perception, design, noise, or other factors. EO 12898 (59 FR 7629) requires federal agencies to identify and address disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low income populations. The provisions apply fully to effects on tribal lands, treaty rights, trust responsibilities, and the health and environment of Native American communities.

Communities within Musselshell and Yellowstone counties, entities within the area, and individuals with ties to the area may all have concerns about the presence of an active coal mine in the Bull Mountains. Environmental justice issues are primarily associated with impacts on the natural and physical environment, and also with social and economic impacts. Environmental justice concerns may include Native American access to cultural and religious sites if the sites are on tribal lands or if treaty rights have granted access to specific locations. The potential issue of access to cultural and religious sites is also addressed in the Cultural Resources Section. The Bull Mountains Mine No. 1 is outside the reservations, does not include any Indian Trust Assets, and does not contain any locations specifically named in tribal treaties.

The Crow Indian Reservation is southeast of Billings in Big Horn and Yellowstone counties about 40 miles south of the coal lease area. The Northern Cheyenne Indian Reservation is east of

the Crow Indian Reservation in Big Horn and Rosebud counties. Both Big Horn and Rosebud counties have substantial Native American populations. Over 9,000 Native Americans live on the two reservations and additional individuals with varying levels of affiliation with the tribes live in surrounding areas.

The project area is located in Census Tract 1, Census Block Group 3, Musselshell County, and Census Tract 15, Census Block Group 1, Yellowstone County. In the 2000, census the populations of these block groups were predominantly white - 95.9 percent in both Musselshell County and Yellowstone County (U.S. Census Bureau 2008). Minority households were predominantly American Indian in Musselshell County (2.4 percent). Most of the non-white households in Yellowstone County are listed as more than one race or other (3.4 percent). No Asian or African American households were listed in either block group. Year 2000 income data at the census tract level shows that 12.7 percent of families in Musselshell County, Census Tract 1 and 9.4 percent of families in Yellowstone County, Census Tract 15 were below poverty level. The project area does not contain any communities or areas characterized by minority or low income populations that may be affected by mining activities.

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4.0 ENVIRONMENTAL CONSEQUENCES

This chapter discusses the potential physical, biological, cultural and socioeconomic effects 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. Under the No Action Alternative, the federal coal lease area would not be approved for leasing. Currently approved mining operations would continue until mining reaches the federal coal lease areas. The Proposed Action would recommend a leasing process and the underground mine would continue its operations in the LOM area in accordance with the approved mine plan. Access to the coal lease areas and the private and state coal reserves to the south and east of the coal lease areas would allow mining to continue for approximately seven additional years.

4.1 Effects from No Action

Under the No Action Alternative, federal coal leasing of the proposed lease area would not occur. Consequently, mining would not occur in these identified lease tracts. The existing surface facilities and underground mine plan (no surface facilities or surface disturbance are proposed for the lease area) would continue until mining reaches the westernmost federal lease area in Section 8. Under the current mine plan, without access through the federal lease tracts, mining in the private and state coal south and east of the federal lease area could not occur. Given the relative locations of the lease tracts, there is no modification to the design of the longwall mining plan that would be economically feasible to mine these private and state reserves. Under the No Action Alternative, the current Life of Mine Plan (**Figure 2.1-1**) would be reduced by approximately seven years. Two areas of potential effects are considered in this analysis, the surface overlying the federal coal lease tracts and the existing mine permit area.

4.1.1 Topography and Physiography

Under the No Action Alternative, coal leasing would not occur and there would be no mining of the coal in the federal lease area. This alternative would have no effect on topography and physiography within the proposed lease area as a result of mining and related subsidence.

The No Action Alternative would continue ongoing permitted effects of the existing mine. This would include minor lowering of topography in the subsided areas within the current permit area.

4.1.2 Geology, Mineral Resources, and Paleontology

Under the No Action Alternative, mining would not occur under the lease area, and there would be no effects on local geology, mineral resources, or paleontological resources of the lease area. Not mining the coal reserves within and south of the federal lease areas under the current mine plan would leave these reserves uneconomical to mine in the future resulting in loss of coal royalties. Early closure of the mine would leave approximately 133 million tons of coal un-mined, including 61.4 million tons of federal coal and 71.6 million tons of private and state coal.

Mining would continue in the current mine permit area until mining operations reach the federal lease area. Effects to geology and paleontology would be similar to the Proposed Action, but would be restricted to the current mine permit area.

4.1.3 Air Quality

Under the No Action Alternative, there would be no emissions produced within the federal coal lease area. Permitted emissions from the operations at the surface facilities complex would continue until mining reaches the federal coal lease area and would then end. Air quality would meet existing permit requirements and all state and federal standards.

4.1.4 Water Resources

Under the No Action Alternative, mining would not occur in the federal lease area, and there would be no subsidence-related effects to water resources in the lease area. Mining would continue in the current mine permit area until mining operations reach the federal lease area. Effects to water resources could result from subsidence over mined areas within the current mine permit area. Existing permitted conditions at the mine surface facilities would continue.

4.1.5 Soils

Under the No Action Alternative, mining would not occur in the federal lease area, and there would be no subsidence-related effects to soils in the lease area. Mining would continue in the mine permit area until mining operations reach the coal lease area. Existing surface facilities would continue to operate. There would be no expansion or substantial modification to the surface facilities that could result in additional effects to soils.

4.1.6 Vegetation

Under the No Action Alternative, mining would not occur in the federal lease area, and there would be no subsidence-related effects to vegetation or wetlands in the lease area. Mining and operation of the existing permitted mine surface facilities would continue until mining operations reach the coal lease area. There would be no expansion or substantial modification to the surface facilities that could result in additional effects to vegetation.

4.1.7 Wildlife

Under the No Action Alternative, mining would not occur in the federal lease area, and there would be no subsidence-related effects to wildlife in these lease areas. Mining would continue in the current mine permit area until mining operations reach the federal coal lease area. There could be negligible localized changes in habitat over mined areas from soil erosion from subsidence. There would be no additional changes to habitat at the surface facilities.

4.1.8 Threatened, Endangered, and Special Status Species

Under the No Action Alternative, mining would not occur in the federal lease area, and there would be no subsidence-related effects to threatened, endangered or special status species in these coal lease areas. Mining and operation of the mine surface facilities would continue in the current mine permit area until mining operations reach the federal coal lease area. During this continued operation, there would be no changes to habitat at the surface facilities and no effects to threatened, endangered or special status species.

4.1.9 Ownership and Use of Land

Under the No Action Alternative, mining would not occur in the federal lease area, and there would be no subsidence-related effects to land use in the lease area. Mining would continue in the mine permit area until mining operations reach the coal lease area. Subsidence over longwall mined areas may result in localized slope instability, rock toppling, and alteration of topography at the interface between mined and un-mined areas on or adjacent to the federal lease area. Slope instability could temporarily constrain land use in specific areas. There would be no long-term effects on ownership and use of land.

4.1.10 Cultural Resources

Under the No Action Alternative, mining would not occur in the federal lease area, and there would be no subsidence-related effects to cultural resources on federal lands.

No Native American concerns have been identified in the portion of the mine permit area that would be mined under the No Action Alternative.

4.1.11 Visual Resources

Under the No Action Alternative, mining would not occur in the federal lease area, and there would be no subsidence-related effects to visual resources in the lease area. Mining and operation of the mine surface facilities would continue in the current mine permit area until mining operations reach the federal coal lease area.

4.1.12 Noise

Under the No Action Alternative, mining would not occur in the federal lease area, and there would be no effects to noise in the lease area. Mining would continue in the mine permit area and permitted operation of the surface facilities would continue until mining operations reach the coal lease area.

4.1.13 Transportation Facilities

Under the No Action Alternative, mining would not occur in the federal lease area, and there would be no effects to transportation facilities in the lease area. Mining would continue at current rates until the private coal reserves are depleted which would reduce the mine life by approximately seven years. This would reduce train traffic of coal shipments and associated workforce vehicle traffic on U.S. Highway 87.

4.1.14 Hazardous and Solid Waste

Under the No Action Alternative, mining would not occur in the federal lease area, and there would be no direct or indirect effects of hazardous and solid wastes in the lease area. Mining would continue in the mine permit area and permitted operation of the surface facilities would continue until mining operations reach the coal lease area. Solid and liquid wastes would continue to be produced at the mine facilities until mining depletes the private coal reserves currently permitted.

4.1.15 Socioeconomics

Under the No Action Alternative, the areas of federal coal would not be leased and currently permitted mining operations would cease when private coal reserves are depleted. If this coal is not leased and subsequently mined, it would not be available for residential and industrial uses and State of Montana revenues would be reduced while the federal coal would not be mined. Furthermore, if the federal coal reserves are not leased there would be no federal rents and royalties. Based on the estimated annual production of up to 10 million tons clean coal that would occur under the Proposed Action, and the 2007 annual average open sales price of $11.79 per short ton of coal produced in Montana (Energy Information Administration 2009), selection of the No Action Alternative could result in the loss of a potential $24 million in annual tax revenues to the state. Consequently, revenue from rents, royalties, and severance and proceeds taxes would not be available to the federal, state, and local government programs and services. In addition, there would be the loss of operating expenditures for supplies and equipment to businesses in the counties. The No Action Alternative would generally have no effect on existing public utilities and services.

The Bull Mountains Mine No. 1 contributes to local employment and the general economy. In 2007, for Musselshell County as a whole, mining-related employment accounted for more than 8 percent of total employment. Once mining operations for the current permitted activities are completed, the current 200 employees would lose employment at the mine, which would increase unemployment levels, and reduce the circulation of payroll dollars through the local economies. There would be losses in revenues from taxes paid by SPE and its employees, and by secondary businesses and their employees, resulting in a decrease in the revenues of the affected counties. Musselshell County government tax-based revenues from mining operations would be negatively affected if the Bull Mountains Mine No. 1 is not producing once current mining activities are depleted. Subsequently, Musselshell County's ability to fund certain utilities and services could be jeopardized. The losses to Yellowstone County would occur primarily from a reduction in taxes paid by SPE employees and the loss of secondary business revenues; however, these losses would be small relative to the size of the Yellowstone County economy. In addition, increased unemployment may increase the use of state unemployment programs and increase the use of county and state social programs.

The projected loss of employment could lead to negative effects on overall stability of communities in the affected counties. Although many current SPE employees could be hired at other mining projects in the region, including ongoing gas development, a substantial number would become unemployed and might leave the area to seek other employment, resulting in a slight reduction in the overall county population. Fluctuations in employment would not provide for a stable community environment.

The federal rents and royalties would be determined following the decision to lease the coal. The estimated royalties would be 8 percent of the revenue realized from sale of the federal coal. The estimated amount and distribution of these royalties would be determined at a later date. The federal royalties would also contribute to the county and community revenue.

The total coal tax burden for coal production in Montana is approximately 14 percent of gross revenues, or approximately 20.2 percent of the contract sales price (Montana Department of Revenue 2009). Based on the estimated annual production of up to 3,419,000 tons clean coal

and the 2007 annual average open sales price of $11.79 per short ton of coal produced in Montana (Energy Information Administration 2009), the proposed project could contribute a potential $24 million in annual tax revenues to the state. The actual annual taxes that would be paid would vary according to several factors, including the actual annual production and the open sales price per ton of coal.

4.1.16 Environmental Justice

Under the No Action Alternative, mining would not occur in the federal lease area, and there would be no effects to environmental justice in the lease area.

4.2 Effects from Proposed Action

The Proposed Action includes five lease tracts totaling 2,679.76 acres as described in **Chapter 2**. The Proposed Action would entail leasing the federal coal within the lease area and underground mining of the Mammoth coal seam. The federal coal is included in portions of ten longwall panels that would be mined in the LOM area over a seven year period that also includes the private and state coal reserves south and east of the lease area. These private and state coal reserves would be uneconomical to mine under the current mine plan without accessing the federal coal reserves. The current layout of the Life of Mine Plan has been established within the existing geologic environment to reduce overall environmental impact, protect environmental resources where possible, and promote mine ventilation and safety for mine workers. No longwall mining would occur in areas of less than 200 feet of overburden cover to protect surface resources from potential subsidence damage. The Proposed Action would also include the continued operation of the existing permitted surface facilities during the mining operations. There are no plans for surface facilities or other mine features in the lease area and there would be no direct effects to the surface. Indirect effects would include or result from subsidence over the mined areas. Other than the indirect effects of subsidence in the coal lease area, the primary effects of coal leasing would be to continue mining operations for an additional seven years while the LOM area is mined.

4.2.1 Topography and Physiography

Under the Proposed Action, there would be no surface facilities in the federal coal lease area. Mining would continue under the current mine plan and permit until operations reach the federal lease area. Indirect effects on topography would include subsidence over the mined areas. In general, subsidence would be uniform over broad areas. Effects of subsidence could occur on steep slopes and along rock outcrops where localized slope failure and rock toppling may occur.

Subsidence over the mined panels would alter the overburden and affect the stability of sandstone outcrops and steeper slopes. The effects of subsidence in the overburden from the proposed longwall mining can be grouped into three zones: the fragmented zone, the fractured zone, and the deformation zone (**Figure 2.1-3**). The fragmented zone is a zone of bedrock which would fracture and collapse. This is expected to occur immediately above the active mining area and extend up to 140 feet into the overburden. The fractured zone is a zone of fracturing and deformation of the bedrock that would begin immediately above the fragmented zone and is expected to extend 400 to 600 feet above the fragmented zone. The deformation zone extends from the fractured zone upward to the surface. The deformation zone would deform without fracturing.

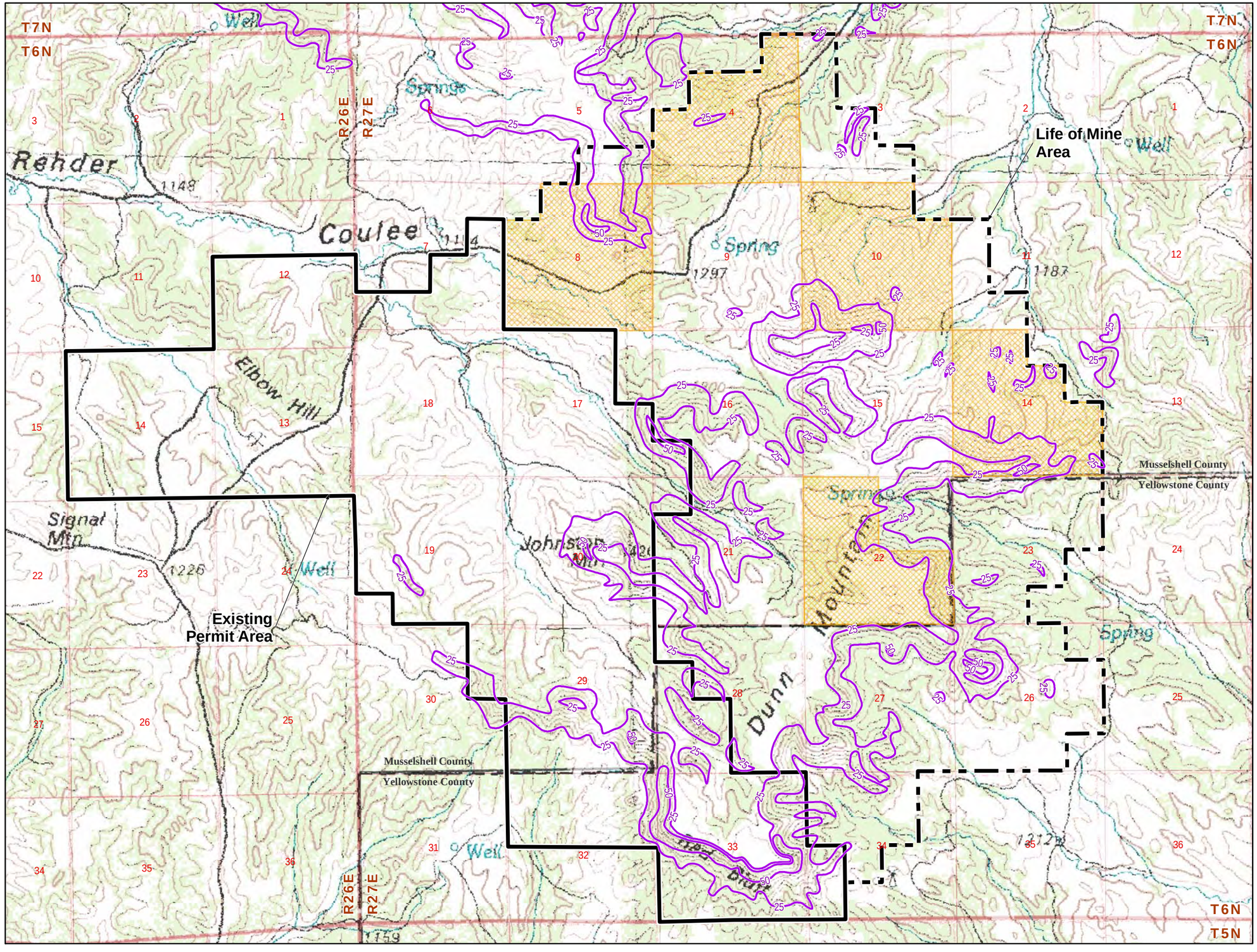
The surface effects of subsidence depend on characteristics of the overburden as well as depth of mining below the surface, height of the coal seam removed, mine layout, and mine direction. It is expected that in areas where the seam height is 8.5 feet, predicted subsidence would be a maximum of 5.95 feet and where the seam height is 13 feet, maximum subsidence would be 9.1 feet. The trough of subsidence would be deepest in the center of the panels, graduating to little or no subsidence at the boundary of coal removal. Along a particular subsidence trough, slope failure and toppling of sandstone rocks that outcrop may occur. Slope instability and failure, rock toppling, and alteration to topography and drainage patterns are most likely to occur where steep slopes, weathered materials, and unstable structural conditions exist. **Figure 4.1-1** shows the areas of steep slopes in the lease area where these effects would be likely to occur. The figure depicts contours of areas where slopes are 25 percent and 50 percent grade. These are areas of continuous steep slopes such as cliffs and bluff edges. Localized rugged terrain and small bedrock outcrops may not show up at this scale. The overall effects from mining-related subsidence would be minor over the short term (one to six months after mining) and negligible over the long term. However, there may be local variations in the effects. In most cases, subsidence-related failures would be an acceleration of the slower natural processes of weathering, erosion, sloughing and toppling.

A monitoring program was implemented at the Bull Mountains Mine No.1 to collect subsidence data. The data is used to verify the accuracy of the predicted subsidence under actual ground conditions and to detect mining-induced effects to surface resources both predicted and unpredicted. In addition, site specific angle of draw, subsidence factor, and tensile strains may be calculated. These results are used to refine the predictive model, which then can be used to estimate the effects of mining in successive longwall panels during the remainder of the mine life.

During mining, waste from coal processing would continue to be deposited in the WDA. This would fill the upper reaches (head-of-hollow) of an ephemeral drainage of Rehder Creek. The resulting topography in this local area would be smoother than the existing topography. The overall nature of the topography and physiography of the area would not change.

4.2.1.1 Mitigation Measures

Effects to topography and physiography include ground disturbance from facility construction and operation, coal and soil stockpiles, the WDA, and subsidence over mined areas. All proposed and anticipated ground disturbance from facility construction and operation, management of coal and soil stockpiles, and management of the WDA has been permitted. The potential effects of waste management at the WDA are discussed below under Hazardous and Solid Waste. Potential ground disturbance from subsidence over mined areas is anticipated, but the exact nature and extent of the disturbance is unknown. The surface over the longwall panel is being monitored as the mine progresses. The information from this monitoring is being used to identify actual subsidence effects and to refine the subsidence model for the real-world conditions of the mine area. The effects of subsidence to topography and physiography may also be associated with effects to other resources such as water, wetlands, soils, vegetation, ownership and use of land, and cultural resources. The mine permit includes a subsidence monitoring plan (SPE 2009 Volume 11 Appendix 901-2) as described below.



LEGEND

- 25 — Slopes, in Percent Contour Interval 25% Dashed Where Inferred
- Existing Permit Area
- Life of Mine Area
- BLM Coal Lease Area

0 3,000 6,000 Feet

NAD 83 MONTANA STATE PLANE, US FOOT

SOURCE: USGS 1:100,000 SCALE TOPOGRAPHIC QUADRANGLE - ROUNDUP (1982), MONTANA

BULL MOUNTAIN COAL LEASING ENVIRONMENTAL ASSESSMENT

Figure 4.1-1
Steep Slopes

ANALYSIS AREA: Musselshell & Yellowstone Counties, Montana

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Prepared By: JC | Reviewed By: EC

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The subsidence monitoring layout would be arranged in terms of 1000-foot monument spacing along the longitudinal axis of the longwall panels. The monument installations for traverse measurement of the longwall subsidence would be located at the beginning of the panel. This would produce subsidence parameters from the start of longwall operations. Monument spacing would be 50 feet at locations within 250 feet on either side of the panel edge. A second subsidence monitoring traverse would be included at a location with deeper cover and steep slopes. The second traverse monument spacing would be increased to 100 feet since these measurements would be a duplication of the first monument survey traverse. Survey control would be located well outside the area of projected subsidence and these controls would be tied to a known control point (USGS benchmark, section corner, etc.) at the northwest end of the panels and at the southeast end of the panels.

Subsidence in longwall panels is surveyed and results submitted to MDEQ. Pending sufficient subsidence parameters to predict subsidence of subsequent longwall mining, no further monitoring would be required, except for special features or as required by MDEQ. Special features include structures, roads, springs, private wells, drainages and steep slopes, as identified by pre-mine surveys.

Subsidence monitoring would be tied to longwall mining operations. A baseline survey would be conducted three months prior to longwall mining of each panel. This survey would include all monuments and the initial longwall face position. Upon commencement of longwall mining, subsidence survey measurements would be made according to longwall mining advancement. Survey measurements would be made every 1000 feet of longwall advance or once a month, whichever interval is shorter. Full subsidence is expected to be delayed, therefore, monitoring of panels would continue until full subsidence is determined (this may be carried out for as long as 24 months after the mining). Each subsidence survey would include the location of the longwall face and would be tied to known control points.

4.2.2 Geology, Mineral Resources, and Paleontology

The Proposed Action would result in removal of all of the mineable portions of the Mammoth coal seam from the federal lease area by underground longwall mining techniques. SPE anticipates mining about 12 million tons of raw coal per year with operations of four crews working seven days per week.

Indirect effects to the geology, mineral resources, or paleontological resources of the leased area would include subsidence over the mined areas. In general, subsidence would be uniform over broad areas. Strata would subside as a block and retain their internal structure. Except for the removal of the coal bed, the overall nature of the geology, mineral resources, and paleontological resources of the area would not change.

Surface activities and mining operations are unlikely to disrupt important vertebrate or invertebrate fossils, except in the coal seam that would be removed by longwall mining. Collapse features associated with underground mining have the potential to disrupt stratigraphic continuity and data associated with paleontological resources at the surface. However, the low potential for disturbance of resources in conjunction with the limited surface-disrupting activities would minimize the potential impact to paleontological resources that might be in the area of the federal coal.

4.2.2.1 Mitigation Measures

SPE would implement a monitoring program at the Bull Mountains Mine No. 1 to collect subsidence data (see Topography and Physiography). Strata and mineral resources would subside as a unit, and the integrity of geology, mineral resource, and paleontology would not be affected. There may be localized areas of cracking, sloughing of some steep slopes and rock toppling. Indirect damage from slope failure and rock toppling would be repaired by stabilizing areas of failure. This would be conducted on a case by case basis as mechanical treatment of strata may be more damaging than non-treatment.

4.2.3 Air Quality

Under the Proposed Action, potential effects to air quality would continue at the surface facilities, but would not occur in the federal lease area. Acquisition of the federal coal lease would enable mining operations to continue through these portions of the Mammoth coal seam. The observed negligible effects associated with permitted sources would continue for an additional seven years. These effects are expected to be local and would not contribute to the Billings and Laurel nonattainment areas. No changes in mining methods are proposed. Operations at the surface facility complex would be ongoing during the mining operations. The surface facilities complex is currently operating under a valid Montana Air Quality Permit (MAQP No. 3179-04). 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.

Other pollutants at the surface facility complex would include exhaust from trucks, maintenance equipment, other motor vehicles, trains, and ventilation emissions from the mine and coal preparation facility. Pollutants from these sources would include carbon monoxide (CO), nitrogen oxides (NO_x), sulfur dioxide (SO_2), particulates, and trace amounts of methane from mine ventilation. These emissions would be within existing levels as allowed under the MAQP and would continue as coal is mined in the LOM area. The 2009 BACT (MAQP #3179-01) concluded that the emissions of the surface facilities would be negligible and that proper operation and maintenance of onsite sources would be adequate to achieve appropriate standards. Some of these pollutants, including methane and nitrous oxides are GHGs that may contribute to climate change. The combined emissions of GHGs from vehicles, equipment, mine ventilation, and coal preparation expressed as CO_2-equivalent would be approximately 2,100 tons (1,905 metric tons) annually. This is well below direct emissions of 25,000 metric tons or more of CO_2-equivalent GHG emissions annually that the CEQ (2010) suggests as a reference point that may be meaningful for quantitative and qualitative assessment of GHG emissions.

4.2.3.1 Mitigation Measures

All mitigation measures included in the existing air quality permit (**Table 3.3-1**) will apply to ongoing operations of the mine. In general, fugitive emissions of particulates from open sources are controlled by preventive or mitigating measures and techniques. Sources of fugitive particulates can be classified in the following four activity classes: wind erosion; coal handling and transfer; reject and waste material handling, transfer, and disposal; and travel on unpaved roads.

Wind erosion affects both storage piles and outdoor material handling and disposal activities. Preventive techniques reduce emissions by reducing the extent of the source, by modifying the process, or by adjusting work practices. Reduction of emissions of fugitive dust or particulate matter from wind erosion and material handling can be accomplished by enclosure, chemical stabilization, or material wetting.

Material handling is broken down into two categories: coal product and reject of waste materials. Coal handling activities include drops to and from conveyors and stockpiles, movement of piles by bulldozer or front-end loader, and movement of material for transport by truck, conveyor or rail. Reject or waste material handling activities include conveyor transfer, bin loading, truck loading and unloading, and material spreading. SPE will minimize the fall distance associated with all material handling activities to the extent feasible. SPE has also developed, implemented, and will maintain good housekeeping practices to keep coal and waste material transfer locations clean.

For particulates generated during coal handling operations onto stockpiles, MDEQ determined that the use of fixed stackers with an underground reclaim system constitutes BACT. In addition, MDEQ determined that the use of enclosures for surface conveyors and incorporating flexible chutes and enclosures at all transfer points for the transport of coal and reject of waste material would constitute BACT. Further, based on similar source determinations, MDEQ determined that the use of fabric filter baghouse pickup points at all surface conveyor material transfer points would constitute BACT. Further, SPE will utilize water or chemical dust suppressant for the purpose of controlling emissions from the movement of materials by bulldozers or front-end loaders. SPE will use watering or chemical dust suppressants, contouring techniques, and soil covering and re-vegetation for controlling particulate emissions from WDA operations.

SPE will take reasonable precautions to limit the fugitive emissions of airborne particulate matter on haul roads, access roads, parking areas, and general plant property. SPE will clean up all spilled material from roadways to further limit potential fugitive emissions. MDEQ determined that the use of water spray or chemical dust suppressant to maintain compliance with the opacity and reasonable precaution limitations would constitute BACT for these sources.

In summary, MDEQ (2009) determined that good housekeeping practices, minimization of fall distance for material transfer operations, the application of moisture throughout the mining process, using stackers with a reclaim system, enclosures for all surface conveyors and conveyor transfer points incorporating fabric filter baghouses or pick-up points, and water spray or chemical dust suppressant to maintain compliance with permitted opacity requirements and reasonable precaution limitations constitutes BACT for these sources.

4.2.3.2 Climate Change

If the federal coal is leased and mined, minor amounts of GHGs would be released to the atmosphere for an additional 7 years. GHG emissions are a concern due to the greenhouse effect. The greenhouse effect is defined as how certain gases in the atmosphere impede the radiation of heat from the earth back into space, trapping heat like the glass in a greenhouse. These gases include carbon dioxide, methane, water vapor, ozone, and nitrous oxide. 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.

As presented in the GHG Emissions section of Chapter 3, the Bull Mountains Mine No. 1 generated approximately 100 tons of CO_2 from gasoline consumption and 2000 tons CO_2 from diesel fuel consumption in 2008. Current measurements of methane from the mine are at or below detection limits; however, minor amounts of methane may be emitted as the mine progresses.

Although the mine emissions are quantifiable, it is not possible to accurately assess the effects of a given amount of CO_2 emissions, resulting from one activity, on global warming and climate change (CEQ 2010). Given the estimated CO_2 emissions from anthropogenic sources in the United States in 2007, 7,282.4 million metric tons CO_2 equivalent (EPA 2008), it is reasonable to assume that the impact of CO_2-equivalent emissions from annual operation of the Bull Mountains Mine No. 1 on global warming would be negligible.

Black carbon would also be emitted from sources at the mine during the mining of the federal coal. As explained in Chapter 3, it would be possible to control some black carbon at the mine from diesel sources. However, given that the US emits 6.1 percent of the globally-emitted black carbon, it is reasonable to assume that the contribution of black carbon from the continuation of sources related to mining of the federal coal would have a negligible impact on local or regional air quality.

The use of the coal after it is mined is also not determined or analyzed at the time of leasing. However, almost all of the coal that would be mined at the Bull Mountains Mine No. 1 would most likely be used by coal-fired power plants to generate electricity. In recognition of this most likely use, a discussion of emissions and by-products that are generated by transporting and burning coal to produce electricity is included in this assessment. However, these emissions would be the same whether or not the coal burned is from this mine. Additional discussion of the current status of global climate change considerations is included in the Cumulative Impacts section of this chapter.

As discussed in **Chapter 2**, under the No Action Alternative, the completion of the currently approved mine plan would mine the remaining portions of the estimated 34 million tons of recoverable coal reserves in approximately three years at an average annual production rate of up to 12 million tons. Under the Proposed Action, SPE estimates that the life of the mine would be extended by about 7 additional years at an average annual coal production rate of up to 12 million tons.

The mining, processing, and shipping of coal from the Bull Mountains Mine No. 1 would contribute directly to GHG emissions through carbon fuels used in mining and processing including fuel consumed by heavy equipment and stationary machinery, electricity used on site, methane released from mined coal, and rail transport of the coal.

4.2.4 Water Resources

4.2.4.1 Groundwater

Subsidence associated with the proposed underground mining activities is anticipated. A consequence of the subsidence may produce changes to the hydrologic system including:

- Changes in groundwater quality and quantity due to subsidence, mine dewatering, and geochemical processes, and
- Changes in surface water quality and quantity.

To assess potential changes to the overburden, coal, and underburden hydrogeologic units resulting from the proposed mine, factors that were considered include:

- The effects of mining and subsidence on aquifer characteristics, groundwater flow, recharge capacity, springs and the alluvium;
- The cones of depression in the overburden, coal, and underburden caused by groundwater flow into the mine and mine dewatering, and potential changes to groundwater quality caused by chemical processes.

4.2.4.1.1 Hydrologic Model Analysis

The hydrologic impacts were analyzed using a computer code called MODFLOW-SURFACT, a commercially available, industry standard software package capable of modeling complex hydrologic conditions such as those in the project area (Hydrogeologic, Inc. 1996). The program has been subjected to numerous verification and testing exercises and found to perform adequately (EPA 1999).

The procedure for analyzing the hydrologic impacts using groundwater modeling software such as MODFLOW starts with developing the Conceptual Site Model (CSM). The CSM represents the hydrologic and geologic conditions of the project area. The numerical model is constructed to simulate the CSM and then calibrated against observed site conditions. With the CSM and numerical model completed, scenarios representing mining conditions can be modeled, and resulting impacts to groundwater can be determined. Development of this model is only a tool to help us assess what actual impacts could be. The resulting values are not absolute and actual effects may vary from those predicted.

4.2.4.1.2 Developing the Conceptual Site Model Mine Inflow

The project area physiographic setting consists of a circular mesa approximately 10 miles in diameter. The surface terrain is highly variable, ranging from 3,800 to 4,700 feet above mean sea level (amsl). The various strata outcrop along the surface and steep sides of the mesas. Several alternating intervals of sandstone and coal overlie the Mammoth coal, however, for the sake of modeling the Mammoth coal seam, the overlying intervals behave in a homogenous fashion and transmit water at a given rate (regardless of which layer is controlling, the rate to the seam is the same). Therefore, the individual units comprising the overlying material were not considered for this analysis, but have been grouped, and modeled as a single overburden unit.

Three lithologic units have been defined as the upper underburden, Mammoth coal, and overburden. **Table 4.2.4-1** summarizes the hydrogeologic properties of these units. Observed water levels from well monitoring data were used to calibrate the model.

Table 4.2.4-1 Project Area Hydrogeologic Unit Properties

Aquifer parameters	Symbol/Unit	Upper Underburden	Mammoth Coal	Overburden
Conditions		Confined	Semi-confined	Unconfined
Hydraulic Conductivity	K (ft/day)	0.013[1]	0.16[2]	0.018[3]
Saturated Thickness	b (ft)	30[4]	10[5]	Varies[6]
Storage Coefficient	S (unitless)	0.02[7]	0.0004[7]	0.0005[7]

Data Sources from Permit Document (SPE 2009):

1 Table 304(5)-5-4 Aquifer Test Results – Underburden, geometric mean.
2 Table 304(5)-5-3 Aquifer Test Results – Mammoth Coal, geometric mean.
3 Table 304(5)-5-2 Aquifer Test Results – Overburden, geometric mean.
4 Based on upper underburden defined herein.
5 Average thickness of Mammoth coal within study area MAP 322-1.
6 MAP 304(6)-7 – Overburden Potentiometric Surface.
7 Table 304(5)-5-5, arithmetic mean.

In addition to the above parameters, the CSM and numerical model also incorporate:

- The geometry of the Mammoth coal,
- The geometry of the overburden,
- The potentiometric surface of the Mammoth coal
- The potentiometric surface of the overburden, and
- The potentiometric surface of the upper underburden.

The overburden is defined as representing all the zones of material above the Mammoth coal varying from 0 to 800 feet thick within the project area. It is composed of interbedded sandstones, siltstones, shale, claystones, and coals. Although its material composition is variable, for this analysis it is simplified and expressed as an unconfined saturated unit with the properties listed in **Table 4.2.4.1**. Vectorized USGS 7.5-minute quadrangles based on 10-foot contour intervals were input into the model to represent the geometry of the overburden.

The Mammoth coal is defined as the zone of material varying from 8 to 11 feet thick within the project area. It is composed completely of coal exhibiting the hydrogeologic properties identified in **Table 4.2.4-1**. For this analysis, it is expressed as a semi-confined aquifer. Boundary conditions were established where the Mammoth coal outcrops. Although the Mammoth coal does vary in thickness throughout the project area, for this analysis, it was assumed to have a uniform thickness of 10 feet.

The upper underburden is herein defined as the zone extending 30 feet below the base of the Mammoth coal. It is composed of interbedded shale, siltstones, and sandstones. The potentiometric surface for this zone is, on average, 60 feet above the base of the Mammoth coal. The permeability of this zone is extremely low, with a geometric mean hydraulic conductivity of

0.013 feet per day. Beneath the upper underburden, a fourth layer called the lower underburden has been included to represent the base of the mesa and enables groundwater to drain out of the system. The hydraulic properties of the lower underburden are similar to those of the overburden.

In order to develop the numerical model, the following assumptions to the CSM and hydrogeologic parameters were utilized:

- Where a unit would outcrop, a no-flow boundary and a drain would be set to the surface elevation and this would define the groundwater elevation;
- A general head boundary was used to fix the groundwater elevation on the east side of the model where the Mammoth coal outcrops;
- An additional drain was placed along the west side of the model domain within the lower underburden to represent seepage from the mesa to the wash;
- The amount of recharge infiltrating through the overburden was determined by lowering the effective rainfall until the water table in the Mammoth coal matched that which was observed;
- The remaining rainfall is assumed to represent aquifer recharge in the overlying units; and
- A steady-state simulation was used to calibrate the model to groundwater contours. Various parameters included the elevation and conductance of the drains and the effective recharge as described above.

Mine Inflow

The Mammoth coal seam is the targeted zone for mining operations. Under pre-mining conditions, it is one of many pancaked saturated zones that form the Bull Mountains groundwater system. As the coal is removed and underground cavities open up, water seeps into the mine from the roof, floor, and walls. The amount of water seepage increases dramatically as subsidence occurs and the hydrologic conductivity between the mine workings and adjacent saturated zones increases. This infiltration, and subsequent dewatering of the surrounding area, was modeled under transient conditions using MODFLOW-SURFACT. The dewatering was simulated by installing a drain at the bottom of the 10-foot-thick coal layer. To simulate the rubblized nature of the workings, the rubble was assumed to have a high hydrologic conductivity (K=1,000 ft/day) and porosity (75%). The most sensitive parameter in calibrating the drain functionality is the transmittance of the drain. A value of 50 times the horizontal transmissivity for this interval was assumed. Mine inflow was determined by calculating the amount of water that would have to be removed to keep the mine workings dry.

Aquifer Drawdown

Water removed from or allowed to pool in the mine workings originates from adjacent saturated zones. As a result, adjacent aquifers would exhibit reduced volumes of water. This effect is called aquifer dewatering or drawdown. The drawdown is calculated by subtracting the simulated groundwater elevation from the calculated elevation during the calibration phase. The extent of the 1-foot drawdown after 5 and 25 years of mine pooling was then plotted with respect

to mine layout. The extent of the drawdown is a balance between the rate of groundwater inflow and the rate of its removal by the mine dewatering system. In this case, the inflow rate is extremely low due to the low hydraulic conductivity of the overburden and Mammoth coal material (0.018 and 0.147 ft/day respectively), resulting in an exceedingly sharp hydraulic boundary.

Mine Pooling

The subsided areas of fragmented roof will function as a highly connected reservoir. The mine pool reservoir will have a high storage, and its transmissivity and yield will increase as the reservoir fills. The mine pool reservoir will be filled by temporary drainage of roof sandstone aquifers above recently subsided longwall panels, by lateral inflow from the coal and overburden, by vertical flow from below, and by vertical recharge from above, which continuously re-saturates the partially-drained roof. As the mine pool rises, lateral inflow and vertical flow from below diminish and eventually become a net outflow. A steady state is reached when the inflow from vertical recharge is approximately the same as the net lateral and vertical outflow from the mine pool reservoir.

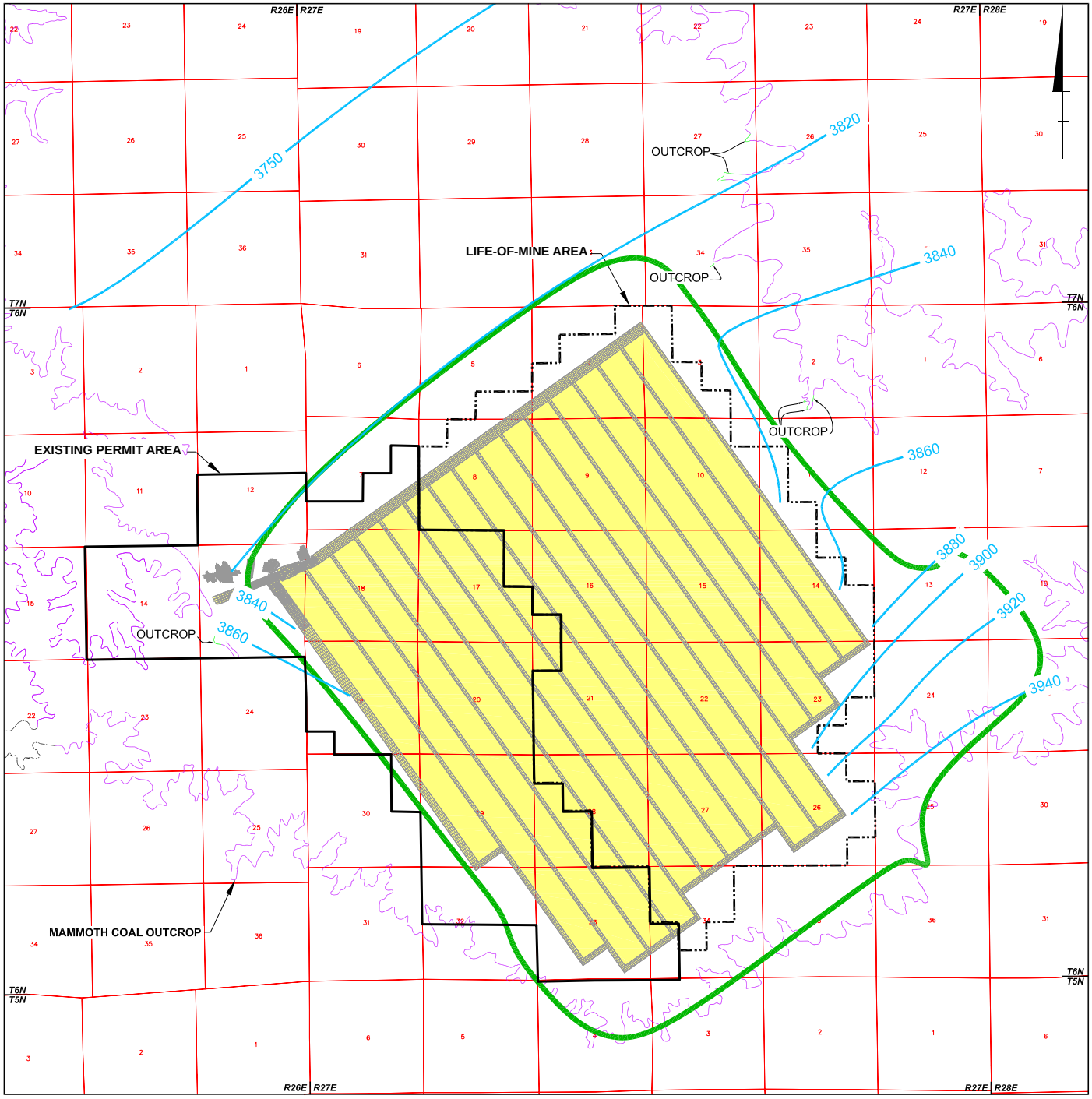
The rate and extent of the mine pool filling depends on four major factors:

1. The rate of vertical recharge (inflow) into the mine,
2. The extent of prior drainage of the fragmented roof zone,
3. The rate of seepage into and out of the mine by lateral flow through the peripheral un-mined coal and overburden, and
4. The rate of seepage into and out of the mine by vertical flow through the floor of the mine.

Model Results

The short-term hydrologic effects on the Mammoth coal aquifer are shown in **Figure 4.2-1**, which indicates the aquifer condition after mining and dewatering of the entire mine area. It represents the conditions immediately following cessation of mining while dewatering continues. The affected environment is defined as the 1-foot drawdown contour (**Figure 4.2-1**), and is interpreted to extend only about 0.5 to 0.75 miles downgradient, but extending to the intersection of the coal seam with the surface in the cross and upgradient direction.

The long-term effects are shown on **Figure 4.2-2** for aquifer drawdown 5 years after dewatering ceases and **Figure 4.2-3** for aquifer drawdown 25 years after dewatering ceases. Equilibrium in the groundwater system of the project area would not be reached within 25 years after mining operations have ceased due to the low rate of effective recharge (~9,000 ft^3/day) compared with the total amount of water being transferred from storage to replace that removed during the mine operating period (2,400,000 ft^3) at the end of the 25-year period. Should subsidence occur, the porosity of the rubble would decrease, therefore decreasing the recovery period. However, the calculations performed here do not account for any subsidence.



LEGEND

- EXISTING PERMIT BOUNDARY
- LIFE-OF-MINE BOUNDARY
- MAMMOTH COAL OUTCROP
- PROJECTED OUTCROP
- OUTCROP
- MINE AREA
- 3900 — APPROXIMATE ELEVATION OF THE POTENTIOMETRIC SURFACE IN THE MAMMOTH COAL
- 1-FOOT DRAWDOWN CONTOUR (AREA OF INFLUENCE)

0 3,500 7,000 Feet

NAD 83 MONTANA STATE PLANE, METER

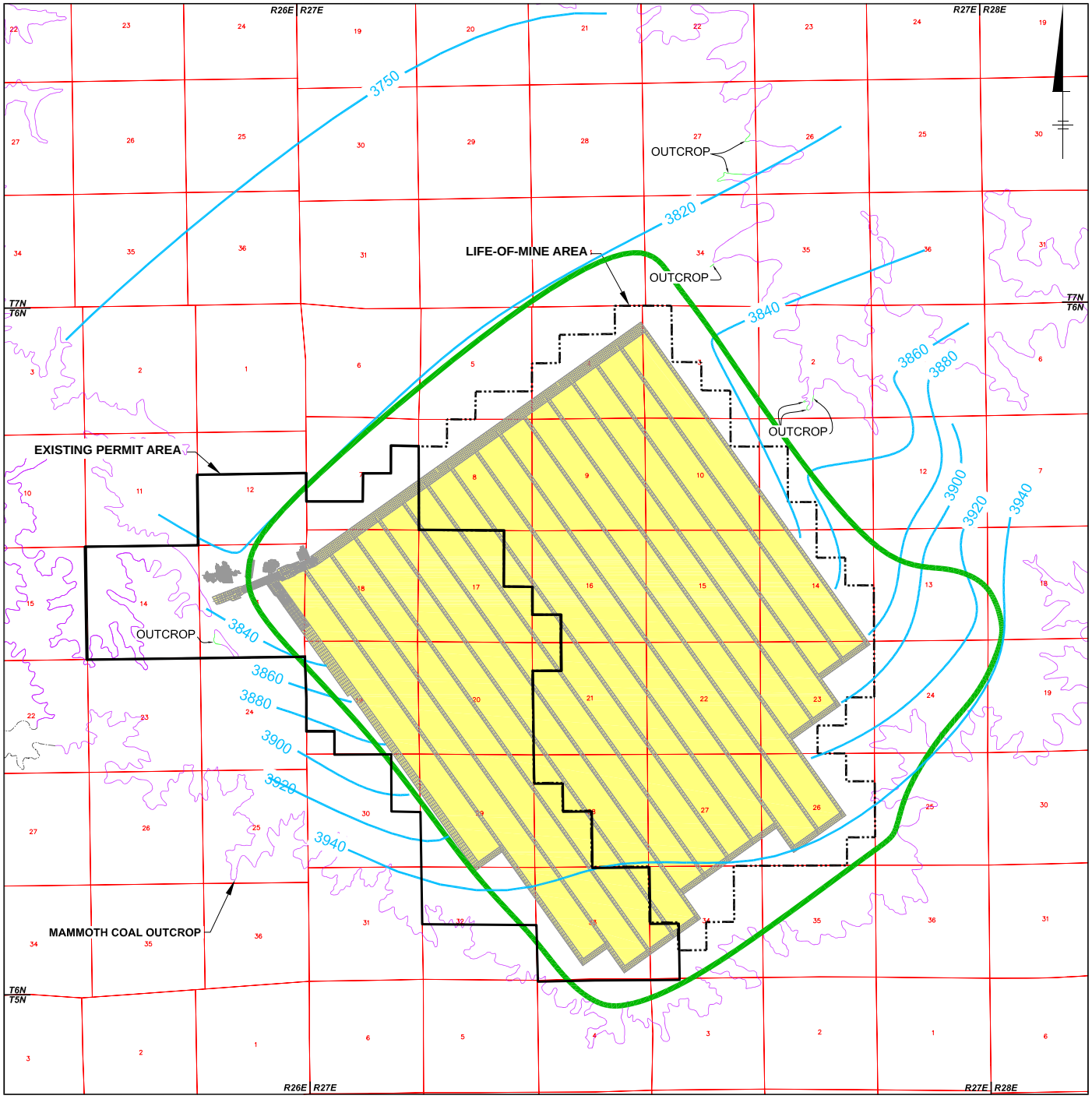
BULL MOUNTAIN COAL LEASING ENVIRONMENTAL ASSESSMENT

Figure 4.2-1
Area of Influence in Mammoth Coal
Mining Complete
Dewatering Continues

ANALYSIS AREA: Musselshell & Yellowstone Counties, Montana

K:\2116_BullMountain\2116\Images\Illustrator\Figure 4.2-1.AI @ 07/17/2009

Prepared By: JC | Reviewed By: EC



LEGEND

- EXISTING PERMIT BOUNDARY
- LIFE-OF-MINE BOUNDARY
- MAMMOTH COAL OUTCROP
- PROJECTED OUTCROP
- OUTCROP
- MINE AREA
- 3900 — APPROXIMATE ELEVATION OF THE POTENTIOMETRIC SURFACE IN THE MAMMOTH COAL
- 1-FOOT DRAWDOWN CONTOUR (AREA OF INFLUENCE)

0 3,500 7,000 Feet

NAD 83 MONTANA STATE PLANE, METER

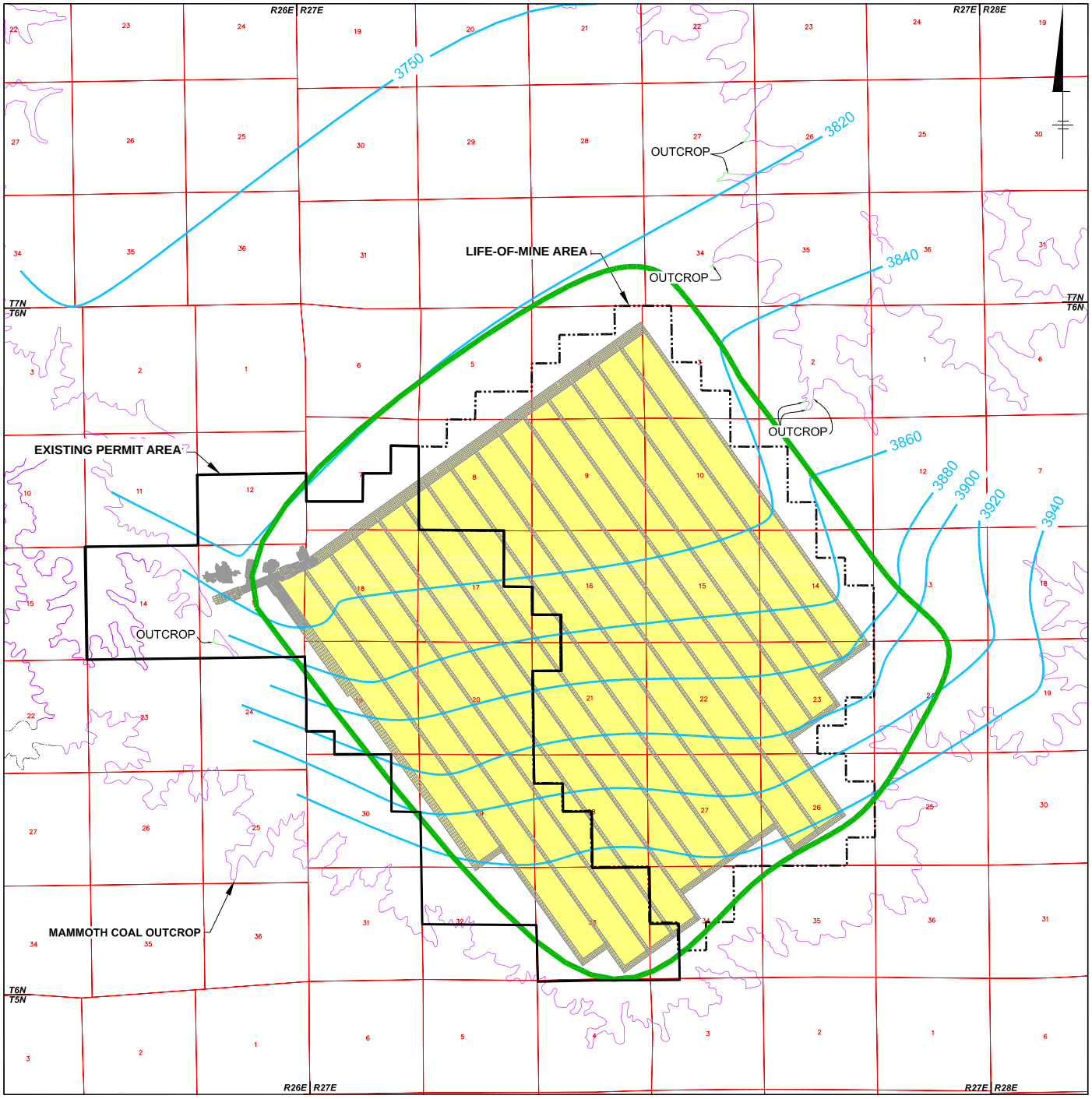
BULL MOUNTAIN COAL LEASING ENVIRONMENTAL ASSESSMENT

Figure 4.2-2
Area of Influence in Mammoth Coal Mining Complete 5-Years after Dewatering Cases

ANALYSIS AREA: Musselshell & Yellowstone Counties, Montana

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LEGEND

- EXISTING PERMIT BOUNDARY
- LIFE-OF-MINE BOUNDARY
- MAMMOTH COAL OUTCROP
- PROJECTED OUTCROP
- OUTCROP
- MINE AREA
- 3900 — APPROXIMATE ELEVATION OF THE POTENTIOMETRIC SURFACE IN THE MAMMOTH COAL
- 1-FOOT DRAWDOWN CONTOUR (AREA OF INFLUENCE)

0 3,500 7,000 Feet

NAD 83 MONTANA STATE PLANE, METER

BULL MOUNTAIN COAL LEASING ENVIRONMENTAL ASSESSMENT

Figure 4.2-3
Area of Influence in Mammoth Coal Mining Complete 25-Years after Dewatering Cases

ANALYSIS AREA: Musselshell & Yellowstone Counties, Montana

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Prepared By: JC | Reviewed By: EC

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Mine inflow was calculated to be approximately 2.4 acre-feet/acre/year for mined-out areas averaged over the lifetime of the project. In practice, the mining operations would be phased with approximately one panel added each year. The modeling described herein assumes that the entire mine was excavated in year one and the groundwater inflow then continued for the life of the mine. Thus, the estimate of 2.4 acre-feet/acre/year represents the maximum inflow of water expected. This water would accumulate as a mine pool in the mined-out area until the steady state pool is reached. This pool would fill the lower portion of the mined-out area and may extend 3 to 5 feet into the fractured overburden. Of this water, 50 percent originates from the upper underburden, 21 percent from the Mammoth coal, and 29 percent from the overburden.

For the recovery phase, 5 years after dewatering has ceased, 65 percent originates from the upper underburden, 2 percent from the Mammoth coal, and 33 percent from the overburden. Twenty-five years after dewatering has ceases, 95 percent originates from the upper underburden, 2.5 percent originates from the Mammoth coal, and 2.5 percent originates from the overburden.

Model Summary

A fully 3-dimensional groundwater flow model has been developed using MODFLOW-SURFACT to simulate the environmental effects of mining on the local and regional groundwater conditions. The groundwater elevations within the target zone, Mammoth coal, are seen to be determined by the topography and effective recharge.

The results of this analysis indicate that the hydrologic impacts of the mining operations would be limited to the immediate vicinity of the mine workings or the area defined by the boundary of the coal and the ground surface (outcrop) (**Figures 4.2-1** through **4.2-3**). The calculated groundwater extraction rate at the full extent of mining is approximately 2.4 acre-feet/acre/year and represents the maximum inflow of water expected. As of March 2006, the amount of water seepage into the extent of the underground mine workings, approximately 80 acres or 3 percent of the permitted mine plan, is small enough that it requires limited dewatering.

Due to the low hydraulic conductivity of the strata directly below the coal (two to three orders of magnitude less than that of the shallow fractured and weathered bedrock), it is unlikely that the lowering of the potentiometric surface in the underburden (caused by mining) would increase the downward flow from the shallow fractured and weathered bedrock. In groundwater flow systems in which there are contrasts of two orders of magnitude in hydraulic conductivity among adjoining media, flow lines in the unit with the higher hydraulic conductivity tend to parallel the contact (Freeze and Cherry 1979). Groundwater would, therefore, continue to flow in the upper system with only a relatively small loss to the underburden unit. These conditions are expected to be the same after mining in all areas.

Model sensitivity is usually judged by varying the input parameters. However, based on previous modeling and field measurements, it was determined that hydraulic conductivity, porosity, and storage were well characterized. The effect of the storage coefficient was evaluated over two orders of magnitude and shown to have only a small effect. Due to the high contrast in hydraulic conductivity among the zones, the parameters exhibiting the most sensitivity are recharge and the conductance of the drains used to simulate seeps and streams.

4.2.4.2 Hydrologic Impact Due to Subsidence

4.2.4.2.1 The Subsidence Process

The effects of subsidence on the mined area have been predicted in studies conducted by Agapito and Maleki (1989 and 1990). The studies concluded that three different zones of deformation would develop above the mined area as a result of subsidence:

Zone 1: Fragmented Zone - includes the immediate roof and may extend upward to a height approximately equal to 2 to 10 times the mining height. The strata in this zone would fracture and collapse into the mined out area.

Zone 2: Fractured Zone - may extend upward to a height approximately equal to 30 to 50 times the mining height. The strata deform and fracture, but maintain their continuity. Bedding plane separation can occur.

Zone 3: Deformation Zone - extends upward from the top of the fractured zone to the surface. The strata deform without significant fracturing, forming compression zones at the surface near the center of the panel and tension zones at the edges of the panel. Bedding plane separation can occur.

The subsidence front follows a wave form, rather than an abrupt front, so that strata bend rather than shear. Curvature of the subsidence wave is broad, with changes in surface slope of about five degrees, so that deformation is laterally distributed. Further, the inflection plane of the subsidence wave is off vertical by approximately 22 degrees (the angle of draw), and therefore would not coincide with a single vertical joint plane throughout the sandstones. These factors limit the shear strain on individual joints. Some horizontal shear may occur between beds during the passage of the subsidence wave, and thin lenses of disturbed rock with higher permeability may develop, particularly in basal sandstones. High-angle joints would experience initial tension and subsequent compression.

In Zone 1, bulking of the fractured rocks and the caved gob account for the proportion of the mined height that does not transfer to the surface as subsidence. This has been estimated to be about 30 percent of the mining height.

Above Zone 1 (the fragmented zone), shale is expected to buffer fracturing. Shale comprises approximately 25 to 40 percent of the overburden, which favors the distribution of subsidence strain and minimizing vertical hydraulic connection that may fracture, but shale greater than ten feet in thickness may deform without fracturing, accommodating strain on small oblique shears. Shear in shale that do intercept water, particularly below saturated sandstones, should tend to soften and close under overburden loads rather than conduct flow.

The presence of several massive, thick sandstones should concentrate overburden loads on pillars left in the gates at panel margins, and cause the pillars to crush and enhance uniform lowering of strata, particularly at greater overburden thicknesses.

At the surface, over mined areas, tension occurs as subsidence begins, and is followed by compression as the overburden settles. Cracks can open during the tension phase, but most close during the compression phase (usually within two years). The trough mode of the subsidence laterally constrains the deforming strata above Zone 1, and limits the tensional cracking. Above

the ultimate mine boundaries, on the edge of the final subsidence trough, there would be a fringe where there is no compression recovery, and tension cracks parallel to the boundaries are expected to heal more slowly. Closing of these cracks is expected due to the soft nature of the sandstones and shale in the project area. Enduring cracks, which are determined to pose a threat to wildlife or livestock or have a detrimental effect on the surface hydrologic system, would be filled or otherwise mitigated, as necessary.

4.2.4.2.2 Changes to the Hydrogeologic System

The hydrogeologic units above and below the mine would be affected to varying degrees by subsidence. The fragmented zone, predicted to extend between 18 and 140 feet above the mined seam (Agapito and Maleki 1990), would have increased hydraulic conductivity, porosity and storage because of bulking. The difference between the mined height and the surface subsidence would be taken up in the gob and the fragmented roof zone. In this case, the zone is predicted to comprise a highly connected pool, which over a ten foot mining height would have a storage capacity of approximately 3 acre feet per acre. This bulking storage has the capacity to gravity drain about 30 feet of sandstone in the fragmented zone, assuming a specific yield of 0.1.

During mining operations, the gob and fragmented zone would intercept and divert vertical flow, interrupting some recharge to the upper underburden, except perhaps in mined areas where water is allowed to accumulate underground. After mining, recharge would begin to re-saturate the gob and fragmented zone until an equilibrium is reached and the portion of recharge to the upper overburden is re-established.

Vertical hydraulic conductivity of a stratiform aquifer system is dominated by the less permeable lithologies, particularly shale, which is less permeable than the associated interbedded sandstones. The capacity of shale in the project area to deform in response to subsidence may be expected to limit changes in overall vertical conductivity in the rocks above the highly fractured Zone 1. Shale thicker than about ten feet that are above the highly fractured subsidence Zone 1 may be expected to show only limited increase in hydraulic conductivity.

An increase in horizontal hydraulic conductivity in a direction parallel to high angle jointing may occur in sandstone bodies. An increase in horizontal conductivity may also occur as a result of some separation and shearing at the base of strata. Volumetric strain should be small compared to the saturated void volume; a new joint with 0.01 inch gap in a cubic foot of sandstone with 10 percent porosity adds only 1 percent storage, although its permeability would be 200 times that of the un-fractured sandstone. Induced jointing may actually increase horizontal flow rates, but is not expected to increase the rate of vertical flow through the overburden as a whole, especially in areas where thick shale maintain continuity and interrupt vertical flow.

Draining of the fragmented overburden into the mine pool is expected to occur at the Bull Mountains Mine No l. This is not considered a loss of water, but rather an accumulation of that water in the most permeable section of the aquifer. Above the fragmented zone, the buffering of deformation and of vertical infiltration of the shale is expected to minimize the impacts to the hydrogeologic systems, such as water level declines.

As water levels decrease in the immediate mine area, some aquifers may shift from semi-confined to unconfined conditions because of partial drainage. Head and storage values are

expected to eventually recover in areas where the shale is again effective in re-isolating aquifers from drainage to the mine, and where settling of the subsided overburden heals the fractures, thus causing conductivities to approach pre-mining conditions. However, groundwater may not recover to pre-mining levels in areas where enduring subsidence fractures occur, but may re-establish at lower levels within the overburden. Aquifer response and recovery would be measured by intensive monitoring of springs and wells as specified by the mine permit that requires monitoring and an adaptive management approach to mitigation in the event that unexpected impacts occur.

4.2.4.2.3 Impacts to Groundwater Flow and Recharge

Impacts on groundwater flow and aquifer recharge capacity due to mine subsidence are expected to be limited to the fragmented zone. The shallow bedrock aquifer system is anticipated to be isolated from the drainage to the mine by shale and other low permeability lithologies, especially in areas of greater overburden thickness. The mine would receive some inflow from the underburden, and intercept some recharge to the underburden, but effects on the underburden aquifers should be negligible.

Groundwater flow in the fragmented zone and the Mammoth coal would be directed towards the mine workings during and immediately following mining activities at the site. Flow direction in this narrow zone is not expected to return to pre-mining conditions for several years or more after mining ceases (see groundwater modeling predictions in Section 4.2.4.1.2 above).

In the fractured and deformed overburden, overall flow direction is not expected to be impacted, except perhaps in situations where the overburden is thin or brittle sandstones are the predominant lithology, and where enduring subsidence fractures occur. In the project area, subsidence fracture conductivities are expected to be buffered by thick shale due to their soft nature. Increases in both vertical and horizontal hydraulic conductivities may occur as a result of subsidence. Horizontal hydraulic conductivities are still expected to dominate groundwater flow, because they would continue to be greater than the vertical component because shale is expected to interrupt downward flow along subsidence-induced fractures.

Flow to springs is believed to be controlled by a shallow fractured and weathered bedrock/alluvial system. Subsidence fractures may reach this system in areas of shallow overburden cover, facilitating the diversion of groundwater. Some increased lateral drainage from higher overburden units to some lower springs also may occur temporarily as a result of flow along subsidence fractures. Settling and compression after mining are expected to close most subsidence fractures, thereby returning the groundwater flow direction, including flow to springs to approximately the pre-mining orientation. If, however, flow to the springs is impacted, then SPE is committed to replacing the flow using one of the mitigation methods.

In the project area, recharge should sustain the aquifers and springs which were not permanently impacted, but may take years to replenish drained groundwater. Recharge in the project area has been estimated to be 0.05 feet/year based on infiltration rates determined by the groundwater mass balance analysis.

Local subsidence depressions may remain that could create minor surface ponding or marshy areas during periods of high precipitation. Since precipitation is very low in the region, this is not

considered a major or detrimental impact. If the ponds contain sufficient quantities of water, then they may be used opportunistically as a source of replacement water. Recharge may be accentuated in these areas during wet periods and snowmelt events.

The groundwater system that feeds springs is a shallow fractured system controlled by topography. Subsidence fractures may reach this system in areas of shallow cover, where stress can be bridged by sandstone beams in the roof, and subsidence may be more abrupt than the usual smooth wave. Flow can occur on such fractures, but visual observations by King (1980) indicate that settling and compression reclose fractures on which significant shear has occurred.

4.2.4.2.4 Impacts to Springs, Ponds, Wetlands, and Wells

Approximately 141 springs and associated wetlands occur within the project area. All of these springs have been monitored as part of the baseline program. There are 15 springs within the coal lease area and an additional 14 springs within the adjacent area, which directly overlie the proposed mine workings or lie within the subsidence angle of draw (**Table 4.2.4-2**). The probability of individual springs being affected is based on the following:

- Depth to mining from the ground surface;
- The lithology of the rocks between the spring and the Mammoth coal (i.e. percent shale, coal, etc.), if a spring lies within the subsidence areas;
- Percentage of watershed in the mining and subsidence areas; and
- The slope of the spring site (the steeper the slope, the more likely the spring would be impacted).

Table 4.2.4-2 Springs and Seeps Overlying Areas Potentially Affected By Subsidence in Coal Lease Area

Spring Name, Number	Location (TRS)	Elevation	Flow Range (gpm)	Development	Relative Score*	Value to Ranchers**
14405	6N/27E 8 NESE	4075	Dry – 1.5	None	1	No
14415	6N/27E 8 SESE	4070	dry - 1.5	small pond	3	Yes
14535	6N/27E 8 NESW	4000	dry - 0.5	None	1	No
14555	6N/27E 8 NESW	4070	dry - 0.3	small pond	2	Yes
16135	6N/27E 22 NWSW	4486	1.0 - 18.0	stream channel flow	2	Yes
52275	6N/27E 4 SWSE	3960	Dry -1.5nd	None	1	Yes
52355	6N/27E 4 NESW	4038	dry - 2.0	None	2	Yes
52365	6N/27E 4 NESW	4028	dry	None	1	No
52375	6N/27E 4 SWNE	3950	dry - 0.8	Pond	2	Yes
53525	6N/27E 10 SENW	4040	dry - 0.5	None	2	Yes
53535	6N/27E 10 SENW	4040	seep - 0.3	small pond	2	Yes
53545	6N/27E 10 SENW	4000	dry - 0.1	None	2	Yes
53225	6N/27E 14 NESW	4113	dry - 0.5	None	2	Yes
53245	6N/27E 14 SENW	3980	dry - 0.5	None	2	Yes
71125	6N/27E 22 SENW	4460	seep - 1.0	None	2	Yes
Springs near the lease boundaries (within 1,000 feet)						
Red Fork 14115	6N/27E 16 SESE	4460	seep - 3.3	None	2	Yes
Busse 14325	6N/27E 17 NENE	4095	1.0 - 39.0	two large ponds in	4	Yes

Table 4.2.4-2 Springs and Seeps Overlying Areas Potentially Affected By Subsidence in Coal Lease Area

Spring Name, Number	Location (TRS)	Elevation	Flow Range (gpm)	Development	Relative Score*	Value to Ranchers**
				lease area Section 4		
14655	6N/27E 8 NWNW	4040	seep - 1.0	Pond	2	Yes
16145	6N/27E 21 NESE	4480	0.3 - 3.5	stream channel flow	2	Yes
16165	6N/27E 22 SENE	4440	dry - 1.3	None	3	Yes
16955	6N/27E 18 NENE	3961	dry - 41.8	None	2	Yes
52165	6N/27E 3 SWSW	3980	pond - 3.3	2 small ponds	3	Yes
52455	6N/27E 3 NWNW	3840	15.4 – 46.6	Small Pond	4	Yes
52565	6N/27E 33 SWSE	3960	dry – 0.5	None	1	No
53125	6N/27E 15 SESW	4400	Seep – 1.0	None	2	Yes
53175	6N/27E 15 NENE	4038	pond - 12.0	large pond	3	Yes
53335	6N/27E 13 NWSW	4080	seep - 0.6	None	2	Yes
53575	6N/27E 10 NENE	3890	seep - 0.8	None	2	Yes
71115	6N/27E 22 NWNE	4416	1.3 - 9.0	extensive piping to stock tanks and storage impoundments	4	Yes

nd - no survey or no data
*Relative Score - An average derived from relative values (1 through 4) assigned to 12 qualitative observations and range variables relating to hydrology, aquatic ecology, vegetation, wildlife and use (adapted from MDSL 1992).
**The value to rancher information was obtained from each landowner interviewed in 1992 (SPE 2009 Volume 1C Section 304(5) Appendix 304(5-6) and 304(12) Appendix 304(12)-1). Updated information obtained in 2010 from Charter (2010) and field monitoring observations (SPE 2010).

- To evaluate these factors, a matrix was designed to evaluate each spring in terms of the probability of impact. Qualitative descriptors were used to define in relative terms the potential for impact to springs. Relative scores for each category, based on literature and the understanding of the hydrogeologic system, are defined as follows: Mining the vertical distance between the spring and the Mammoth coal; the relationship of the spring to the mine layout; and the direction of mining relative to topography as the mine moves under the spring were all determined for each spring (**Table 4.2.4-3**). Each of these three categories were evaluated as factors contributing to the probability of spring impact.

Table 4.2.4-3 Mining Score for Spring Impact Probability Matrix

Depth Of Mining			Mine Layout			Direction Of Mining	
<200 Ft.	10	+	Edge of Pillar or on Pillar	1	+	Uphill	1
200 - 300 Ft.	4		Center of Panel	0		Downhill	0
300 - 400 Ft.	3		Outside of Mining	0		Outside of Mining	0
400 - 500 Ft.	2						
500 - 600 Ft.	1						
>600 Outside of Mining	0						

There are no published criteria for developing the Mining Scores. Professional judgement and the literature indicate that the springs most likely to be impacted are close to the

mining level, located near or on a pillar, or positioned on a slope that would be undermined in an uphill direction. It is also known that fracturing at the surface is most likely to occur in areas of shallow cover; therefore, the springs located 200 to 400 feet above the mining operation would have a disproportional higher probability of being impacted.

- Hydrology. The conceptual groundwater model, supported by field data, shows that most of the water discharged at a spring originates from recharge to the watershed in which it is located. This water moves downhill by gravity through a thin system of alluvium and shallow fractured bedrock. Therefore, the percentage of the contributing watershed overlying the subsidence areas was calculated for each spring. As described in **Table 4.2.4-4**, springs with greater proportions of their contributing watersheds overlying the active mining area were given higher scores. For example, a spring with 50 to 100 percent of its contributing watershed overlying the active mine was given a score of 5, while a spring with less than 20 percent was given a score of 1.
- Geology. Geophysical logs from boreholes close to each spring were used to determine the percentage of shale, sandstone/siltstone, coal, and unconsolidated surficial material between the spring and the Mammoth coal. It is assumed that a relatively high percentage of shale will reduce the impacts of subsidence on a spring. As shown in **Table 4.2.4-4**, springs underlain by less than 20 percent shale were given a score of 5, while springs underlain by more than 40 percent shale were given a score of 1 and springs beyond the subsidence areas were given a score of 0.
- Topography. Areas of high topographic relief, would affect the size and location of tension cracks and horizontal ground movement. The percent slope map generated by the Office of Surface Mining and USGS topographic maps for the area were used in this analysis. Topography scores on **Table 4.2.4-4** ranged from 5 to zero. Springs with slopes greater than 50 percent were give a score of 5, while springs with slopes less than 5 percent were given a score of one. Springs beyond the subsidence areas were given a score of 0.

Table 4.2.4-4 Scoring Methodologies for Probability Matrix

Hydrology Score: Hydrology (% of watershed in mine area)	
50% - 100%	5
40% - 50%	4
30% - 40%	3
20% - 30%	2
< 20%	1
Beyond mining area	0

* +1 for coal spring

Geology Score: Geology (% of Shale)	
< 20%	4
20% - 30%	3
30% - 40%	2
> 40%	1
Beyond mining area	0

Table 4.2.4-4 Scoring Methodologies for Probability Matrix

Topography Score: Topography (% of slope)	
> 50%	5
25% - 50%	4
10% - 25%	3
5% - 10%	2
< 5%	1
Beyond mining area	0

The scores for each of these factors for the 27 springs in and surrounding the coal lease area are presented in **Table 4.2.4-5**. All potential impact to these springs during the LOM were considered in this evaluation. The scores were added and ranked according to the following probability criteria:

Score	Impact Potential
0 – 2	None
3 – 5	Negligible
6 – 10	Low
11 – 14	Moderate
15 – 21	High

Table 4.2.4-5 Probability of Impact Matrix for Springs in the Coal Lease Area

Spring Number	Mining	Hydrology	Geology	Topography	Total		Probability
14115	1	5	2	2	3	(10)	**L**
14155	1	5	2	2	3	(10)	**L**
14165	3	5	2	2	4	(12)	**M**
14255	2	5	2	2	4	(11)	**M**
14325	4	5	2	1	4	(12)	**M**
14415	3	5	3	1	4	(12)	**M**
14535	5	5	3	1	4	(14)	**M**
14555	4	5	3	1	4	(13)	**M**
16135	0	5	4	1	3	(10)	**L**
16145	1	5	4	2	4	(12)	**M**
16165	1	5	4	3	4	(13)	**M**
16255	1	5	4	1	4	(11)	**M**
16275	1	5	4	2	4	(12)	**M**
16355	3	5	3	1	4	(12)	**M**
17635	2	5	3	4	4	(14)	**M**
17655	2	4	4	1	4	(11)	**M**
52125	3	5	2	1	4	(11)	**M**
52145	5	5	3	1	4	(14)	**M**
52225	3	5	3	1	4	(12)	**M**

Table 4.2.4-5 Probability of Impact Matrix for Springs in the Coal Lease Area

Spring Number	Mining	Hydrology	Geology	Topography	Total		Probability
52235	3	5	3	1	4	(12)	**M**
52255	4	5	3	1	4	(13)	**M**
52455	0	5	1	4	3	(10)	**L**
53115	2	5	3	4	4	(14)	**M**
53125	2	5	3	4	4	(14)	**M**
53125	1	5	3	4	4	(13)	**M**
53145	4	5	4	3	5	(16)	**H**
53155	3	5	4	3	5	(15)	**H**
53175	3	5	4	1	4	(13)	**M**
53225	4	5	3	1	4	(13)	**M**
53245	0	5	1	4	5	(15)	**H**
53525	5	5	2	3	5	(15)	**H**
53535	5	5	2	3	5	(15)	**H**
53545	5	5	3	1	4	(14)	**M**
71115	2	5	3	4	4	(14)	**M**
71125	1	5	3	4	4	(13)	**M**

IMPACTS: N = no Ng = negligible L = low M = moderate H = high
Total scores are in parentheses

This analysis indicates that for the 15 springs within the coal lease area, four springs have a low potential for being impacted by mining, seven have a moderate potential, and four have a high potential. For the 14 springs surrounding the coal lease area, six would have a low potential for impact and eight would have a moderate potential for impact. Further discussion of the logic used to develop the Probability of Impact Scores for these 29 springs is presented in Permit Document (SPE 2009).

Impact scores are considered relative. An impact to a spring could be a change in location, flow quantity, or water quality. For instance, a spring such as 16135 that occurs at a higher elevation (relative to the coal seam) has a low Impact Potential score. In evaluating this spring, a Mining Score of 0 (relatively low) was assigned primarily because of the depth to the seam, however, a Hydrologic Score of 5 was assigned because of the percent of watershed in the mine area. Due to the depth to mining, it is not anticipated that this spring would lose flow. However, there is a chance that the spring could be relocated due to changes to the topography.

For topographically lower located springs, such as 14535 (**Table 4.2.4-5**), the opposite holds true. This spring has a high Mining Score (5) yet a relatively low Topography Score (1). In this case, there is a chance that a change in flow quantity may occur due to the shallow depth to mining, yet the change in topography would have little impact on the spring.

It is still unknown as to what impacts actually would occur to the springs and the actual impacts may be different from those predicted by this analysis. Nonetheless, SPE is committed to mitigate impacts to springs and to mitigate impacts to the associated perennial and intermittent stream reaches.

Although caution must be exercised in applying conclusions drawn from hydrogeologic studies from one mine to another, the results of a study by Pennington et al. (1984) on the effects of longwall mining on overlying aquifers gives additional insight into the possible consequences of mining under springs in the Bull Mountains. As part of that study, the effects of longwall mining on a shallow sourced spring were evaluated. The spring was located between 500 and 600 feet above the longwall panel, a situation similar to that which would occur in the Bull Mountains. The study showed that during pre-mining, active mining, and post-mining conditions spring flow was maintained and was consistently related to precipitation in the study area. It is believed that this also would be the case in the project area where the majority of springs emanate from the shallow fractured bedrock and are recharged locally by precipitation.

Since the Bull Mountains Mine No. l would be an underground operation, surface impacts would be minimal. None of the springs or ponds would be removed by mining. The potential for each spring to be impacted by mining has been evaluated above. Impacts of mining on the existing springs and perennial stream reaches would be identified using SPE's baseline and operational monitoring program. Key monitoring springs and perennial stream reaches would be identified as those within and adjacent to each area of active mining and subsidence. Spring flows for these key monitoring springs would be compared with flows from reference springs located outside the permit area and the influence of subsidence. A change in the relationship between the flows at the key monitoring springs and the reference springs occurring at the time of mining and subsidence would indicate impact to the springs and associated perennial segment.

For water quality, TDS concentrations measured at the key monitoring springs would be compared with TDS measurements from reference springs. A change in the relationship between the TDS at the key monitoring springs and the reference springs occurring at the time of mining and subsidence would indicate impact to the springs and associated perennial segment.

For all potentially impacted springs and perennial stream segments, impacts to the use of these resources would be evaluated by comparing the wildlife, vegetation and livestock use patterns with long term data for the specific site and for the reference or control sites. For the 12 springs surrounding the coal lease area, five would have a low potential for impact and seven would have a moderate potential for impact.

Two private wells, 62710BBB (possible Mammoth coal well) and 62711CCD (possible underburden well), are located within the coal lease area that would be mined. SPE has established mitigation measures approved by MDEQ in the mine permit to replace wells that would be removed or severely impacted with new wells or a comparable water supply. Water rights are protected as stipulated in the permit.

Impacts of mining on existing water supply wells will be identified using SPE's baseline and operational monitoring program. For water quantity, drawdown of water levels in the coal, overburden and underburden would be determined and updated annually. Water supply wells located within the drawdown zone of their respective unit would be identified as potentially impacted. SPE would evaluate measures to mitigate the impacts to water supply such as rehabilitating the well, deepening the well or drilling a new well. SPE is currently using approximately 500 gpm from two permitted Madison Formation wells to supply the coal preparation plant and underground mining equipment. This deep formation is capable of

providing this level of sustained use and there are no other water users that rely on Madison Formation water for their uses.

For water quality, TDS concentrations measured in SPE's groundwater monitoring wells in the coal, overburden and underburden would be compared with baseline concentrations to identify possible trends. Groundwater quality within the vicinity of the monitoring well would be identified as potentially impacted if there is a statistically significant increase in the TDS concentrations in four successive samples relative to the TDS concentrations measured during the baseline and operational monitoring periods. A statistical calculation would be utilized to analyze the data. Locations where water quality within the coal, overburden and underburden may be potentially impacted would be mapped and analyzed for statistically significant increases in TDS. Samples would be collected and analyzed for TDS and major ions. If the concentration of TDS or major ions exceed the corresponding use standards, the water quality would be assumed to be impacted and SPE would evaluate measures to mitigate the impacts to water quality such as rehabilitating the well, deepening the well or drilling a new well.

4.2.4.2.5 Impact Downgradient of the Mine

Regional aquifers would not be impacted by mining operations in the coal lease area or LOM area. Hydrogeologic units directly downgradient of the mine would not be directly impacted by subsidence, but may be affected by mine dewatering and associated drawdown within the coal and overburden. In addition, mine subsidence fracturing may enhance drainage into the mine and subsequent drawdown in the hydrogeologic units above the fragmented zone.

The local unit of most concern is the shallow fractured bedrock, which contributes the majority of flow to the springs. Impacts to the shallow fractured bedrock are expected to be temporary as subsidence fractures within the bedrock underlying this unit should heal and water levels should recover. However, in areas where springs have a probability (low, moderate, or high) of being impacted, mitigation measures have been developed to replace springs and augment flow downgradient (SPE 2009).

The only other hydrogeologic unit that could be impacted by subsidence is the alluvium in areas of low overburden cover. The alluvium receives most of its recharge from precipitation and spring discharge. A small portion of the recharge also originates from deeper bedrock discharge. Within the project area, water from the alluvium drains into the bedrock; emerges further downslope as part of the next spring's discharge; is used, or moves further downslope either as surface flow or alluvial flow; drains back into the shallow bedrock; and so on down the valley. Some portion of the water may stay permanently in the shallow bedrock, while some may not.

Interruption of alluvial groundwater could have a measurable impact on water levels in the alluvium and shallow bedrock downgradient of the subsidence area. However, this would not significantly impact water availability because:

- The alluvium is relatively thin,
- Saturation of the alluvium is discontinuous and where saturated, the depth to water is greater than 8 feet, and
- Surface flow in the streams is ephemeral except immediately downgradient of some springs.

Impacts are expected to be temporary as subsidence fractures within the bedrock underlying the alluvium heal and water levels should recover. However, groundwater may not recover to pre-mine levels in areas where enduring subsidence fractures or bedding plane separation occur.

The Mammoth coal would be the most impacted unit due to its removal and dewatering during mining. Drawdown of pre-mining potentiometric surfaces would have the greatest extent in the Mammoth coal.

Downgradient impacts due to mine dewatering and subsidence would be minimal. A flow net analysis indicates that groundwater discharge from the Mammoth coal to the various drainages is quite small because of the low permeability of this unit and the relatively low hydraulic gradient. Drawdown in the Mammoth coal does not extend very far beyond the mined area. Drawdown within the Mammoth coal would reduce groundwater flow in the coal downgradient of the mine. Steady state discharge rates in the coal are quite low, and most of the inflow to the mine is water depleted from storage in the coal and in the overburden. Inflow from the underburden is also estimated to be quite small.

Water removed from storage in the coal and overburden during mining would be replaced slowly over time as water levels recover in the gob. Impacts following completion of mining would be similar to impacts during mining, but would diminish with time as groundwater levels recover.

4.2.4.2.6 Impacts Due to Mine Dewatering

The Mammoth coal seam is one of many saturated zones that make up the Tongue River Member of the Fort Union Formation, which contains most of the usable water in the project area (Slagle 1986). As a result, mining the Mammoth coal seam would permanently impact the flow of groundwater in the project area during and after mining. The objective of this analysis is to assess potential worst-case, short and long-term hydrologic impacts to the project area as a result of mining.

Although drawdown in the aquifer as a result of mining activities may also impact surface hydrology features such as springs and ponds, the following sections focus on impacts to groundwater. Impacts to and mitigation for springs and ponds are explained above. The impacts modeled and discussed below focus on both the nearby and regional impacts in and around the mining area.

4.2.4.2.7 Groundwater Quality

All of the impacts presented in this analysis are expected to occur as a result of the approved current mining operations, regardless of the decision to lease the federal coal. No significant increased degradation of groundwater quality is anticipated as a result of the proposed leasing activities. The quality of groundwater that does not come in contact with the highly fractured rocks immediately above the mined out area or the gob (mine waste) should not be affected by mining. No significant change in acidity is anticipated to occur in the operational or post-mining groundwater quality in the project and downgradient areas. A general increase in total dissolved solids, sodium and sulfate concentration is anticipated in the groundwater that flows through the gob and the highly fractured zones immediately above the mined out area; however, it is expected that groundwater quality would continue to be suitable for the current and post-mining uses of watering livestock and wildlife. These changes would result primarily from chemical

reactions that may occur as the fragmentation and collapse of the overburden expose new mineral surfaces to oxygen and groundwater. Areas affected by these changes currently have elevated levels of TDS, sodium, and sulfate which often exceed drinking water standards. No additional restrictions on water use beyond those presently in place are anticipated. However, regular monitoring of water quality would be maintained. Fragmentation and collapse of the overburden immediately overlying the mined-out area may expose rocks previously existing in a reducing environment to an oxidizing environment, and drain stagnant pores that may be not in equilibrium with mobile water. The oxidizing conditions would exist until after mining is complete, and re-saturation of the collapsed material has occurred. These conditions may result in increased sulfide oxidation, cation exchange, leaching, and weathering, which together with the exposure of stagnant porosity, cause an increase in the concentration of calcium, magnesium, and sodium ions. An increase in mine water acidity, however, generally does not occur as a result of these chemical reactions in the coal mines of the Northern Great Plains, because of the buffering capacity of the alkaline sediments present throughout the project area and because the indigenous sulfide minerals generally occur in a relatively stable chemical form. However, should acid drainage occur, it would be mitigated to acceptable standards.

The fragmenting and fracturing of the overlying strata may result in the interconnection of a number of hydrogeologic units. This interconnection should not have a significant effect on resultant water qualities for two primary reasons. First, the geochemical properties of both the overburden and Mammoth coal groundwater are similar; and secondly, separate overburden water-bearing units generally are not discernible from one another using water quality comparisons. Natural groundwater flow in the Bull Mountains is downward, and in the long term all aquifers are connected. The evolution of chemical change through the vertical section is not so pronounced. Therefore, the geochemistry should not significantly change laterally, over a distance of several hundred feet.

A study that indicates the probable quality of post-mining water was conducted by the Montana Bureau of Mines and Geology (Reiten and Wheaton, 1989; Wheaton and Van Voast, 1989). They conducted a hydrogeologic reconnaissance of abandoned underground coal mines near Roundup, Montana to investigate the potential for beneficial development of the waters contained in these mines. The results of this study indicate that water in the abandoned mines is predominantly sodium-sulfate type with calculated dissolved solids ranging from 1,325 to 5,155 mg/L. Historical water quality data for several mines indicate that dissolved solids, sodium and sulfate concentrations have steadily increased over time while calcium and bicarbonate have decreased. No acidic waters were encountered in any of the mines sampled, and the pH of the water samples ranged from 7.2 to 8.2.

The study suggests dissolution of gypsum, pyrite oxidation, and ion exchange as the most likely geochemical mechanisms contributing to the existing mine water chemistry conditions. It also suggests that mine water quality has developed over a relatively long period of time (some of the mines have been abandoned for over 70 years) and that cyclic dewatering could significantly improve the water quality (Wheaton and Van Voast, 1989).

In general, the MBMG study found that although the quality of the water consistently did not meet the National Secondary Drinking Water Standards for TDS and sulfate, the overall composition generally met the Montana Groundwater Classification standards for agricultural

and livestock use. More recent studies (Raisbeck, et al 2008) suggest that several of these samples exceed acceptable levels for livestock use. **Table 4.2.4-6** summarizes water quality analyses collected during the study (Wheaton and Van Voast, 1989). Baseline water quality statistics for Mammoth coal well waters are presented for comparison in **Table 4.2.4-7**. In general, water qualities in the abandoned mines are of similar character and quality to the baseline coal water qualities at the Bull Mountains Mine No. 1.

Given that the water in the mines in the Roundup area has tended to show a general degradation in water quality over time, it is likely that a similar degradation of water quality, such as increased TDS and sulfate, will occur during the operation of the Bull Mountain Mine No. 1. Overall long term effects on groundwater quality will depend to a large extent on the degree of groundwater flow through the collapsed mine workings. Post-mining groundwater quality within the collapsed zone will probably stabilize at a slightly degraded level compared with baseline water quality unless the mine water is periodically pumped or otherwise removed.

In addition to examining existing data on mine water quality, geochemical analyses of selected samples from the overburden materials were run in order to evaluate the potential changes to groundwater quality that may result from mining. Cores and chip samples from five holes drilled in the project area were selected for overburden analyses of a number of parameters. Samples were collected from the first six inches of material overlying the coal seam, the first 10 feet of strata overlying the coal seam, and additional strata selected as representative of the various major overburden lithologies. Most of the samples were collected from overburden Intervals 5, 6, and 7, which are the intervals most likely to fragment and fracture as a result of subsidence. These samples were analyzed for pH, saturation percent, conductivity, calcium, magnesium, sodium, SAR, textural parameters, nitrate as N, boron, molybdenum, and selenium. Anions, such as sulfate, bicarbonate, and chloride were not analyzed. Saturated paste extracts were used to determine the concentration of the calcium, magnesium, and sodium cations.

Post-mining groundwater quality commonly is predicted using overburden saturated paste extract data because, despite certain drawbacks, saturated paste extracts do provide order of magnitude estimates of potential concentrations (McWhorter, 1979).

The saturated paste extract procedure consists of wetting a sample with distilled water until a saturated paste is formed. Saturation is reached when the paste glistens as it reflects light and flows slightly. The resulting solution is extracted and analyzed for chemical constituents of interest. Since the saturation criterion is subjective, the degree of saturation achieved in one sample may be considerably different from that achieved in another. As a result, observed extract concentrations often are not directly comparable (Mednick, 1987).

Van Voast and Thompson (1982) concluded that potential post-mining, groundwater ionic concentrations could be calculated using the results from saturated paste analyses. In their study, cation concentrations were determined by saturated paste analysis. They calculated anion concentrations by assuming chloride content was insignificant; that bicarbonate and sulfate concentrations remained in the same relative proportions as those in the natural groundwater near each mine; and that cation/anion balance was maintained. They calculated dissolved solids concentrations by summing the concentrations of calcium, magnesium, sodium, sulfate, and

Table 4.2.4-6 Water-Quality for Underground Mine Workings[1]

Mine	Location	Date of Sample	pH (Lab)	Specific Conductance (Lab) (Microsiemens per cm 0 25 cm)	Calculated[2] Dissolved Solids (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Bicarbonate (mg/L)	Sulfate (mg/L)	Chloride (mg/L)	Sodium Adsorption Ratio	Laboratory
Republic No. 1	08N25E24AB	12/16/13			793	99.0	41.0	(110)[4]		334.0	359.0	15.0	2.4	Milwaukee Railroad
Republic No. 1	08N25E24AB	04/01/59			1200	120.0	80.0	(170)[4]		323.0	669.0	12.0	2.9	Department of Health
Republic No. 1	08N25E24AB	03/19/75	7.5	1730	1150	112.0	70.0	175.0	4.0	349.0	600.0	23.0	3.3	Department of Health
Republic No. 1	08N25E24AB	09/28/76	7.5		1375	118.0	64.0	250.0	4.0	383.0	750.0	21.0	4.6	Department of Health
Republic No. 1	08N25E24AB	05/08/79	7.5		1620	165.0	96.0	258.0	7.0	439.0	881.0	38.0	3.9	Department of Health
Republic No. 1	08N25E24AB	07/22/82	8.2			167.0		337.0		433.0				Department of Health
Republic No. 1	08N25E24AB	06/10/86	7.6		2125	193.0	118.0	364.0		425.0	1237.0		5.1	Department of Health
Republic No. 1	08N25E24AB	07/14/86	7.2		2530	212.0	117.0	455.0	6.0	538.0	1436.0	24.0	6.2	MBMG
Republic No. 1 (R-147)	08N25E24ABC8	01/05/89	7.8	3000	2535	204.0	121.0	483.0		538.0	1462.0		6.6	Department of Health
Republic No. 2	08N25E36	01/22/10			883	37.0	36.0	(220.0)[4]		415.0	339.0	16.0	6.2	Milwaukee Railroad
Republic No. 2 (R-151)	08N25E36CCAB	07/12/89	7.0	4550[3]	4055	327.0	145.0	792.0	12.0	926.0	2300.0	15.0	9.2	Energy Labs
Roundup 3 East	08N25E25AD	07/30/56	8.0	2010	1340	87.0	46.0	293.0	5.0	347.0	715.0	21.0	6.3	USGS
Roundup 3 (R-153)	08N25E23CADB	07/10/89	7.0	6430	5155	393.0	277.0	857.0	15.0	1150.0	3010.0	23.0	8.1,	Energy labs
Roundup 3 West	08N25E22	03/12/81	7.5	2200	1590	63.0	39.0	414.0	8.0	483.0	809.0	20.0	10.0	Energy Labs
Jeffrey (R-144)	08N26E180CBC	07/29/86	7.7	1890	1280	86.0	43.0	298.0	4.0	464.0	589.0	27.0	6.6	MBMG
Jeffrey (R-145)	08N26E18DCDC	07/30/86	7.6	1930	1320	88.0	44.0	301.0	4.0	465.0	624.0	29.0	7.4	MBMG
Jeffrey (R-145)	08N26E18DCDC	07/14/89	7.8	1800[3]	1325	76.0	38.0	332.0'	5.0	463.0	615.0	28.0	7.8	Energy Labs
Jeffrey (R-146)	08N26E18CADA01	12/18/86	7.6	1880	1290	86.0	42.0	301.0	6.0	471.0	592.0	27.0	6.7	MBMG
Prescott (R-154)	08N25E24CAAC	07/10/89	6.9	6260	5090	472.0	204.0	891.0	14.0	953.0	3000.0	27.0	8.6	Energy Labs
R-160	08N26E17DBAC	07/31/89	7.2	2780	2140	111.0	72.0	541.0	7.0	717.0	1030.0	25.0	9.8	Energy Labs

[1] Source: Wheaton and Van Voast (1989).
[2] Dissolved solids were calculated from the major constituents.
[3] SC is field measurement.
[4] Na calculated from SAR, Ca, Mg

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Table 4.2.4-7 Mammoth Coal Wells Water Quality Statistics

Parameter	Range Minimum Maximum	Mean	Standard Deviation	Number of Samples	Number of Non-Detects	Number of Sample Points
Spec Cond-Lab6125 C(umhos)	1400.000-3730.000	2272.444	775.319	45	0	10
pH-Lab of 25 C (su)	7.000-9.800	8.069	0.708	45	0	10
Acidity	0.000-0.000	0.000	0.000	45	0	10
Alkalinity as CaC03	299.000-812.000	492.067	109.894	45	0	10
Bicarbonate as HC03	321.000-991.000	571.467	156.867	45	0	10
Carbonate as C03	0.000-131.000	14.289	33.504	45	0	10
N03-NO2 Nitrogen – N	<0.050-2.000	0.125	0.293	45	26	10
Sodium Adsorption Ratio	1.290-43.100	18.720	15.192	45	0	10
Sulfate	251.000-1690.000	798.311	478.468	45	0	10
Total Dissolved Solids	862.000-2970.000	1607.689	678.725	45	0	10
Aluminum	<0.100-1.400	0.147	0.201	45	36	10
Arsenic	<0.005-0.008	0.005	0.000	45	42	10
Barium	<0.100-0.100	0.100	0.000	45	44	10
Boron	<0.100-0.200	0.111	0.032	45	16	10
Cadmium	<0.001-0.003	0.001	0.000	45	40	10
Calcium	3.000-189.000	67.244	65.745	45	0	10
Chloride	6.000-30.000	9.756	4.513	45	0	10
Chromium	<0.020-<0.020	<0.020	0.000	45	45	10
Fluoride	0.110-2.800	0.566	0.507	45	0	10
Iron	<0.030-3.680	0.297	0.715	45	20	10
Lead	<0.010-0.020	0.010	0.001	45	41	10
Magnesium	2.000-146.000	68.978	66.405	45	0	10
Manganese	<0.020-0.380	0.057	0.074	45	15	10
Mercury	<0.001-<0.001	<0.001	0.000	45	45	10
Molybdenum	<0.005-0.036	0.006	0.006	45	40	10
Nickel	<0.030-<0.030	<0.030	0.000	45	45	10
Phosphorus	<0.010-0.110	0.024	0.022	45	19	10
Potassium	3.000-32.000	9.822	7.072	45	0	10
Selenium	<0.005-<0.005	<0.005	0.000	45	45	10
Silver	<0.005-0.006	0.005	0.000	45	44	10
Sodium	85.000-712.000	405.489	201.916	45	0	10
Vanadium	<0.100-<0.100	<0.100	0.000	45	45	10
Zinc	<0.010-1.280	0.215	0.259	45	1	10

Notes: All units are mg/L unless otherwise noted.
ALL samples were collected between 4/89 and 10/91.
Non-detects assigned a value equal to the detection limit in calculation of mean and standard deviation.

0.4917 multiplied by the concentration of bicarbonate per liter. They then predicted post-mining groundwater quality by adding both the lognormal mean concentrations of cations from the paste analyses and calculated anions to those concentrations representing natural baseline groundwater conditions.

The same method was used to predict post-mining groundwater quality for the Bull Mountains Mine No. 1 for water flowing through the gob and rubblized zone. The predicted water quality for the current mining activities is the same as that predicted for mining the federal coal lease, however, the mine pool area would be larger. The results of paste extracts from overburden samples from the project area and groundwater analyses from baseline monitoring of Mammoth coal and lower overburden wells were used. **Table 4.2.4-8** summarizes these results. **Table 4.2.4-8** also presents, for comparison, the post-mining concentrations predicted by Thompson (1982) in his study of the Bull Mountains area. Thompson also used saturated paste extracts for his predictions. There is a good correspondence between the ionic concentrations predicted by the current study and the Thompson study (**Table 4.2.4-8**).

The paste extract predictions and the existing data on mine water quality in the Roundup area both suggest that TDS, sodium and sulfate concentrations in the groundwater of the mine workings will increase following mining. The paste extract predictions are reasonably consistent with actual mine water quality measurements in existing mines, although a few of the mines currently show higher TDS, sodium and sulfate.

Both the current mean average coal and overburden water quality and the predicted post-mining water qualities exceed sulfate, sodium, and TDS limits for drinking water. On this basis, post-mining groundwater quality would fall within either the Class II or Class III designation of the state. Under this system, the Class II groundwater would be considered suitable for livestock watering. However, some of the Class II wells may have undesirable concentrations of sulfate. Thompson's (1982) study concludes that “Re-saturation of reclaimed surface-mine spoils or of underground mine workings would occur over a period of years, during and after mining. Because groundwater flow rates are very small, the downgradient migration of the plume of lower-quality water would not affect water users even immediately adjacent to the mine for many years. The quality of water in the migrating plume would be altered somewhat by contact with the undisturbed rocks outside the mined area. The post-mining groundwater would still be suitable for stock watering, but not domestic use.”

However, Van Voast and Thompson's (1982) figures for predicted underground-mine spoils water (Table 4.2.4-8) indicate that sulfate concentrations are likely to exceed Montana stock water limits. In addition, more recent studies (Raisbeck, et al 2008) have shown that these limits may be unrealistic and that chronic consumption by livestock of water with sulfate concentrations greater than 1,000 mg/L, while not lethal, reduces feed intake, water intake, growth, and performance. This does not take into account that sulfate or other forms of sulfur may also be consumed in forage and other feedstuff. In ruminants, such as cattle, sulfate is also converted to sulfide which inhibits the bioavailability of trace elements such as zinc and copper. Analyses also indicate that overburden pH is essentially neutral to slightly alkaline and the acid-base potential of the overburden and coal mine waste is not acid-producing.

Table 4.2.4-8 Montana Water Standards and Predicted Post-mining Groundwater Quality

Constituent	Montana Groundwater Limits		Average 2007 Overburden + Mammoth Coal Groundwater[1]			Current Study Predicted Post-mining Groundwater (OB + GW)		Van Voast and Thompson[2] Predicted Underground-Mine Spoils Water	
	Drinking Water (mg/L)	Stock Water (mg/L)	Range (mg/L)	Mean (mg/L)	n[3]	Range (mg/L)	Mean (mg/L)	Range (mg/L)	Mean (mg/L)
pH Units (field)	6.5 - 8.5 [a][s]	-	7.15 - 8.15	7.54	16	**	**	**	**
COMMON ELEMENTS (mg/L)									
TDS	500 [a][s]	5,000	261 - 2585	1325	16	**	2505	1580-6110	3100
Bicarbonate as HCO3	-	-	285 - 918	548	16	**	1050	540-2050	1060
Calcium	-	-	12 - 171	73	16	21-822	120	46-150	83
Chloride	250 [a][s]	1,500	3.0 - 19.5	10.3	16	**	**	**	**
Fluoride	4 [p]	2	0.12 - 5.10	0.81	16	**	**	**	**
Iron	0.3 [a][s]	-	0.19 - 1.41	0.68	8	**	**	**	**
Magnesium	-	2,000	2.5 - 2.04	79	16	11-830	92	33-110	96
Manganese	0.05 [a][s]	-	0.02 - 0.23	0.06	11	**	**	**	**
Potassium	-	-	3 - 10.5	6.8	16	**	**	**	**
Sodium	250 [a]	2,000	9.5 - 740	265	16	22-1400	424	460-1840	920
Sulfate	250 [a][s]	1,500	13 - 1430	606	16	**	913	780-3000	1510
TRACE METALS (µg/L)									
Aluminum	50-200 [a][s]	-	*	250	1	**	**	**	**
Arsenic	10 [p]	50	*	30	1	**	**	**	**
Barium	2,000 [p]	-	100 - 100	100	2	**	**	**	**
Cadmium	5 [p]	10	*	*	0	**	**	**	**
Lead	15 [p]	50	*	*	0	**	**	**	**
Selenium	50 [p]	50	*	*	0	**	**	**	**
Silver	100 [a][s]	-	*	*	0	**	**	**	**
Zinc	5,000 [a][s]	24,000	20 - 250	100	9	**	**	**	**

Notes:
1 Ranges based on data collected January-December 2007.
2 Van Voast and Thompson (1982).
3 Number of wells with detectable levels of this constituent.
- There is currently no standard for this constituent.
[a] This standard is based on aesthetic quality of water (i.e. odor, color, etc.) and is not a health standard.
[p] U.S. Environmental Protection Agency maximum contaminant level or action level: revised October 13, 1999.
[s] U.S. Environmental Protection Agency secondary contaminant level: revised October 13, 1999.
* No detectable quantities were identified for this constituent.
** No future concentrations were calculated for this constituent.

Given that the water in the mines in the Roundup area has shown a general degradation in water quality over time, it is likely that a similar degradation of water quality, such as increased TDS and sulfate, would occur during the operation of the Bull Mountain Mine No. 1. Because the water in the Bull Mountain mine area is used predominantly for livestock watering and because sulfate is a concern for livestock, particular attention should be given to sulfate concentrations in groundwater monitoring. Sources of replacement water may need to be identified promptly to mitigate the effects of elevated sulfate concentrations.

The prediction of post-mining groundwater quality, presented above, specifically considers water flowing through the mined-out areas, the gob, and the rubblized zone. It is anticipated that groundwater flow and quality in the shallow fractured and weathered bedrock, which sources most spring flow, would not be degraded by effects of mining, especially in the topographically higher areas where the ground surface is more than 400 feet above the Mammoth coal.

Water quality of springs decreases in a downgradient direction. The shallow fractured and weathered bedrock has water quality comparable to the springs it sources. Whenever possible, this zone would be tapped using horizontal drains or vertical wells and used to supply water to mitigate losses of spring flow at topographically lower elevations. The water supply system would be designed to simulate the natural distribution of water downgradient from recharge areas. The quality of the replacement water would be comparable to or better than any lost or diminished water resources; therefore, there should be no impact on the wetland vegetation or soils.

Should it be necessary to obtain replacement water from a source other than the shallow bedrock, the underburden would be used. Mining should have little effect on the deeper underburden.

Prior to the installation of monitoring well 62720-03, most water quality and quantity data for the underburden had been obtained from sampling and testing monitoring wells completed in the rocks 30 to 40 feet below the Mammoth coal. This stratigraphic interval is comprised of interbedded siltstones, shale, and thin sandstones; having relatively low K values and poor water quality. To determine whether the underburden could be used as a source of replacement water, SPE investigated deeper stratigraphic intervals. Monitoring well 62720-03 was installed in a 50 foot thick fluvial channel sandstone. Other studies (Flores, 1981; Shurr, 1972; and Woolsey, 1917) and geophysical logs from oil and gas test wells indicate that the lower portion of the underburden is a fluvial channel facies-dominated system, and therefore, these massive sandstones are relatively common. If it is necessary to use the underburden as a source of replacement, then wells would be installed to tap this or other massive fluvial sandstones.

In addition, most of the private wells within the project area were completed in the underburden and are used for livestock watering and domestic purposes. Even without the benefit of the extensive hydrogeologic database, geophysical data, background information, and resources available to SPE, some of these wells were completed in intervals capable of sustaining relatively high yields of comparable quality water.

Concentrations of TDS in underburden water range from 943 to 4520 mg/L with a mean value of 2138 mg/L. Water of this quality, although lower than most spring water quality, still should be adequate for the maintenance of wetlands, and livestock and wildlife watering.

To illustrate this point, quality data for the water sample from well 62720-03 indicate a TDS concentration of 1620 mg/L and an SAR value of 7.71. The concentration of TDS is somewhat lower than the mean concentration of TDS for Litsky Springs (1720 mg/L), and slightly higher than mean TDS concentrations for all springs (1118 mg/L). The TDS value of the water from well 62720-03 is below the limit published in MBMG Form 196 of 2000 mg/L. Therefore, no negative effect to the vegetation or soils is likely to occur as result of using water from well 62720-03 to augment the water supplying the wetlands. Additional management practices should not be necessary as a result of the soluble salt concentration in the replacement water.

The SAR value of the water from well 62720-03 is higher than that noted in the springs (mean value for all springs, 1.62). The measured SAR of water from well 62720-03 is below the MBMG recommended and permissible limit for irrigation water.

If necessary, SPE would apply some simple management practices that can be implemented to minimize negative effects of the slightly higher SAR values for the water associated with well 62720-03. Measures that can be taken include: adding organic matter such as hay, bark, or wood chips to the wetland soils to enhance the organic content; or periodically adding gypsum to the soils or feed water (Overcash and Pal, 1981). These simple processes should eliminate any need for more intensive management practices to prevent build up of salts in the soil profile or the degradation of soil structure. Monitoring the success of mitigated springs would detect whether these additional measures would be required.

However, native wetland plant species in the western United States tolerate relatively high salt levels (Hammer, 1992). Plant species known to be salt-tolerant are dominant in many spring wetlands in the project area. These plant species include cattail, rushes, bulrushes, alkali grass, cordgrass, and salt grass. These plants should not be adversely affected by the slightly higher SAR values (7.71) for water from well 62720-03 falls within the range of values for all springs (0.17 - 13.1). However, this SAR value is higher than the mean value for all springs (1.62), but it is still within the acceptable standards for irrigation waters published in MBMG Form 196 (SAR range of 8 to 18 is crop and soil type specific).

In addition, the high natural organic content would tend to mitigate the adverse effects of waters with slightly high SAR (Camp and Meserve, 1974). Typically, wetlands tend to have soils rich in organic matter. A wetlands area would also indicate that a high leaching condition exists and a steady flow of water through the root zone exists, thereby minimizing any salt buildup.

Irrigation waters with higher SAR values can cause problems in areas where swelling clays are dominant in the soil. Soil types mapped in the area of the wetlands do not include a predominance of swelling clay soils.

4.2.4.2 Surface Water

As the longwall advances the roof is allowed to subside into the mine voids. Subsidence leaves a rubble zone up to 10 times the seam height and a fracture zone extending upwards 30 to 50 times the seam height (combined with the rubble zone). Depth of mining varies from about 200 feet below the lower valley bottoms to over 600 feet below the clinker capped ridges.

Spring water and groundwater that is intercepted by subsidence fractures and drained into mine voids would be collected in underground sumps and, if necessary, pumped to the surface facilities area into a sediment pond. This water would be used for mine operations at the preparation plant or longwall mining equipment. If excess water accumulates, it may be discharged through the provisions of the existing MPDES permit. Once mining passed through an area, water levels may increase in the overburden, alluvial or underburden units, increasing flow at existing springs or streams, or emerge as new or relocated springs or streams, as discussed in the groundwater section above. Changes in water quality are expected within the fractured zone due to water coming into contact with collapsed rubble and fresh mineral surfaces. Increases in TDS are likely to be most evident from water pumped from the mine.

Mitigation plans already exist in the permit document for all springs in the project area, including the federal lease area. The plans include restoring springs, stream reaches, and ponds by opportunistic development of springs where they appear, guzzler emplacements, horizontal wells, vertical wells, pipeline systems, deepening or rehabilitating existing wells, reclamation of stream reaches and function, and water treatment where appropriate or necessary and restoring pre-mine land use (SPE 2009).

4.2.4.2.1 Effects of Mining on Local Geomorphology

Operations at the Bull Mountains Mine No. 1 would consist of underground continuous and longwall mining. The land surface of the area to be mined that might be impacted by subsidence is used primarily for livestock grazing and wildlife habitat. Subsidence effects are not anticipated to cause material damage or diminution of the renewable resources. Surface disturbances would occur to the acreage occupied by the main facilities area and Waste Disposal Area (WDA). Other potential effects on the land surface would occur above the longwall mine subsided areas, including 1) changes to the drainage channels; 2) impacts from general land surface lowering; and 3) surface subsidence cracks.

Longwall panels feature yielding pillar design, promoting uniform subsidence profile and also providing stable mining conditions. This smooth subsidence profile is classified as trough subsidence, and normally a gradual flexure of the surface is observed. It is anticipated that maximum subsidence would be 70 percent of extraction height with an angle of draw of 22.5 degrees. In areas with an average coal height of 8.5 feet, maximum subsidence would be approximately 5.9 feet, and in areas with an average coal height of 11 feet, subsidence would be approximately 7.7 feet (Agapito and Maleki, 1990). A subsidence monitoring program would be implemented to measure the subsidence and to record any mining induced damage to surface resources.

Mine area stream channels may be affected by the surface expression of mine subsidence. The profiles of these drainages may be modified by small ridges held up over barriers, pillars, and mains, and by depressions over the longwall panels. The occurrence of these modifications would be dependent upon the orientation of the drainages to the mine layout. Generally, the mine would only pass under a drainage approximately one time in a year, so the progression of the effects can be monitored, and enduring detrimental effects can be mitigated. These drainages are ephemeral and flow in response to storm events. If it is determined that surface flow is being diverted downward into the mine workings, then culverts or piping would be used to contain this flow and carry it over extraction areas. If ponding occurs in the depressions, then an evaluation

would be made to determine whether it may be used opportunistically as an alternative source of replacement water.

Surface fractures may temporarily open up over areas of tensional stresses in the rocks overlying the area of active mining. These cracks would be relatively small and shallow and would heal with time (Agapito and Maleki, 1990). If enduring detrimental impacts to the hydrologic system occur as result of surface fractures, then SPE would implement remedial measures such as filling the fractures, using culverts or pipes to divert flow across them, or some other appropriate mitigation measure.

4.2.4.2.2 Effects on Channel Characteristics and Downstream Users

The mine effects on channel characteristics and downstream users would be negligible as discussed above. The mine effects to downstream use or users would also be negligible. SPE has made a commitment in the existing permit document to protect and replace the water supply of any owner if such supply has been affected by the underground mining operation.

4.2.4.2.3 Effects on Surface Water Quality

No surface facilities would be located on the federal coal lease area. The effects of sediment pond discharges on stream water in the existing mine facilities area would be negligible. All sediment ponds are designed to contain the 10-year/24-hour runoff plus sediment. Due to the low precipitation in the area, pond discharges should be very infrequent. In the event that a sediment pond discharge should occur, sampling, effluent limits, and reporting would comply with the MPDES requirements. Routine maintenance of the ponds would ensure the storage capacity. Where practical, runoff from undisturbed areas would be diverted around the sedimentation ponds in order to decrease the quantity of water to be treated within the ponds. Some undisturbed area waters would enter the ponds, however, and would be treated and discharged under permit requirements.

During the life of the mining operation, ditches and culverts would be employed to handle surface runoff within and around the mine facilities area. All ditches are designed to convey the 10-year/24-hour precipitation event, except those in the WDA, which are designed to convey the 100-year/24-hour precipitation event. All ditches and culverts would be routinely inspected to ensure that accelerated erosion is not occurring at the outfalls. No long term or permanent water quality impacts are anticipated due to the emplacement of these structures.

4.2.4.2.4 Effects of Runoff on Stream Quantity and Quality

No permanent effects to the quantity and quality of stream flow are anticipated from disturbed areas within the mine facilities area. Since this is an underground operation, the total disturbed surface acreage is small. All flow from these disturbed areas would be discharges into sedimentation ponds and would meet approved MPDES discharge criteria prior to discharge into PM Draw. Discharge from mine dewatering would also pass through a sedimentation pond and would meet approved MPDES discharge criteria (see Groundwater section above for predictions of mine water quality) prior to discharge into PM Draw. Reclamation and revegetation of the disturbed areas would prevent detrimental impacts from occurring. All flow is ephemeral in the mine plan area; therefore, flow impacts would be negligible.

4.2.4.3 Mitigation Measures

SPE is committed to mitigating hydrologic impacts caused by mining through the measures approved in the permit, or by alternative measures to be developed in consultation with the MDEQ. Depending on the resource, impact, and mitigation alternatives available, SPE will rehabilitate water resources as appropriate. This might include drilling new wells, piping water from wells or springs to specific locations, development of new springs, repair of stream channels, repair of ponds, or establishment of other water management structures, such as guzzlers (water harvest tanks). To implement these measures, SPE has developed a strategy for mitigation of any short or long-term hydrologic or wetland impacts that occur due to mine development, operation, or reclamation. The mitigation plan will follow a multi-step process that has already been initiated for phases of progression of mining operations. These steps include:

Pre-mining Phase

- Determine water use patterns and demands to be maintained.
- Estimate the time required for potential hydrologic impacts to appear after mining begins.
- Determine mitigation alternatives for impacted sites.
- Obtain MDEQ approval and if necessary, conduct appropriate field surveys of the areas in which mitigation will occur.
- Establish an "enhancement bubble" of mitigation measures in advance of any potential impacts by testing and evaluating alternative materials and measures for repair and restoration of ponds, stream channels, or wells.
- Establish and monitor reclamation targets for hydrology, vegetation, aquatic ecology and land uses.

Operation Phase

- Monitor to determine if impacts have occurred.
- Inspection to define extent of changes.
- Emergency response and temporary mitigation to satisfy current water uses.
- Agree on and complete appropriate mitigation measures.
- Monitor to determine reclamation success.

Post-mining Phase

- Initiate final reclamation and mitigation program.
- Continue maintenance on mitigation measures as required.
- Establish final reclamation standards for all measures completed.

4.2.5 Soils

Mining of the federal lease area would not require any surface facilities or disturbance and would have no direct effect on soils in the lease area. Surface subsidence over the mined areas would also have no indirect effect on the nature or productivity of soils. Steep slope instability and failure, rock toppling, and alteration to topography and drainage patterns resulting from subsidence could lead to localized soil changes on steep slopes and at the bases of slopes. These changes would have negligible effects on productivity. Pre-mining surface drainage patterns would be restored. In general, it would be less damaging to allow soils to heal naturally than to use any mechanical treatment.

4.2.5.1 Mitigation Measures

Subsidence over mined areas may alter surface drainage and accelerate degradation of erosive or unstable soils in limited areas. In consultation with MDEQ, soil salvage, regrading, soil replacement, or seeding may be necessary to maintain existing soils and pre-mine land use. In most areas of subsidence where erosive or unstable soils are not present soil profiles would remain intact and retain their chemical and physical characteristics. Mitigation of surface effects of subsidence to soils would be evaluated on a site-specific basis in consultation with MDEQ.

4.2.6 Vegetation

The Proposed Action would not include any surface ground disturbance or surface features, but would lead to subsidence over the longwall mined areas which may temporarily affect upland and wetland vegetation. There could be short-term indirect effects to vegetation resources resulting from subsidence over the mined areas. There are perennial ponds and stream reaches created by flow from 15 springs on the federal coal lease area and 12 springs located adjacent to the lease area. Changes in spring flow would affect the distribution of these wetland habitats. It is expected that vegetation would naturally re-colonize disturbed areas. Because disturbances would occur subsurface, the further spread of invasive, non-native plants is not expected.

4.2.6.1 Mitigation Measures

Subsidence would result in localized areas of erosion and slope instability or altered surface drainage which could disrupt the distribution of vegetation. Mitigation of altered surface drainage is discussed under water resources. Areas of surface disturbance would be evaluated on a site-specific basis and, if the extent of disturbance warranted, a site-specific repair and mitigation plan would be developed and implemented in consultation with MDEQ.

4.2.7 Wildlife

Wildlife is highly responsive to vegetation distribution because vegetation communities are essentially the habitats for wildlife. The Proposed Action would not have any surface disturbance that would directly affect wildlife. However, the Proposed Action may affect wildlife through its indirect effects on vegetation, though these effects are expected to be minimal. Slight changes in topography, spring flow, and vegetation resulting from subsidence over the longwall would lead to minor local changes in wildlife habitat, but would not change the distribution of habitats or wildlife populations. Effects to wildlife as a result of the operation of the surface facilities complex would not change as a result of the Proposed Action, however, would be extended for

an additional 7 years while the federal coal is mined. The operations plan includes measures to replace affected wildlife habitats with similar habitats.

Critical big game habitats and migration corridors are not known to occur in the coal lease area. Thus, any indirect effects to vegetation arising from subsidence would not impact the survivorship and productivity of big game species in the project area. Effects to big game as a result of the operation of existing surface facilities would not change as a result of the Proposed Action.

There is potential for bat roosting habitat to be impacted in the subsidence area. Twelve bat species have been identified in the project area. Many of the bats may use rock outcrop areas for roosting. This habitat may be locally affected in steep slope areas by subsidence and rock toppling over longwall mined areas. However, these species are adaptive and if displaced, would likely move to new roost locations. Subsidence alone is not expected to significantly change the distribution of bat populations.

Subsidence may also minimally affect bat and bird roosts and nests in trees and cliff areas. The average subsidence, estimated to be 7.7 feet, is expected to be uniform across large areas. This may result in rock toppling and damage to some trees where nests may be located. This could cause localized damage to raptor or other migratory bird nests within the subsidence area, and possibly some limited mortality of eggs or young if the subsidence occurred during the breeding season. Birds are adaptive and if displaced would be expected to re-nest in new locations in subsequent years. The only raptor nest identified during surveys within the subsidence area is a great horned owl nest located in Section 9 (adjacent to lease tract in Section 8) as shown in **Figure 3.7-1** (WESTECH 2007, 2008). Other raptor nests were observed near surface facilities, with the nearest being located to the east and approximately 0.13 miles from the existing Fattig Creek Road, as shown on **Figure 3.7-1**. In addition, a sharp-tailed grouse lek location was observed in 2006 to the east of the surface facilities and approximately 0.22 miles east of existing Fattig Creek Road, as shown on **Figure 3.7-1**. These nest and courtship locations would not be further affected by the continued operation of the existing surface facilities (WESTECH 2007, 2008).

Aquatic habitat in the area includes streams, ponds, springs, seeps, and areas associated with wetland communities. The Rehder, Fattig, and Railroad Creek drainages are ephemeral; however, there are perennial ponds and stream reaches created by flow from 15 springs on the federal coal lease area and 12 springs located adjacent to the lease area. Changes in spring flow would affect the distribution of these habitats. Depending on the rate and extent of changes in spring flow, local populations of amphibians and aquatic species may experience local short-term modifications in habitat.

4.2.7.1 Mitigation Measures

Subsidence may result in local changes to surface and groundwater flow and to the distribution of vegetation communities. This would affect the distribution of resources available to wildlife. Mitigation for water resources and vegetation are discussed in those resource sections.

4.2.8 Threatened, Endangered, and Special Status Species

Federally threatened or endangered species, particularly the black-footed ferret and the whooping crane, have not been identified in federal lease areas. They would not be affected by the Proposed Action.

Montana special status species that have been documented during mine-related studies include several raptors, migratory birds, bats, the Great Plains toad, the Northern Leopard frog, and sagebrush lizard. The greater sage-grouse and sagebrush lizard occur exclusively in sagebrush communities, which are sparse in the project area. The remaining birds and bats are mobile or migratory and are unlikely to be affected by local changes in vegetation and drainage resulting from subsidence over the mined areas. The Great Plains toad and Northern Leopard frog are dependent on mesic habitats and would be affected by changes to springs and drainage patterns. Mitigation measures identified to minimize effects or replace spring flow would limit the effects of mining on these species.

4.2.9 Ownership and Use of Land

The proposed lease area is both private and federal surface with federal minerals administered by the BLM. Adjacent land is privately owned. Under the Proposed Action, leasing of the coal for underground longwall mining would not result in surface modifications within the lease area that would limit or change current surface uses. Subsidence over longwall mined areas may result in localized slope instability, rock toppling, and alteration of topography at the interface between mined and un-mined areas. This may slightly alter patterns of use in the short term during subsidence, but would not have a long-term effect on use of the land.

Kern et al (2002) prepared a study of effects to residential property values from longwall coal mining. The report does not discuss the specifics of particular cases, but general patterns. Nevertheless, these patterns may provide some considerations for the Bull Mountains Mine No.1. In the area of the study in Pennsylvania, longwall mining operations occurred in more rural and remote sections of the counties rather than densely developed areas. Consequently, the subsidence may affect a relatively small number of structures over a large area. There also may be other kinds of property damage not addressed by this report. As discussed in Section 2.1.1.3, the surface effects of subsidence over longwall mining are affected by: the thickness of the overburden; the thickness of the coal seam removed; the type of rock in the overburden; surface topography; the width of the longwall panel; and the location in relation to the center and edges of the longwall panel. On an ideal uniform surface, the greatest structural stress occurs where there is the greatest difference in vertical displacement, horizontal tension, and horizontal compression or displacement. Kern et al (2002) note that subsidence deformation increases significantly as the longwall panel width increases in proportion to the depth of the coal seam. Longwall panels wider than the depth of the coal seam, rather than simplifying the surface effects, result in multiple points of maximum subsidence. Kern et al (2002) found that the value of properties in rural areas was more strongly affected by land use density and access to public infrastructure (roads, sewer and water) than by proximity to longwall mining. In this study, less than 8 percent of the properties located in areas where longwall mining was active filed claims with the coal companies for damage. Some property owners may not have filed claims for damage that occurred because they were not aware of the process or did not consider it worth the effort. Nevertheless, it appears that property damage was generally not extensive or extreme. The

study found that, of the properties that filed claims for subsidence damage with the coal companies and also sought tax assessment reductions because of property damage, many returned to or surpassed their previous assessment value. The report also noted instances of road damage in the mining areas reviewed by this study. The authors concluded that with regular maintenance and planning these subsidence effects can be minimized.

Surface structures located within the lease area that may be affected by subsidence include fences, roads, and trails in all sections, water conveyance pipeline for livestock in Section 22, building structures in Section 4, home sites in Section 4, spring developments (including ponds, water tanks, and pipes) in all sections for livestock and wildlife, and wells located in sections 4, 10, 14 and 22. SPE would be required to conduct a pre-mine survey to determine the status of all structures above the mine area, monitor subsidence during and after mining, and immediately repair damage to the structures. SPE would also post a reclamation bond to insure availability of funds to repair damages to identified structures. This bond would not cover construction of structures to be built after mining or subsidence damage to undeveloped rangeland. In addition, Musselshell County would require that SPE repair any damage to Fattig Creek County Road.

4.2.9.1 Mitigation Measures

- SPE would repair damage to existing buildings and structures resulting from subsidence.
- SPE would repair damage to existing infrastructure over mined areas such as roads, fences, communications facilities, and utilities.
- Where there would be known or reasonably anticipated damage to infrastructure or communications facilities, SPE would submit a protection and mitigation plan to MDEQ for approval prior to mining under that area.
- SPE would publish the mining schedule at least six months prior to mining under an individual's land, to provide adequate warning of periods of risk and to minimize the potential risk to humans and livestock.

4.2.10 Cultural Resources

4.2.10.1 Prehistoric and Historic Resources

The federal coal lease area has been surveyed for cultural resources. No resources eligible for the National Register have been documented, however, one site (24ML667) is unevaluated because of the potential for deeply buried cultural deposits. Until this site is evaluated, it should be treated as an eligible site. 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 and, to date, no eligible cultural resources have been identified in the LOM area on steep slopes or in areas of cliffs and rock outcrops. If potentially eligible cultural resources are identified that may be affected by mining, site-specific treatment plans will be developed and implemented.

4.2.10.2 Native American Religious and Traditional Concerns

Formal consultation is a government-to-government process that must be completed by the BLM for the federal coal lease area and by the state for a permit to mine the lease area. Formal Native American consultation has been initiated with the Crow and Northern Cheyenne and is ongoing. To date, no concerns have been raised.

During the informal consultation that occurred in the 1990s, no potential TCPs were identified in the proposed lease area (Kooistra-Manning and Deaver 1993).

In general, rock shelters, rock art, large rock features, or burials could be affected by areas of slope failure and rock toppling. However, no similar sites were identified during the 2008/2009 cultural inventory of the proposed lease area. Springs were identified as potentially sensitive resources during the informal consultation in the 1990s and would need to be addressed regarding mitigation if effected by subsidence.

Under the Proposed Action, this disturbance of the quiet zone of the deep earth and disruption of the spirits that dwell in springs cannot be avoided. Native American religious and traditional concerns, if present, could be affected by subsidence above mined areas.

4.2.11 Visual Resources

The Proposed Action would not include any direct surface disturbance or surface facilities in the federal lease area. Mining of the coal seam would result in subsidence over the mined areas which could result in slope instability and failure, rock toppling, and alteration to topography and drainage patterns. In general, this would not affect scenic views from the county road or from residences in the Bull Mountains. This would alter details of the scenery such as local rock features in steep slope areas, but not the overall nature and quality of the scenic and aesthetic values.

4.2.12 Noise

The Proposed Action would not create any surface activity in the federal lease area and there would be no direct effects as a result of underground mining. The Proposed Action would facilitate ongoing mining and would lead to the continuation of current noise levels and effects from the mining operations at the surface facilities complex.

Baseline noise level data were collected from the PM Mine when it was still in operation. Construction and heavy equipment operation noise levels ranged from about 72 to 95 dBA near the preparation facility to an ambient noise level of about 35 to 40 dBA. SPE anticipates that noise levels at the Bull Mountains Mine No. 1 facilities would be comparable during the permitted coal mining operations. During operation of the surface facilities, principal noise sources would be preparation plant equipment, other stationary machinery, ventilation fans, heavy equipment, conveyors and rail cars. Noise levels at the facilities during operation range from 72 to 95 dBA. These noise levels would decrease and reach acceptable outdoor levels of about 40 dBA at the nearest residences about 4,500 feet from the surface facilities. Most residences in the general area are much farther from the surface facilities. However, the rail loop reaches within about 2,100 feet of the nearest residence to the south. It is expected that as many as three coal trains a day would carry coal from the mine to the BNSF Railroad mainline at Broadview. Coal production from the lease area would not increase train traffic noise in local communities, but would extend the transportation of coal by an additional seven years.

4.2.12.1 Mitigation Measures

Noise levels are monitored and kept within state and federal guidelines and standards. Noise control measures include well-maintained heavy equipment and enclosed stationary equipment.

The impacts of noise from the mine surface facilities would affect very few people and would be present only as long as the mine is operating. There would be no change in existing noise levels as a result of currently permitted mining operations. There would be no new noise impacts from leasing the federal coal, however, existing noise from surface facilities would continue for an additional 7 years.

4.2.13 Transportation Facilities

The Proposed Action would not include any surface activities or traffic in the federal lease area that would alter existing transportation infrastructure or facilities or require additional maintenance. No additional demand for transportation of employees to the surface facilities complex would be required. Mining operations, processing, and coal transportation would be extended throughout the period required to mine the additional available coal from the coal lease area. There would be approximately three trains a day carrying coal from the mine. Railroad traffic levels would continue at the existing rate for an additional seven years as a result of the availability of coal from the coal lease area.

4.2.14 Hazardous and Solid Waste

Under the Proposed Action, there would be no surface activities in the federal lease area that would create any known hazardous, solid, or liquid waste. Solid and liquid waste would continue to be produced at the mine facilities and, as the mine advances, these wastes would result from activities associated with mining the leased coal. Continued operation of the surface facilities during mining operations would produce waste material from underground development and from coal processing which would be deposited in the permitted WDA. The use of the WDA for waste material disposal would result in the filling of the upper reaches of the ephemeral side drainage of Rehder Creek.

Procedures are in place for handling solid and liquid waste produced by mining activities, and these procedures would continue to be used. Waste would be produced by daily operation of the facilities and office, operation of machinery and mining. Waste materials would include garbage, non-mineral waste and sewage; lumber and debris; grease, lubricants, paints, and flammable liquids; underground development waste; and coal processing waste.

4.2.14.1 Waste Disposal

Trash and non-mineral waste would be accumulated in commercial dumpsters located in convenient locations around the site. Trash from these dumpsters would be picked up regularly by a licensed commercial trash service for disposal off site. Lumber, garbage, and other debris would be placed in storage containers which would be regularly picked up by an appropriately licensed commercial waste disposal company.

A septic tank and drain-field has been constructed in the mine facilities area to treat sewage and other waste water from potable systems. This system is designed to comply with state and federal regulations. System design capacity complies with state regulations, considering the number of men working and the number of shower and restroom facilities provided.

4.2.14.2 Measures against Acid/Toxic Materials

Storage and final disposal of grease, lubricants, paints, and flammable liquids would be in compliance with MDEQ Rule 17.24.507. Grease, lubricants, paints, and flammable liquids would be stored in steel drums and periodically picked up by, or delivered to, an appropriately licensed and bonded liquid waste disposal company.

4.2.14.3 Disposal of Underground and Coal Processing Waste in the WDA

Underground development waste that cannot be stored underground together with coal processing waste would be disposed of in the WDA (**Figure 2.1-4**). Generally, underground development wastes would represent poor quality coal, shale, claystones, mudstones, and siltstones that are mined to access economic coal zones or to clean up roof falls, maintain floor grades, or to maintain necessary roof heights. If possible, this waste would be stored underground. Otherwise, this material would be conveyed to the WDA and blended with the coal processing waste. Coal processing waste is also made up of shale, claystones, sandstones, mudstones, siltstones and unrecovered coal fines that are removed from mined coal (raw coal) to make it marketable. Since underground development waste would represent less than 10 percent of the WDA material, design details for the WDA are based on the more conservative requirements for coal processing wastes (SPE 2009). No underground development or coal processing wastes from outside the permit area would be disposed of in the WDA without approval from the MDEQ.

Underground development and coal processing waste is being hauled and placed within the permitted area. The WDA is designed to control runoff by diverting surface runoff from undisturbed areas around the fill and directing runoff from disturbed areas in ditches through sediment ponds to achieve discharge requirements in compliance with MDEQ Rules 26.4.631 and 26.4.633. The WDA fill structure would be covered with 4 feet of non-toxic material (including topsoil and sub-soil) and revegetated according to the mine Reclamation Plan when final fill contours are achieved (both during operations and at end of life). For those areas of the WDA which have been enhanced for topographic diversity (knobs and the top and nose of the WDA face at the head of the valley) additional placement of spoil material is planned to further reduce potential erosion problems. The enhanced topographic areas of the WDA would be constructed with the standard 4 feet of non-toxic material (topsoil and sub-soil) with the placement of an additional 6 feet of spoil located between the non-toxic material and the coal fines. Stockpiles would be vegetated to minimize erosion and reclaimed to approximate original contour when the WDA is no longer in operation. The planned post-reclamation land use is rangeland and wildlife habitat. The WDA would not create a public hazard either during construction or after reclamation and would be posted and patrolled to limit public access. Wastes would be well-compacted and covered with non-toxic material to eliminate the possibility of spontaneous combustion.

All vegetation and other organic materials would be removed from the WDA fill area and stockpile areas before topsoil and are removed and stockpiled. No underground development processing wastes would be placed until vegetation, and sub-soil has been removed and diversion ditches and sub-soil or coal topsoil sedimentation ponds are operable. Topsoil and sub-soil would be removed in a progressive fashion in advance of fill construction to minimize exposure to wind and water erosion and disturbed areas would be kept to reasonable minimums. Salvage

operations would be conducted periodically as required in advance of the fill construction area. SPE would maintain a buffer zone of sufficient area to avoid contamination of soil by coal processing waste. SPE would provide diversion and collection ditches, riprap and vegetation of disturbed areas to minimize surface erosion.

The WDA would ultimately meet the definition of a head-of-hollow fill. Waste materials would be placed in maximum 2-foot lifts and compacted to at least 90 percent maximum dry density to provide stability and prevent mass movement. Coal wastes would be mixed in the coal preparation as part of the cleaning process, and would be further mixed during transport and spreading at the WDA. Mixed coal waste would be spread in two foot lifts and allowed to air dry, as necessary, prior to compaction.

Analyses of underground development and coal processing wastes were conducted to determine the acid-base potential of the materials to be placed in the WDA (Dollhopf 1989). The study determined that these materials are non-acid forming due to either their low sulfur content and/or lack of framboidal pyrite. The acidity from any pyrite contained in the waste will be neutralized by the inherent inert base chemistry of these massive morphology materials. Based on the results of the analyses, it was concluded that coal refuse will not produce acid upon exposure to water and oxygen. Liberation of metals was tested from TCLP laboratory analysis of the waste material by SPE in December 2009 (SPE 2010) and all parameters were found to be not detected at the reporting limit or within maximum contaminant levels. With the control of surface water run-on and low precipitation of the area, negligible effects to surface and groundwater of the WDA area are expected. To monitor these predictions, SPE will conduct testing of the underground development and coal processing wastes using EPA Test Method 1627: Kinetic Test Method for the Prediction of Mine Drainage Quality (EPA 2009b).

The WDA does not contain any springs, natural or manmade water courses (except ephemeral flow in drainages), or wet-weather seeps.

4.2.15 Socioeconomics

Under the Proposed Action, the mineral rights of the federal coal lease areas would be leased, and operation of the mine would continue at its current level for the proposed mine plan of 12 years. The project would contribute to the maintenance of current socioeconomic conditions in the Bull Mountains area at current levels, and would prolong the duration of employment for current employees. The issuance of this lease adds reserves to an existing mining operation, and would not adversely impact the social or infrastructure systems of the local communities. These local communities are located in a coal mining area where mining activities have sporadically occurred for over 100 years. Without issuance of this lease, employment would not reach the mine's projected sustainable term.

Implementation of the Proposed Action would result in effects to the social and economic structure and community resources of the affected counties over the additional project life of 7 years that would be a continuation of effects from current mine activities. The mine would provide employment for the existing mine workforce of 200 for an additional 7 years. It is not anticipated that the proposed mining activities would require the hiring of additional workers. The extension of the life of mining activities at Bull Mountains Mine No. 1 under the Proposed Action would maintain current mining employment in the affected counties, and provide for the

continued payment of local, state, and federal taxes by SPE and its employees. Local government fiscal conditions in particular depend on sustained economic activity and continued revenues from sales and use taxes and property taxes. Counties would continue to receive revenues from taxes, fees, and permits. Continued operation of the mine would contribute to severance taxes imposed on coal production. Severance taxes are paid directly to the State of Montana. Coal Gross Proceeds on coal production support county governments where the mine is located. The proceeds revenue is proportionally distributed to the appropriate taxing jurisdictions in which production occurred based on the total number of mills levied in fiscal year 1990.

Additional personal income would be generated for residents in Musselshell County and the State of Montana by circulation and recirculation of dollars paid out as salaries, business expenditures, and as state and local taxes.

Most additional required construction and operations workforce would be available within the Billings area. The mine recently expanded the operations workforce by 50 workers, of which an estimated 20 percent were estimated to migrate into the counties from other regions, for a total of 200 workers. It is anticipated that effects to social and economic conditions in the counties would be very small. The relatively small number of in-migrating workers is unlikely to affect permanent and temporary housing stock, which is plentiful in Billings.

Because there would be no significant increase in population from in-migration, construction, operation, and maintenance of the proposed project; there would be no increase or decrease in the need for police, fire, medical or other community resources in Musselshell and Yellowstone counties. Similarly, there would be no change in housing requirements.

The Bull Mountains Mine No. 1 project currently generates a monthly payroll in Montana of over $400,000, adding much needed revenue and employment to the local economy (SPE 2009). The monthly contribution would continue an additional 7 years with the approval of the proposed project.

The federal rents and royalties would be determined following the decision to lease the coal. The estimated royalties would be 8 percent of the revenue realized from sale of the federal coal. The estimated amount and distribution of these royalties would be determined at a later date. The federal royalties would also contribute to the county and community revenue.

The total coal tax burden for coal production in Montana is approximately 14 percent of gross revenues, or approximately 20.2 percent of the contract sales price (Montana Department of Revenue 2009). Based on the estimated annual production of up to 10 million tons clean coal and the 2007 annual average open sales price of $11.79 per short ton of coal produced in Montana (Energy Information Administration 2009), the proposed project could contribute a potential $23,816,000 million annually in tax revenues to the state. The actual annual taxes that would be paid would vary according to several factors, including the actual annual production and the open sales price per ton of coal.

The Proposed Action would have minimal effects to the rural character valued by residents of the Billings Field Office area. The apparent naturalness, opportunities for solitude, and other

characteristics of the rural landscape would remain unchanged under the Proposed Action; however, effects to these qualities from the sights and sounds of current mining activities would continue for an additional seven years. Existing trends in population growth, energy development, and popularity of recreational opportunities in the region (south-central Montana) would combine to change the area over time, as more people use and enjoy it.

4.2.16 Environmental Justice

The project area is outside the Crow and Northern Cheyenne Indian Reservations, does not include any Indian Trust Assets, and does not contain any locations specifically named in tribal treaties. The mine surface facilities complex is about 35 miles from the nearest reservation lands and operation of the mine would have no direct effects on the natural and physical environment of the reservations. No adverse human health or environmental effects would be expected to fall disproportionately on the reservations or on other minority or low income populations from the Proposed Action.

4.2.17 Short-term Uses and Long-term Productivity

NEPA requires consideration of "the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity" (40 CFR 1502.16). As declared by the Congress, this includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans (NEPA Section 101). The discussions contained within this environmental consequences chapter provide the analysis and relationships of shorter uses and long-term productivity.

4.2.18 Unavoidable Adverse Effects

For the Proposed Action, subsidence is unavoidable if coal is mined in a productive and economic manner. The Geology Section discusses the affects of subsidence and other resource sections discuss the indirect effects of subsidence.

4.2.19 Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources are those that cannot be regained. In this case, the removal of mined coal is an irreversible commitment of resources. Irretrievable commitments are those that are lost for a period of time. In this case, the localized loss of soil and rock toppling on steep slope as a result of subsidence are likely to be irretrievable.

4.3 Cumulative Impacts Analysis

Cumulative impacts are those impacts that result from incremental effects of an action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or action undertakes such other actions.

4.3.1 Past and Present Actions

Past and present actions in the general area include past small-scale coal mining, the development of the Bull Mountains Mine No. 1, ranching, recreation, and dispersed rural residential development in the upland divide area north and east of the existing mine between the Rehder and Fattig Creek drainages.

Past coal mining in the area has included the PM Underground and Surface Mine that was acquired by SPE, the Meridian Coal Test Pit, and several historic small underground mines on the coal outcrop of the Mammoth seam. Historic underground mining was by room and pillar methods and there is some limited residual subsidence at these locations. The PM Mine was a surface and underground coal mining operation that the Bull Mountains Mine No. 1 surface facilities were built around. The mine was a small continuous miner operation with six workers that operated intermittently from the 1930s to the early 1970s. The Meridian Coal Test Pit was a surface mine developed by Meridian for marketability testing of the Mammoth seam coal reserves. Approximately 180,000 tons of coal was extracted by open pit techniques in 1989 and 1990. This coal was trucked to the Huntley load-out facility. Peak employment by this mine was about 20 employees.

Historically, the project area has been used for ranching. The area also supports wildlife. The project area includes portions of the lands formerly used by four large ranching operations. Two of those ranches are still active.

4.3.2 Reasonably Foreseeable Action Scenario

Foreseeable future actions in the general project area include additional coal mining to the north of the Bull Mountains Mine No. 1 LOM area, continued ranching activities in the Bull Mountains area, and additional dispersed rural residential development (**Figure 4.3-1**). Future subdivisions on private lands typically increase the demand for access roads and utilities rights-of-way across BLM public lands.

The Mammoth coal seam to the north of the LOM area may be considered for mining as the coal reserves become exhausted at the Bull Mountains Mine No. 1. This is not currently a reasonably foreseeable action. No mine plans are available to assess the potential effects of this mining. While it could be speculated that mining methods would be similar to that of the Bull Mountains Mine No. 1 and the effects would also be similar in nature and magnitude, it is also possible that technology may change prior to mining this area. Development of the Mammoth seam reserves north of the divide could continue mining activities for an additional 10 to 20 years at production levels of 10 to 15 million tons per year.

The ongoing dispersed rural residential development includes portions of sections 4 and 5, north of Rehder Creek accessed by Fattig Creek Road. It is reasonably foreseeable that this residential

development may continue to the north and west of Fattig Creek Road. This development would increase human activity in the area affecting local traffic, noise, and wildlife populations.

Ranching operations in the area are expected to continue for the foreseeable future. As economics and the desire to ranch large areas may diminish, future subdivisions may occur, thus,

causing an increase in population and human activities in the area. These activities may cause changes in vegetation communities and additional pressure on wildlife populations.

4.3.3 Cumulative Impacts

The potential impacts of continued mining in the Bull Mountains at Bull Mountains Mine No.1 or any other mine that may be developed in the area would incrementally add to cumulative impacts. These impacts individually and in the short-term would be minor. If mining continues to the north of the Bull Mountains Mine No. 1 LOM area, impacts would be similar. If additional residences are built in this area, and if the coal reserves to the north are developed, there would be the potential for subsidence damage to structures over the mined areas. Livestock grazing in the region has been managed for sustained production, which relies on minimizing adverse impacts to the environment. Continued ranching under current management practices would have little or no cumulative impact on resources.

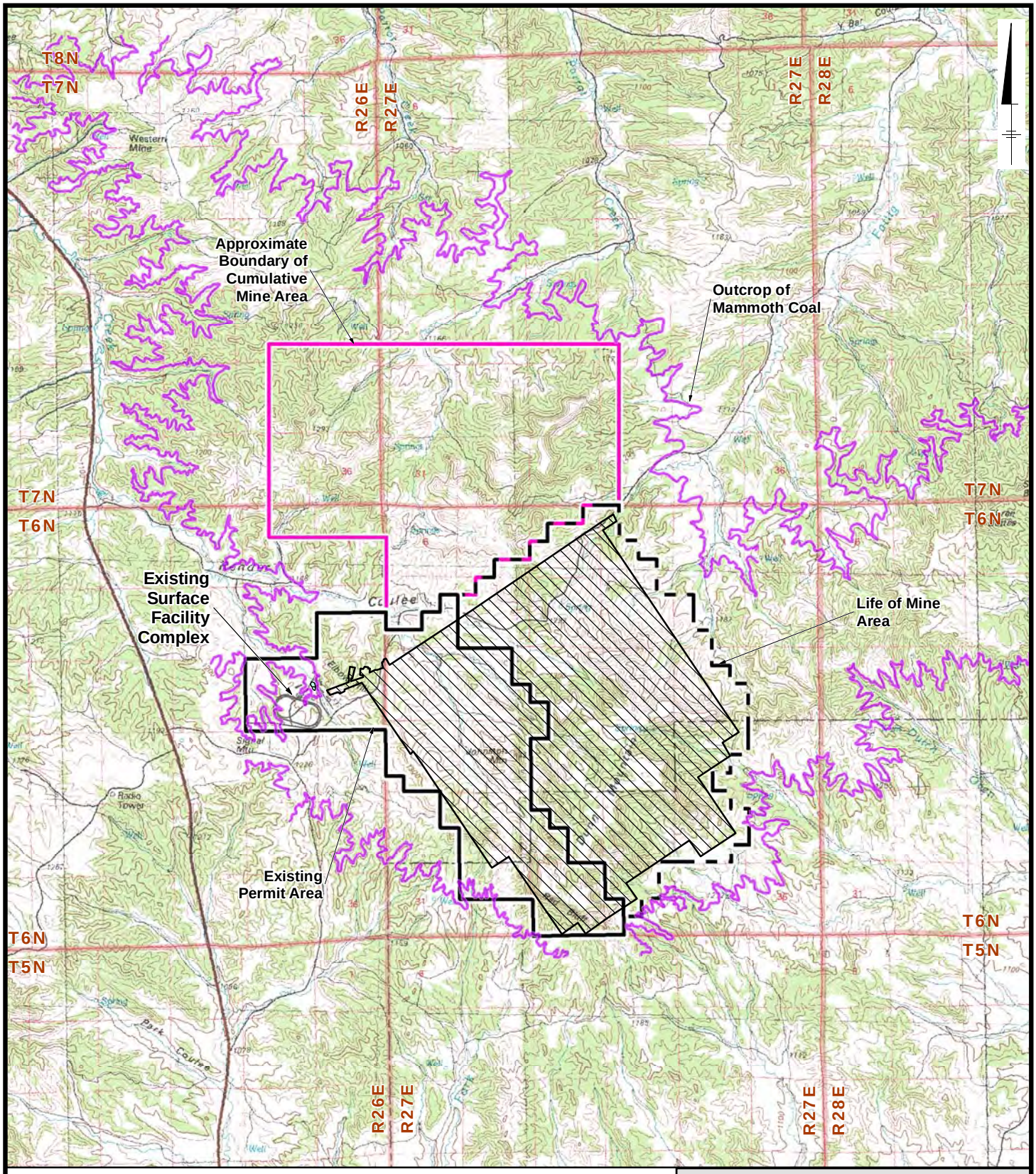
In general, the effects of other underground mining in the Bull Mountains would be cumulative. These would include the surface disturbances at surface facilities that would be reclaimed when the mine is closed and indirect effects of subsidence over the mined areas that may impact water resources. Short-term effects of subsidence may include areas of slope failure and rock toppling, possible disruption of groundwater flow and surface drainage patterns, disruption of vegetation and wildlife, and local disruption of land use. Some of these disruptions may require short-term mitigation measures. Overall, anticipated impacts of underground mining are mitigable, and there are no categories of impacts that are likely to accumulate to a moderate or severe level. The resources would recover after the mining operations are complete.

The cumulative effects of dispersed residential development may be more evident than the cumulative effects of underground coal mining. New roads have been built north of Fattig Creek Road in recent years and scattered residences are being developed. Since the land in sections 4 and 5 at the north end of the Bull Mountains Mine No. 1 LOM area was subdivided in the late 1980s, approximately 25 parcels have been developed. A similar pattern could reasonably be anticipated to the north in other drainage basins.

4.3.3.1 Topography and Physiography

Additional underground mining in the Bull Mountains would have short-term effects on topography and physiography while surface facilities are active. The facilities could include coal storage piles, soil stockpiles, and waste disposal areas that would affect topography and physiography. After mining is complete, these areas would be reclaimed. General pre-mining topography and physiography would be approximated. Cumulative effects would be minor.

Effects of such additional underground mining would also include subsidence over the mined areas. Subsidence would be expected to be relatively uniform over large areas. Short-term effects of subsidence may include slope failure, surface cracking and rock toppling. There may be small areas that would require mitigation to restore surface drainage patterns or to treat the effects of rock toppling, but overall, the effects of subsidence to topography and physiography would be minor.



LEGEND

- Outcrop of Mammoth Coal
- Approximate Boundary of Mined Area
- Existing Permit Area
- Life of Mine Area
- Approximate Boundary of Cumulative Mine Area

0 1 2 Miles

NAD 83 MONTANA STATE PLANE, METER

SOURCE: USGS 1:100,000 SCALE TOPOGRAPHIC QUADRANGLE - ROUNDUP (1982), MONTANA

BULL MOUNTAIN COAL LEASING ENVIRONMENTAL ASSESSMENT

Figure 4.3-1
Cumulative Mine Area

ANALYSIS AREA: Musselshell & Yellowstone Counties, Montana

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Prepared By: JC | Reviewed By: EC

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Dispersed residential development would have localized effects to topography and physiography from construction of buildings, roads and infrastructure. It is expected that this development would remain dispersed and that cumulative effects would be minor.

4.3.3.2 Geology, Mineral Resources, and Paleontology

The cumulative effects of additional underground mining in the Bull Mountains would primarily be removal of large portions of the Mammoth coal seam. Other geologic features, mineral resources and paleontology in the overburden of the coal would subside in place and largely be intact. Cumulative effects to these resources would be minor.

Dispersed residential development would have very localized effects on geology, mineral resources and paleontology. The overall cumulative effects of the development of these subdivisions would be minor.

4.3.3.3 Air Quality and GHG Emissions

As discussed in Chapter 1, BLM does not authorize mining by issuing a lease for federal coal, but the impacts of mining the coal are considered in this EA because it is a logical consequence of issuing a lease to an existing mine. The use of the coal after it is mined is not determined at the time of leasing. However, almost all the coal that is currently being mined at the Bull Mountains Mine No. 1 is being utilized by coal-fired power plants to generate electricity for U.S. consumers. A discussion of emissions that are generated when coal is transported and burned to produce electricity is included in the Cumulative Impacts section.

As discussed in Chapter 2, under the currently approved mining plan, which represents the No Action Alternative, SPE anticipates that the Bull Mountains Mine No. 1 would mine its remaining estimated 34 million tons of recoverable coal reserves in three years at an average annual production rate of approximately 12 million tons. Under the Proposed Action, SPE estimates that the life of the mine would be extended by about seven additional years at an average annual coal production rate of approximately 12 million tons.

Section 3.3.2 contains estimates of air and GHG emissions resulting from the specific mine operations at the Bull Mountains Mine No. 1 from current and projected operations under the Proposed Action. Under the No Action Alternative, these emissions would continue for another three years until the federal coal is reached.

Ongoing scientific research has identified the potential impacts of anthropogenic (man-made) GHG emissions and changes in biological carbon sequestration due to land management activities on global climate. Although GHG levels have varied for millennia, recent industrialization and burning of fossil carbon sources have caused CO_2 concentrations to increase. “As with any field of scientific study, there are uncertainties associated with the science of climate change. This does not imply that scientists do not have confidence in many aspects of climate change science. Some aspects of the science are known with virtual certainty, because they are based on well-known physical laws and documents trends (EPA 2008).”

The National Assessment of the Potential Consequences of Climate Variability and Change, an interagency effort initiated by Congress under the Global Change Research Act of 1990, Public Law 101-606, has confirmed that climate change is impacting some natural resources that the

Department of the Interior has the responsibility to manage and protect (DOI 2001). The Synthesis Report, the final part of the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), was released in preliminary form on November 17, 2007. The Synthesis Report summarizes the results of the assessment carried out by the three working groups of the IPCC. Observations and projections addressed in the report include:

- "Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperature, widespread melting of snow and ice, and rising global average sea level."
- "Observational evidence from all continents and most oceans show that many natural systems are being affected by regional climate changes, particularly temperature increases."

From 1850 to present, historic trend data show an increase of 1°C in global mean temperature. The increase is not linear, and there have been extended periods (decades) where temperature has dropped or stayed constant. This historic warming over that same period has caused sea levels to rise by about 20 cm on average, and has also resulted in changes in climate patterns on land. These changes are not uniform. In some areas near the equator, temperatures have cooled by about 5°C, while closer to the poles, temperatures have risen by equal amounts (Hansen and Lebedeff 1987). In northern latitudes (above 24° N), temperature increases of nearly 1.2°C (2.1°F) have been documented since 1900. Temperature changes can result in shifts of weather patterns (rainfall and winds) which may then affect vegetation and habitat. The importance of temperature change and changes in precipitation in species migration and change is being investigated.

There has been, and continues to be, considerable scientific investigation and discussion as to the causes of the recent historic rise in global mean temperatures, and whether the warming trend will continue. "Several activities contribute to the phenomena of climate change, including emissions of GHGs (especially carbon dioxide and methane) from fossil fuel development, large wildfires and activities using combustion engines; changes to the natural carbon cycle; and changes to radiative forces and reflectivity (albedo). It is important to note that GHGs will have a sustained climatic impact over different temporal scales (EPA 2008)." Three identified possible causes are solar effects, human population growth, and greenhouse gas effects.

Solar variability may play a role in global climate change, though the magnitude of the influence of increased sun activity is not well understood. Physical aspects of the sun, like sunspots and solar radiation output, are known to vary over time. The intensity of energy from the sun has varied through time and has resulted in global temperature variation.

Human population doubled to two billion over the period 1780 to 1930, then doubled again by 1974. The atmospheric concentrations of greenhouse gases have increased as human populations have increased. More land and resources were used to provide for the needs of these populations. As human activities have increased, carbon-based fuels have been used to provide for those additional energy needs. Forests and vegetation were cleared in order to provide for food production and human use.

Carbon dioxide, methane, water vapor, ozone, and nitrous oxide (NO_2) are recognized as greenhouse gases. Through complex interactions on a regional and global scale, these GHG emissions and net losses of biological carbon sinks cause a net warming effect of the atmosphere, primarily by decreasing the amount of heat energy radiated by the earth back into space. Like glass in a greenhouse, these gases trap radiation from the sun and act as an insulator around the Earth, holding in the planet's heat.

According to the IPCC's synthesis report (IPCC. 2007):

- "Global atmospheric concentrations of carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) have increased markedly as a result of human activities since 1750 and now far exceed pre-industrial values determined from ice cores spanning many thousands of years."
- "Most of the observed increase in globally-averaged temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations. It is likely there has been significant anthropogenic warming over the past 50 years averaged over each continent (except Antarctica)."
- "There is high agreement and much evidence that with current climate change mitigation policies and related sustainable development practices, global greenhouse gas emission will continue to grow over the next few decades."
- "Continued greenhouse gas emissions at or above current rates would cause further warming and induce many changes in the global climate system during the 21st century that would be very likely to be larger than those observed during the 20th century."
- "There is high confidence, by mid-century, annual river runoff and water availability are projected to increase at high latitudes and in some tropical wet areas and decrease in some dry regions in the mid-latitudes and tropics. There is also high confidence that many semi-arid areas (e.g., Mediterranean basin, western United States, southern Africa and northeast Brazil) will suffer a decrease in water resources due to climate change."
- "Anthropogenic warming and sea level rise would continue for centuries due to the time scales associated with climate processes and feedbacks, even if greenhouse gas concentrations were to be stabilized."
- "Anthropogenic warming and sea level rise could lead to some impacts that are abrupt or irreversible, depending upon the rate and magnitude of the climate change."
- "There is high agreement and much evidence that all stabilization levels assessed can be achieved by deployment of a portfolio of technologies that are either currently available or expected to be commercialized in coming decades, assuming appropriate and effective incentives are in place for their development, acquisition, deployment and diffusion and addressing related barriers."

The National Academy of Sciences has confirmed these findings, but also has indicated there are uncertainties regarding how climate change may affect different regions. Computer model predictions indicate that increases in temperature will not be equally distributed, but are likely to be accentuated at higher latitudes. Warming during the winter months is expected to be greater

than during the summer, and increases in daily minimum temperatures is more likely than increases in daily maximum temperatures. Increases in temperatures would increase water vapor in the atmosphere, and reduce soil moisture, increasing generalized drought conditions, while at the same time enhancing heavy storm events. Although large-scale spatial shifts in precipitation distribution may occur, these changes are more uncertain and difficult to predict.

Relatively steep elevation gradients between valley floors and adjacent mountain ranges in the western U.S. produce considerable geographic climate variability. Warm, dry, semi-arid conditions are typical on valley floors; moist and cool conditions are typical in higher parts of mountain ranges. Different plant communities occur within specific elevation zones. There also have been patterns of historic climatic variation in these areas for more than 10,000 years, during which plant communities gradually shift to higher or lower elevations depending on the direction of temperature and precipitation changes (Tausch et. al. 2004).

If global warming trends continue into the foreseeable future, Chambers (2006) indicates that the following changes may be expected to occur in the West:

- The amount and seasonal variability of precipitation will increase over most areas. IPCC (2001) climate model scenarios indicate that by 2100, precipitation will increase about 10 percent in summer, about 30 percent in fall, and 40 percent in winter. Less snowfall will accumulate in higher elevations, more precipitation will occur as rain, and snowmelt will occur earlier in the spring because of higher temperatures.
- Streamflow patterns will change in response to reduced snow pack and increasing precipitation. Peak flow in spring is expected to occur earlier and be of lower magnitude because of snowpack changes. Runoff from greater amounts of winter rainfall will cause higher winter flow. Summer flow will be lower, but with higher variability depending on the severity of storm events.
- Some populations of native plants, invasive species, and pests will expand. Increasing amounts of atmospheric carbon dioxide and precipitation during the growing season will provide favorable growth conditions for native grasses, perennial forbs, woody species, and invasive annuals such as cheatgrass. Insect populations also will likely increase because milder winter temperatures will improve reproduction and survival rates.
- Fire frequency, severity, and extent will increase because of the increased availability of fine fuels (grasses, forbs, and invasives) and accumulation of fuels from previous growing seasons. Higher temperatures will extend the length of fire seasons. Expansion of pinyon-juniper species and increasing tree densities could increase the number of high severity crown fires. Higher rates of insect damage and disease also may increase fuel accumulations.
- Sensitive species and overall biodiversity will be reduced. High-elevation habitats will shrink in area or disappear as lower-elevation plant communities expand. It is probable that some mammalian, avian, and other species that currently inhabit these high-elevation habitats may become extinct. Higher rates of disease and insect damage also may pose threats to other sensitive plant and animal species.

In 2006, transportation sources accounted for approximately 29 percent of total U.S. greenhouse gas emissions (EPA 2008). Transportation is the fastest growing source of U.S. GHGs, accounting for 47 percent of the net increase in total U.S. emissions since 1990 (EPA 2008). Transportation is also the largest end-use source of CO_2, which is the most prevalent GHG (EPA 2008).

Historically, the coal mined in Montana and Wyoming has been 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 (CO_2), which has been identified as a principal anthropogenic GHG. According to the Energy Information Administration (U.S. Department of Energy 2008):

- CO_2 emissions represent about 84 percent of the total U.S. greenhouse gas emissions.
- Estimated CO_2 emissions in the U.S. totaled 5,934.2 million metric tons in 2006, which was a 1.8 percent decrease from 2005.
- Estimated CO_2 emissions from the electric power sector totaled 2,343.9 million metric tons, or about 39.5 percent of total U.S. energy-related CO_2 emissions in 2006.
- Estimated CO_2 emissions from coal electric power generation in 2005 totaled 1,937.9 million metric tons or about 33 percent of total U.S. energy-related CO_2 emissions in 2006.
- Coal production from Montana/Wyoming represented approximately 42 percent of the coal used for power generation in 2006, which means these coal mines were responsible for about 13.9 percent of the estimated U.S. CO_2 emissions in 2006.

Montana/Wyoming coal is shipped nationwide and is currently being exported to Asia. These mines have sold, and are expected to sell coal into the open coal market. Each mine's ability to sell coal in this market will determine annual production rates at that mine. Historically, the coal buyers have been domestic electric producers, although the coal could be used in other coal applications or could be exported.

Relatively little coal, about two percent, is burned in Montana/Wyoming. In 2005, coal was shipped to 35 states besides Montana/Wyoming. As noted above, coal represented 50.2 percent of the fuel mix used by electric generators nationally in 2004. In the NERC power regions where Montana/Wyoming coal is sold, coal use range from 74.2 percent in the upper Midwest to 15.6 percent in the northeast U.S. (EPA 2007).

There are methods of generating electricity that result in fewer GHG emissions than burning coal, including natural gas, nuclear, hydroelectric, solar, wind, and geothermal resources. However, coal-burning power plants currently supply about 50 percent of the electric power generated in the U.S. The demand for power is increasing in the U.S. and throughout the world. According to a recent report by the North American Electric Reliability Council, peak demand for electricity in the U.S. is expected to double in the next 22 years. Many developing countries, including China and India, are also relying heavily on coal to meet their rapidly increasing power demands as coal is more economical and more available than other sources of electrical generation.

Technologies for producing cleaner, more-efficient, and more reliable power from coal are currently available, although not yet commercially established. These include advanced pulverized coal, circulating fluidized bed, and integrated gasification combined cycle (IGCC) technologies. The FutureGen project proposes to produce electricity by turning coal into gas, remove impurities, extract CO_2 from the waste stream, and then sequester the CO_2 underground. A site in southeastern Illinois was recently selected for the plant, which has a goal of being operational in 2012.

At this time, there is no national policy or law in place that regulates CO_2 emissions. A number of bills were introduced in the U.S. Congress in 2007 related to global climate change. The Lieberman-Warner Climate Security Act, which was introduced in October, 2007 by Senators Joseph I. Lieberman (ID-CT) and John W. Warner (R-VA), would establish a cap-and-trade within the United States. This program would require a 70 percent reduction in greenhouse gas emissions from covered sources, which represents over 80 percent of total U.S. emissions. It was voted out of the Senate Environment and Public Works Committee in December, 2007 (http://www.pewclimate.org, accessed 12/21/2007).

Additionally, in 2007, the U.S. Supreme Court (Massachusetts v. EPA) held that CO_2 qualifies as an air pollutant under the Clean Air Act (CAA) Section 302(g). The case was remanded to EPA to take further action to regulate CO_2 under the CAA unless the EPA determines that CO_2 does not endanger public health or welfare. At this time, EPA has not made that determination.

Federal, state, and local governments are also developing programs and initiatives aimed at reducing energy use and emissions. The 2002 Clear Skies and Global Climate Change Initiative is a voluntary national program to reduce greenhouse gas emissions. There are federal tax incentives for energy efficiency and conservation, and some states have renewable energy and energy efficiency policies. Regional initiatives have been started in the northeast (Northeast Regional Greenhouse Gas Initiative) as well as the Western Climate Initiative in the western states. At this time, it is not possible to predict how all of these programs would be melded into a national regulatory process if one were to be enacted.

A number of U.S. financial and corporate interests have acknowledged that enactment of federal legislation limiting the emissions of CO_2 and other greenhouse gases seems likely (NARUC 2007). There is uncertainty about anticipated CO_2 emission limits and carbon capture/sequestration regulations. This has caused some proponents to cancel or delay their proposed projects that use existing and emerging technologies to produce electricity from coal.

The regulatory mechanisms proposed under the Climate Security Act, as well as the past regulation of other pollutants under the CAA, are imposed at the point when coal is burned and converted to electric energy and by-products like CO_2. Over 95 percent of coal produced in the PRB is sold in an open market where coal is purchased on short term contracts or spot prices based on a coal feed stock that is suitable for each buyer's power generating facility. Coal production at any one mine is not tied in any predictable way over a period of time to any one power plant. Power plant operators attempt to buy coal from suppliers at the most economical prices that meet their needs. PRB coal has competed well in this market due to its low sulfur content. This makes it valuable in lowering sulfur dioxide pollution, as well as competitive mining costs when compared to delivered costs of coal from other coal producing areas.

U.S. coal production increased from 1,029.1 million tons in 1990 to 1,161.4 million tons in 2006, an increase of 12.9 percent. The share of electric power generated by burning coal was consistently around 50 percent during that time frame. Also, the percentage of total U.S. CO_2 emissions related to coal consumption was consistently around 36 percent during that same time frame. The percentage of U.S. CO_2 emissions related to the coal electric power sector increased from about 31 percent in 1990 to about 33 percent in 2006.

As discussed earlier, future coal mining estimates are based on two forecast scenarios for coal production through 2020. In the low scenario, the percentage of coal use for electric generation would stay about the same, assuming that all forms of electric generation would grow at a proportional rate to meet forecast electric demand. In the high scenario, percentage of coal use would also remain about the same, but with Montana/Wyoming coal displacing coal from other domestic coal regions.

If public sentiment results in changed electric demand, or if CO_2 emissions are ultimately regulated, the demand forecast for coal for electric generation could change. The Department of Energy has forecasted that by 2030, the coal share of total energy use will increase from 23 percent in 2006 to 25 percent in 2030, while the share of natural gas will fall from 22 percent to 20 percent, and the liquids share is predicted to fall from 40 percent to 37 percent. The combined share of carbon-neutral renewable and nuclear energy is forecasted to grow from 15 percent in 2006 to 17 percent in 2030.

Taken together, projected growth in the absolute level of primary energy consumption and a shift toward a fuel mix with slightly lower average carbon content will cause projected energy-related emissions of CO_2 to grow by 16 percent from 2006 to 2030. This is slightly lower than the projected 19 percent increase in total energy use. Over the same period, the economy becomes less carbon-intensive, because the 16 percent increase in CO_2 emissions is about one-fifth of the projected increase in GDP (79 percent), and emissions per capita decline by 5 percent.

In the 2008 study, projected energy-related CO_2 emissions grew from 5,890 million metric tons in 2006 to 6,851 million metric tons in 2030. In the Annual Energy Outlook 2008 study, energy-related CO_2 emissions were projected to grow by about 35 percent, to 7,950 million metric tons in 2030. This reflects both a higher projection of overall energy use and, to a lesser extent, a different mix of energy sources**.**

The Annual Energy Outlook 2008 report projected that energy-related emissions of CO_2 would grow by 16 percent from 2006 to 2030. In this projection, the mix of sources for this generation include coal, natural gas, nuclear, liquids (petroleum), hydro-power, and non-hydro renewable (wind, solar, etc.). They forecast that the generation mix by 2030 as compared to 2007 would be:

Source	2007	2030
Coal	51%	58%
Nuclear	21%	19%
Natural Gas	18%	11%
Petroleum	1%	1%
Hydro Power	7%	6%
Renewable	2%	5%

The Electric Power Research Institute (James 2007) attempted to identify a scenario of how the full portfolio of technologies to provide for electric energy would respond if national policy were to require that CO_2 emissions be reduced to 1990 levels. As noted earlier, there is no regulatory structure or CO_2 emission levels or limits that have been set by national policy or law yet. This scenario provides some analysis of the possible effect of regulation as well as decreased demand through energy efficiency at the user end, in transmission, and at the producer end. Under this scenario, the generation mix by 2030 as compared to 2007 would be:

Source	2007	2030
Coal	51%	52%
Nuclear	21%	29%
Natural Gas	18%	5%
Petroleum	1%	0%
Hydro Power	7%	5%
Renewable	2%	9%

This study predicts that national policy that forces a reduction of CO_2 emissions to 1990 levels would promote increased energy efficiency, and the growth of "non-carbon" sources such as nuclear and renewable. Renewable sources include wind and solar, as well as emerging technologies like tidal power and river turbines. Hydropower is limited because most opportunities for hydropower have already been used or require large infrastructure. Carbon-based sources such as coal, gas, and petroleum are reduced as compared to the EIA forecast. Both EIA and EPRI predict increases in electricity cost.

The mines in the Montana/Wyoming region have sold and are anticipated to sell coal in the open coal market. In both EIA market projections and projections that contemplate CO_2 regulation, the coal market supplies half or more of the electric generation mix through 2020. Each mine's ability to sell coal in this market would determine annual production rates at that mine. Historically, the coal buyers have been domestic electricity producers, although the coal could be used in other coal applications or could be exported.

In addition to CO_2 emissions, black carbon would also be emitted from sources at the mine during the mining of the federal coal. As explained in section 3.3.1.4, it would be possible to control some black carbon at the mine from diesel sources. However, given that the US emits 6.1 percent of the globally-emitted black carbon, it is reasonable to assume that the contribution of black carbon from sources related to mining of the federal coal would have a negligible impact on the cumulative local or regional air quality.

Transportation of coal by railroad is a connected action. GHG emissions are generated when rail car engines combust fuel during travel. GHG emissions were estimated by using an EPA guidance document (EPA 2008a) that presents methods to estimate emissions from rail transportation. Due to coal washing and preparation at the mine, approximately 2 million of the 12 million tons of annual coal is removed and a resultant 10 million tons is transported approximately 3000 miles to Ohio annually. Using the EPA calculation and emission factors, and based on ton miles traveled, approximately 5.4 million tons of CO_2 equivalent is calculated. This represents approximately 0.08 percent of the total 2008 US emissions (EIA 2008) of CO_2

equivalent of 7,000 million tons. The contribution of CO_2 equivalent from transportation of coal mined from the federal lease would have an insignificant impact on the cumulative global environment.

Emissions of GHG are also generated when the coal is burned in Ohio. An analysis of potential impacts of burning 10 million tons of coal annually for 7 years has been evaluated. According to the DOE (2007a,b), estimated CO_2 emissions in the US totaled about 6,000 million metric tons in 2006 and estimated CO_2 emissions from electric power generation totaled approximately 2,300 million metric tons.

Annual coal production destined for electricity production from the federal lease would be 10 million tons of clean coal or roughly less than 1 percent of the estimated US total coal consumption of 1,073 million short tons (EIA 2009) in 2009. The emissions from burning coal from the federal lease would be a small percentage of the US total (23 million tons of CO_2 per year). 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 federal coal considered in this assessment. This energy efficiency would decrease GHG emissions by burning less coal to produce the same amount of electricity.

The method in which the coal is burned would also impact the emissions. Innovative 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.

Additionally, because the tons of coal recovered during the mining of the federal lease would remain relatively consistent with the tons of coal currently being mined on an annual basis, it is anticipated that GHG emissions from the mine and related actions such as the transportation and burning of coal during the mining of the federal lease would remain relatively consistent with emissions currently generated by the mine. The contribution to the cumulative impact would remain relatively constant. The level of emissions from the Proposed Action have been quantified, but the state of the science does not allow any given level of emissions to be tied back to a quantifiable effect on climate change.

It is not likely that selection of the No Action Alternative would result in a decrease of U.S. CO_2 emissions attributable to coal-burning power plants in the long term. There are multiple other sources of coal that, while not having the cost, environmental, or safety advantages, could supply the demand for coal beyond the time that the Bull Mountains Mine No. 1 completes recovery of the coal in its existing life of mine plan. Development of dispersed residential subdivisions including houses, roads, infrastructure and residential traffic would also introduce fugitive dust and GHG emissions from vehicles and heat sources from houses.

4.3.3.4 Water Resources

There would be minor cumulative effects on identified water resources from additional mining and rural residential development in the Bull Mountains area. Mining the federal coal lease area by underground mining methods would have limited disturbance on the surface, however, there would be subsidence related impacts to water resources, as identified under the Proposed Action.

Impact projections have been made for the current life of mine area that includes the federal coal lease area under the Proposed Action. Permit requirements would mitigate these potential impacts. Mining that may occur in the area to the north of the current life of mine area would have similar effects on surface water drainages, springs, and aquifers in that area. These effects would be dependent on a site specific mine plan and mitigation measures established under the approved mining permit issued for development.

Residential development would also have additive effects from surface disturbance and use of groundwater for domestic purposes. Uses of water from mining and residential development could affect the quantity and quality available to downstream users in the primary drainages such as Rehder and Fattig creeks.

4.3.3.5 Soils

The cumulative effects of additional underground mining to soils in the Bull Mountains would primarily be the disturbance effects of mine surface facilities. Reclamation after closure of the surface facilities would include replacement of sub-soil and topsoil that had been stockpiled during mining operations. Reclamation would replace soil materials in the areas of disturbance, but recovery of the natural soil structure would require a long period of time. The land over the mined areas would subside in place and largely intact. There would be local areas of slope failure, rock toppling, and restored drainage patterns, but overall effects on soils would be minor.

Dispersed residential development would have localized effects on soils from surface disturbance and erosion potential. The overall cumulative effects of the development of these subdivisions would be minor.

4.3.3.6 Vegetation

Other than minor subsidence effects, additional mining operations to the north of the Bull Mountains Mine No.1 LOM area would not significantly impact vegetation communities. Sustainable grazing is anticipated to continue as practiced, and vegetation communities are not expected to be significantly altered by this practice. There may be local displacement of vegetation communities as a result of continued dispersed residential development. Overall, cumulative effects to vegetation are expected to be minor, and mining operations would negligibly contribute to these effects.

The cumulative effects of additional mining to wetlands in the Bull Mountains would be minimal and would only arise from subsidence effects in the mine area. Continued grazing, if allowed to become environmentally unsustainable, could affect the structure and water quality of those wetlands impacted. Dispersed residential development is expected to continue in the Bull Mountains. This development could remove or alter local wetlands and their present vegetation communities in the area. Federal regulations under section 404 of the Clean Water Act and regulations set by the U.S. Army Corp of Engineers over jurisdictional waters would reduce the potential for developments to remove or impact wetlands in the area.

4.3.3.7 Wildlife

Other than what has already been analyzed, prolonged mining in the Bull Mountains could alter wildlife habitat and population dynamics. Continued sustainable cattle grazing may cause some localized competition for habitat and food resources; however, this is not expected to change

from what competition already exists between cattle and wildlife in the area. Dispersed residential development is expected to continue in the Bull Mountains. This development could cause wildlife, sensitive to human activity, to seek habitat outside the area of development. The increased presence of houses, other buildings, fences, roads, and traffic would also alter the movement of big game animals and restrict hunting and other recreational opportunities. Wildlife and their habitats would still be present in the area, but their habits and habitats would likely be altered and populations reduced.

4.3.3.8 Threatened, Endangered, and Special Status Species

There would be negligible cumulative effects on identified threatened, endangered or special status species or habitats from additional mining and rural residential development in the Bull Mountains area. Underground mines would not disturb the surface and any impacts to water resources would be mitigated. Residential development would also have minimal effects from surface disturbance on habitats in the area.

4.3.3.9 Ownership and Use of Land

Additional underground coal mining would not have a long-term cumulative effect on the ownership and use of land in the general area. However, subdividing the land for dispersed residential development would split up land ownership and would remove areas of rangeland from use for livestock grazing. For the foreseeable future, it is expected that livestock grazing would continue to be important in the Bull Mountains area, although portions of the land could be developed for dispersed private residences.

4.3.3.10 Cultural Resources

4.3.3.10.1 Prehistoric and Historic Resources

Few cultural resources have been documented in the Bull Mountains area. Cultural resources on steep slopes and in areas of cliffs and rock outcrops may be affected by subsidence resulting from additional underground mining. The full extent of these effects would not be known unless systematic monitoring of cultural sites occurs. Dispersed residential development would also affect cultural resources. Currently there is no requirement for systematic cultural resource surveys for residential development.

4.3.3.10.2 Native American Religious and Traditional Concerns

Informal Native American consultation was conducted in the early 1990s for the surface facilities complex, the railroad corridor, and selected locations in the Life of Mine area. A result of the informal consultation in the early 1990s with the Crow, Eastern Shoshone, Assiniboine, Gros Ventre, Oglala Sioux, Blackfeet, Flathead, and the Medicine Wheel Alliance, several potential TCPs were identified during data gathering for the surface facilities complex and railroad corridor (Kooistra-Manning and Deaver 1993). Tribal representatives expressed concern that underground mining disturbs the quiet zone of the deep earth and disrupts or destroys elements of the spiritual environment. They expressed particular concern about disruption to springs and the spirits that dwell in these waters. These impacts are currently occurring on private land at the existing mine site.

4.3.3.11 Visual Resources

Mine surface facilities would have minimal short-term effects to the visual character of the natural landscape during mining operations. When mining is complete, the surface facility areas

would be reclaimed. In the long-term, these areas would be returned to pre-mining visual landscape. Some small areas may have less topographic diversity than before mining. Dispersed residential development would also affect visual resources. The houses, roads and utility infrastructure would alter the visual character of the landscape. These developments are not regulated in terms of visual impacts.

4.3.3.12 Noise

The principal noise sources related to the additional mining operations of the surface facilities includes the preparation plant, ventilation fans, trucks, conveyors, load-out equipment, and trains. Surface facilities may be located near residences and noise control measures include maintenance of existing equipment and screening to contain or deflect noise. Dispersed residential development would also affect background noise levels by increased human presence in the area.

4.3.3.13 Transportation Facilities

Future mining operations would maintain mine-related infrastructure for traffic. The tax revenue generated from mining and residential development would contribute to maintenance of public roads. The railroad traffic related to mining would not affect other traffic if the current railroad is used.

4.3.3.14 Hazardous and Solid Waste

Additional mining would produce corresponding quantities of hazardous and solid waste. These materials would continue to be managed and controlled under current regulations and BMPs. Cumulative impacts would be kept within state and federal guidelines and would be minor. Development of residential subdivisions would also generate waste materials. It is expected that the private landowners would contract with private waste management specialists and the cumulative effects would be minor.

4.3.3.15 Socioeconomics

The cumulative socioeconomic effects of additional mining would include a constant level of employment and tax revenues during the operation of the mines and the removal of that source of income when the mines are closed. Residential developments would increase the local population and infrastructure in the Bull Mountains.

4.3.3.16 Environmental Justice

The cumulative effects area is outside the Crow and Northern Cheyenne Indian Reservations, does not include any Indian Trust Assets, and does not contain any locations specifically named in tribal treaties. The mine surface facilities complex is about 35 miles from the nearest reservation lands and operation of the mine would have no cumulative effects on the natural and physical environment of the reservations. No adverse human health or environmental effects would be expected to fall disproportionately on the reservations or on other minority or low income populations from the Proposed Action. As a result, there would be no cumulative environmental justice effects from additional mining and rural residential development in the Bull Mountains area.

5.0 CONSULTATION AND COORDINATION

5.1 Consultation and Coordination

A coal tract that is acceptable for further consideration for leasing must be located within an area that has been determined to have coal development potential. Two major coal deposits have been identified in the Billings management area, the Mammoth/Rehder (Mammoth) Coal Bed and the McCleary Coal Bed (BLM 1983). The Bull Mountains Mine No. 1 LOM area is within the southern portion of the Mammoth Coal Bed. This area has been identified as having coal development potential by the BLM.

During preparation of the application for the current state mining permit, non-government consultation was conducted with Native American tribes to identify potential concerns in the mine permit area and along the railroad corridor. Tribal contacts were initiated in October 1990. The following year Metcalf Archaeological Consultants took over coordination with the tribes. In May 1992, Metcalf Archaeological Consultants hired Ethnoscience to complete Native American consultation for the proposed mine. Ethnoscience consulted with representatives of the Crow, Eastern Shoshone, Assiniboine, Gros Ventre, Northern Cheyenne, Oglala Sioux, and the Medicine Wheel Alliance (Kooistra-Manning and Deaver 1993). In July 1992, Ethnoscience sent letters to representatives of the Crow, Northern Cheyenne, Oglala Sioux, Eastern Shoshone, Assiniboine, Blackfeet, Gros Ventre, and Salish tribes, and to the Medicine Wheel Alliance. The letter contained a summary of the proposed mine, maps, and brief descriptions of potentially sensitive sites within and adjacent to the project area. Cultural representatives were invited to make site visits and to comment on the proposed mine and treatment of specific sites. The Northern Cheyenne Cultural Commission and several Crow, Northern Cheyenne, and Eastern Shoshone members of the Medicine Wheel Alliance requested site visits. In addition to the requests for site visits, the Medicine Wheel Alliance expressed concerns over potential impacts to spirits, springs, and archaeological sites in the mine area. Spring sites in the mine area were visited by tribal representatives in October and December of 1992. No subsequent data gathering or non-government consultation has been conducted for the LOM area.

BLM released an announcement of the current federal coal lease application to interested parties on November 19, 2008. Public scoping comments were accepted from November 24 through December 23, 2008. In addition, a public meeting was held in Roundup on December 10, 2008. Representatives of MDEQ and OSM also attended the public meeting. Nine written public comments were received. Six of the comments approved of the mine and three comments expressed concerns about the effects of subsidence. Principal concerns about the mine were potential effects of subsidence to water resources (both surface water and groundwater) and to structures and infrastructure above the mined area.

BLM released the Draft EA on March 16, 2010 to the public for review and comment for a 30 day period beginning on March 29, 2010 ending on April 27, 2010. There was also an opportunity to provide comments on the EA at a public hearing in Billings, Montana at the BLM State Office on April 13, 2010. Five written comments were provided on the Draft EA. Comments that provided changes to the EA are highlighted in this document. Comments that were determined to be out of the scope of this analysis or require a response not included in the EA are discussed in the FONSI/DN.

During the development of this EA, the BLM has discussed the project with the OSM, USFWS, MDEQ, MFWP, and tribal entities. Consultation was initiated by letters sent to the Crow and Northern Cheyenne Tribes in October 2009 and is ongoing.

5.2 Preparers and Contributors

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

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Table 5.2.1-1 ARCADIS U.S. Inc.

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5.3 Distribution of the EA

This EA will be distributed to individuals who specifically requested a copy of the document and/or commented during scoping. It will also be made available electronically on the BLM website.

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6.0 REFERENCES, ACRONYMS AND ABBREVIATIONS, INDEX

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6.2 Abbreviations and Acronyms

ARM	Administrative Rules of Montana
AUM	Animal Unit Month
AVF	Alluvial valley floor
BACT	Best available control technology
BLM	Bureau of Land Management
BMP	Best management practice
C	Celsius
CAA	Clean Air Act
cfs	cubic feet per second
CH_4	Methane
CO	Carbon monoxide
CO_2	Carbon dioxide
CRP	Conservation Reserve Program
dB	Decibels, a logarithmic unit of sound levels
DNL	Day-night average sound level
DR	Decision Record
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
EPA	U.S Environmental Protection Agency
EPCA	Energy Policy and Conservation Act
ESP	Electrostatic precipitator
ET	Evapotranspiration
fbgs	Feet below ground surface
FCLAA	Federal Coal Leasing Act Amendment
FEIS	Final Environmental Impact Statement
FONSI	Finding of No Significant Impact
GHG	Greenhouse gas
gpm	gallons per minute
ISA	Intangible spiritual attributes
K	Conductivity
LL&E	Louisiana Land and Exploration Company
LOM	Life of mine
µg/m³	micrograms per cubic meter
MAQP	Montana Air Quality Permit
MBTA	Migratory Bird Treaty Act
MBMG	Montana Bureau of Mines and Geology

MDEQ	Montana Department of Environmental Quality
MDNRC	Montana Department of Natural Resources and Conservation
MDSL	Montana Department of State Lands
MFWP	Montana Department of Fish, Wildlife and Parks
mg/L	Micrograms per liter
MLA	Mineral Leasing Act
MNHP	Montana Natural Heritage Program
MPDES	Montana Pollutant Discharge Elimination System
N_2O	Nitrous oxide
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NRHP	National Register of Historic Places
NO_x	Nitrous oxides
NRCS	Natural Resource Conservation Service
OSMRE	Office of Surface Mining Reclamation and Enforcement
ppm	Parts per million
PM-10	Fine particulates less than 10 microns
PSD	Federal Prevention of Significant Deterioration Program
RCRA	Resource Conservation and Recovery Act
RMP	Resource Management Plan
ROD	Record of Decision
ROM	Run of mine
SAR	Sodium adsorption ratio
SMCRA	Mining Control and Reclamation Act
SMP	State Mine Permit
SO_2	Sulfur dioxide
SPE	Signal Peak Energy, LLC
TCP	Traditional Cultural Property
TDS	Total dissolved solids
TPH	Tons per hour
TPY	Tons per year
TRS	Township, Range and Section
TSP	Total suspended particulates
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WDA	Waste disposal area

APPENDIX A

BLM SPECIAL COAL LEASE STIPULATIONS, AND BLM COAL LEASE FORM 3400-12

EXHIBIT A

COAL LEASE SPECIAL STIPULATIONS

Sec. 15. SPECIAL STIPULATIONS - In addition to observing the general obligations and standards of performance set out in the current regulations, the lessee shall comply with and be bound by the following stipulations. These stipulations are also imposed upon the lessee's agents and employees. The failure or refusal of any of these persons to comply with these stipulations shall be deemed a failure of the lessee to comply with the terms of the lease. The lessee shall require his agents, contractors and subcontractors involved in activities concerning this lease to include these stipulations in the contracts between and among them. These stipulations may be revised or amended, in writing, by the mutual consent of the lessor and the lessee at any time to adjust to changed conditions or to correct an oversight.

(a) CULTURAL RESOURCES -

(1) Before undertaking any activities that may disturb the surface of the leased lands, the lessee shall conduct a cultural resource intensive field inventory in a manner specified by the Authorized Officer of the BLM (herinafter referred to as the Authorized Officer) on portions of the mine plan area, or exploration plan area, that may be adversely affected by lease-related activities and which were not previously inventoried at such a level of intensity. Cultural resources are defined as a broad, general term meaning any cultural property or any traditional lifeway value, as defined below:

> Cultural property: a definite location of past human activity, occupation, or use identifiable through field inventory (survey), historical documentation, or oral evidence. The term includes archaeological, historic, or architectural sites, structure, or places with important public and scientific uses, and may include traditional cultural or religious importance to specified social and/or cultural groups. Cultural properties are concrete, material places, and things that are classified, ranked, and managed through the system of inventory, evaluation, planning, protection, and utilization.
>
> Traditional lifeway value: the quality of being useful in or important to the maintenance of a specified social and/or cultural group's traditional systems of (a) religious belief, (b) cultural practice, or (c) social interaction, not closely identified with definite locations. Another group's shared values are abstract, nonmaterial, ascribed ideas that one cannot know about without being told. Traditional lifeway values are taken into account through public participation during planning and environmental analysis.

The cultural resources inventory shall be conducted by a qualified professional cultural resource specialist; i.e., archaeologist, anthropologist, historian, or historical architect, as appropriate and necessary, and approved by the Authorized Officer (BLM if the surface is privately owned). A report of the inventory and recommendations for protection of any cultural resources identified shall be submitted to the Assistant Director of the Western Support Center of the Office of Surface Mining (hereinafter referred to as the Assistant Director) by the Authorized Officer. Prior to any on-the-ground cultural resource inventory, the selected professional cultural resource specialist shall consult with the BLM, the Northern Cheyenne Cultural Protection Board, and the Crow Historic and Cultural Committee. The purpose of this consultation will be to guide the work to be performed and

EXHIBIT A

COAL LEASE SPECIAL STIPULATIONS

to identify cultural properties or traditional lifeway values within the immediate and surrounding mine plan area. The lessee shall undertake measures, in accordance with instructions from the Assistant Director to protect cultural resources on the leased lands. The lessee shall not commence the surface-disturbing activities until permission to proceed is given by the Assistant Director in consultation with the Authorized Officer.

(2) The lessee shall protect all cultural resource properties within the lease area from lease related activities until the cultural resource mitigation measures can be implemented as part of an approved mining and reclamation plan or exploration plan.

(3) The cost of carrying out the approved site mitigation measures shall be borne by the lessee.

(4) If cultural resources are discovered during operations under this lease, the lessee shall immediately bring them to the attention of the Assistant Director, or the Authorized Officer if the Assistant Director is not available. The lessee shall not disturb such resources except as may be subsequently authorized by the Assistant Director. Within two (2) working days of notification, the Assistant Director will evaluate or have evaluated any cultural resources discovered and will determine if any action may be required to protect or preserve such discoveries. The cost of data recovery for cultural resources discovered during lease operations shall be borne by the surface managing agency unless otherwise specified by the Authorized Officer.

(5) All cultural resources shall remain under the jurisdiction of the United States until ownership is determined under applicable law.

(b) PALEONTOLOGICAL RESOURCES -

If a paleontological resource, either large and conspicuous, and/or of significant scientific value is discovered during construction, the find will be reported to the authorized officer immediately. Construction will be suspended within 250 feet of said find. An evaluation of the paleontological discovery will be made by a BLM approved professional paleontologist within five (5) working days, weather permitting, to determine the appropriate action(s) to prevent the potential loss of any significant paleontological value. Operations within 250 feet of such discovery will not be resumed until written authorization to proceed is issued by the Authorized Officer. The lessee will bear the cost of any required paleontological appraisals, surface collection of fossils, or salvage of any large conspicuous fossils of significant interest discovered during the operation.

(c) PUBLIC LAND SURVEY PROTECTION -

The lessee will protect all survey monuments, witness corners, reference monuments, and bearing trees against destruction, obliteration, or damage during operations on the lease areas. If any monuments, corners or accessories are destroyed, obliterated or damaged by this operation, the lessee will hire an appropriate county surveyor or registered land surveyor to reestablish or restore the monuments, corners, or accessories at the same locations, using surveying procedures in accordance with the "Manual of Surveying Instructions for the Survey of Public Lands of the United States." The survey will be recorded in the appropriate county records, with a copy sent to the authorized officer.

EXHIBIT A

COAL LEASE SPECIAL STIPULATIONS

(d) RESOURCE RECOVERY AND PROTECTION PLAN (R2P2) -

Notwithstanding the approval of a resource recovery and protection plan (R2P2) by the BLM, lessor reserves the right to seek damages against the operator/lessee in the event (i) the operator/lessee fails to achieve maximum economic recovery (MER) [as defined at 43 CFR 3480.0-5.2(21)] of the recoverable coal reserves or (ii) the operator/lessee is determined to have caused a wasting of recoverable coal reserves. Damages shall be measured on the basis of the royalty that would have been payable on the wasted or unrecovered coal.

The parties recognize that under an approved R2P2, conditions may require a modification by the operator/lessee of that plan. In the event a coal bed or portion thereof is not to be mined or is rendered unmineable by the operation, the operator shall submit appropriate justification to obtain approval by the authorized officer to leave such reserves unmined. Upon approval by the authorized officer, such coal beds or portions thereof shall not be subject to damages as described above. Further, nothing in this section shall prevent the operator/lessee from exercising its right to relinquish all or a portion of the lease as authorized by statute and regulation.

In the event the authorized officer determines that the R2P2 as approved will not attain MER as the result of changed conditions, the authorized officer will give proper notice to the operator/lessee as required under applicable regulations. The authorized officer will order a modification if necessary, identifying additional reserves to be mined in order to attain MER. Upon a final administrative or judicial ruling upholding such an ordered modification, any reserves left unmined (wasted) under that plan will be subject to damages as described in the first paragraph under this section.

Subject to the right to appeal hereinafter set forth, payment of the value of the royalty on such unmined recoverable coal reserves shall become due and payable upon determination by the authorized officer that the coal reserves have been rendered unmineable or at such time that the lessee has demonstrated an unwillingness to extract the coal.

The BLM may enforce this provision either by issuing a written decision requiring payment of the MMS demand for such royalties, or by issuing a notice of non-compliance. A decision or notice of non-compliance issued by the lessor that payment is due under this stipulation is appealable as allowed by law.

(e) MULTIPLE MINERAL DEVELOPMENT -

Operations will not be approved which, in the opinion of the authorized officer, would unreasonably interfere with the orderly development and/or production from a valid existing mineral lease issued prior to this one for the same lands.

The BLM realizes that coal mining operations conducted on Federal coal leases issued within producing oil and gas fields may interfere with the economic recovery of oil and gas; just as Federal oil and gas leases issued in a Federal coal lease area may inhibit coal recovery. BLM retains the authority to alter and/or modify the R2P2 for coal operations on those lands covered by Federal mineral leases so as to obtain maximum resource recovery.

Form 3400-12
(September 2010)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

COAL LEASE

FORM APPROVED
OMB NO. 1004-0073
Expires: June 30, 2013

Serial Number

PART 1. LEASE RIGHTS GRANTED

This lease, entered into by and between the UNITED STATES OF AMERICA, hereinafter called lessor, through the Bureau of Land Management (BLM), and *(Name and Address)*

hereinafter called lessee, is effective *(date)* / / , for a period of 20 years and for so long thereafter as coal is produced in commercial quantities from the leased lands, subject to readjustment of lease terms at the end of the 20th lease year and each 10-year period thereafter.

Sec. 1.This lease is issued pursuant and subject to the terms and provisions of the:

☐ The Mineral Leasing Act of 1920, as amended, 30 U.S.C. 181 - 287; or
☐ The Mineral Leasing Act for Acquired Lands, 30 U.S.C. 351 - 359;
and to the regulations and formal orders of the Secretary of the Interior which are now or hereafter in force, when not inconsistent with the express and specific provisions herein.

Sec. 2. Lessor, in consideration of any bonuses, rents, and royalties to be paid, and the conditions and covenants to be observed as herein set forth, hereby grants and leases to lessee the exclusive right and privilege to drill for, mine, extract, remove, or otherwise process and dispose of the coal deposits in, upon, or under the following described lands:

containing acres, more or less, together with the right to construct such works, buildings, plants, structures, equipment and appliances and the right to use such on-lease rights-of-way which may be necessary and convenient in the exercise of the rights and privileges granted, subject to the conditions herein provided.

PART II. TERMS AND CONDITIONS

Sec. 1. (a) RENTAL RATE - Lessee must pay lessor rental annually and in advance for each acre or fraction thereof during the continuance of the lease at the rate of $ for each lease year.

(b) RENTAL CREDITS - Rental will not be credited against either production or advance royalties for any year.

Sec. 2. (a) PRODUCTION ROYALTIES - The royalty will be percent of the value of the coal as set forth in the regulations. Royalties are due to lessor the final day of the month succeeding the calendar month in which the royalty obligation accrues.

(b) ADVANCE ROYALTIES - Upon request by the lessee, the BLM may accept, for a total of not more than 20 years, the payment of advance royalties in lieu of continued operation, consistent with the regulations. The advance royalty will be based on a percent of the value of a minimum number of tons determined in the manner established by the advance royalty regulations in effect at the time the lessee requests approval to pay advance royalties in lieu of continued operation.

Sec. 3. BONDS - Lessee must maintain in the proper office a lease bond in the amount of $. The BLM may require an increase in this amount when additional coverage is determined appropriate.

Sec. 4. DILIGENCE - This lease is subject to the conditions of diligent development and continued operation, except that these conditions are excused when operations under the lease are interrupted by strikes, the elements, or casualties not attributable to the lessee. The lessor, in the public interest, may suspend the condition of continued operation upon payment of advance royalties in accordance with the regulations in existence at the time of the suspension. Lessee's failure to produce coal in commercial quantities at the end of 10 years will terminate the lease. Lessee must submit an operation and reclamation plan for the BLM's approval pursuant to 30 U.S.C. 207(c) prior to conducting any development or mining operations or taking any other action on a leasehold which might cause a significant disturbance of the environment.

The lessor reserves the power to assent to or order the suspension of the terms and conditions of this lease in accordance with, inter alia, Section 39 of the Mineral Leasing Act, 30 U.S.C. 209.

5. LOGICAL MINING UNIT (LMU) - Either upon approval by the lessor of the lessee's application or at the direction of the lessor, this lease will become an LMU or part of an LMU, subject to the provisions set forth in the regulations.

The stipulations established in an LMU approval in effect at the time of LMU approval will supersede the relevant inconsistent terms of this lease so long as the lease remains committed to the LMU. If the LMU of which this lease is a part is dissolved, the lease will then be subject to the lease terms which would have been applied if the lease had not been included in an LMU.

(Continued on page 2)

Sec. 6. DOCUMENTS, EVIDENCE AND INSPECTION - At such times and in such form as lessor may prescribe, lessee must furnish detailed statements showing the amounts and quality of all products removed and sold from the lease, the proceeds therefrom, and the amount used for production purposes or unavoidably lost.

Lessee must keep open at all reasonable times for the inspection by BLM the leased premises and all surface and underground improvements, works, machinery, ore stockpiles, equipment, and all books, accounts, maps, and records relative to operations, surveys, or investigations on or under the leased lands.

Lessee must allow lessor access to and copying of documents reasonably necessary to verify lessee compliance with terms and conditions of the lease.

While this lease remains in effect, information obtained under this section will be closed to inspection by the public in accordance with the Freedom of Information Act (5 U.S.C. 552).

Sec. 7. DAMAGES TO PROPERTY AND CONDUCT OF OPERATIONS - Lessee must comply at its own expense with all reasonable orders of the Secretary, respecting diligent operations, prevention of waste, and protection of other resources.

Lessee must not conduct exploration operations, other than casual use, without an approved exploration plan. All exploration plans prior to the commencement of mining operations within an approved mining permit area must be submitted to the BLM.

Lessee must carry on all operations in accordance with approved methods and practices as provided in the operating regulations, having due regard for the prevention of injury to life, health, or property, and prevention of waste, damage or degradation to any land, air, water, cultural, biological, visual, and other resources, including mineral deposits and formations of mineral deposits not leased hereunder, and to other land uses or users. Lessee must take measures deemed necessary by lessor to accomplish the intent of this lease term. Such measures may include, but are not limited to, modification to proposed siting or design of facilities, timing of operations, and specification of interim and final reclamation procedures. Lessor reserves to itself the right to lease, sell, or otherwise dispose of the surface or other mineral deposits in the lands and the right to continue existing uses and to authorize future uses upon or in the leased lands, including issuing leases for mineral deposits not covered hereunder and approving easements or rights-of-way. Lessor must condition such uses to prevent unnecessary or unreasonable interference with rights of lessee as may be consistent with concepts of multiple use and multiple mineral development.

Sec. 8. PROTECTION OF DIVERSE INTERESTS, AND EQUAL OPPORTUNITY - Lessee must: pay when due all taxes legally assessed and levied under the laws of the State or the United States; accord all employees complete freedom of purchase; pay all wages at least twice each month in lawful money of the United States; maintain a safe working environment in accordance with standard industry practices; restrict the workday to not more than 8 hours in any one day for underground workers, except in emergencies; and take measures necessary to protect the health and safety of the public. No person under the age of 16 years should be employed in any mine below the surface. To the extent that laws of the State in which the lands are situated are more restrictive than the provisions in this paragraph, then the State laws apply.

Lessee will comply with all provisions of Executive Order No. 11246 of September 24, 1965, as amended, and the rules, regulations, and relevant orders of the Secretary of Labor. Neither lessee nor lessee's subcontractors should maintain segregated facilities.

Sec. 9. (a) TRANSFERS -

This lease may be transferred in whole or in part to any person, association or corporation qualified to hold such lease interest.

This lease may be transferred in whole or in part to another public body or to a person who will mine coal on behalf of, and for the use of, the public body or to a person who for the limited purpose of creating a security interest in favor of a lender agrees to be obligated to mine the coal on behalf of the public body.

This lease may only be transferred in whole or in part to another small business qualified under 13 CFR 121.

Transfers of record title, working or royalty interest must be approved in accordance with the regulations.

(b) RELINQUISHMENT - The lessee may relinquish in writing at any time all rights under this lease or any portion thereof as provided in the regulations. Upon lessor's acceptance of the relinquishment, lessee will be relieved of all future obligations under the lease or the relinquished portion thereof, whichever is applicable.

Sec. 10. DELIVERY OF PREMISES, REMOVAL OF MACHINERY, EQUIPMENT, ETC. - At such time as all portions of this lease are returned to lessor, lessee must deliver up to lessor the land leased, underground timbering, and such other supports and structures necessary for the preservation of the mine workings on the leased premises or deposits and place all workings in condition for suspension or abandonment. Within 180 days thereof, lessee must remove from the premises all other structures, machinery, equipment, tools, and materials that it elects to or as required by the BLM. Any such structures, machinery, equipment, tools, and materials remaining on the leased lands beyond 180 days, or approved extension thereof, will become the property of the lessor, but lessee may either remove any or all such property or continue to be liable for the cost of removal and disposal in the amount actually incurred by the lessor. If the surface is owned by third parties, lessor will waive the requirement for removal, provided the third parties do not object to such waiver. Lessee must, prior to the termination of bond liability or at any other time when required and in accordance with all applicable laws and regulations, reclaim all lands the surface of which has been disturbed, dispose of all debris or solid waste, repair the offsite and onsite damage caused by lessee's activity or activities incidental thereto, and reclaim access roads or trails.

Sec. 11. PROCEEDINGS IN CASE OF DEFAULT - If lessee fails to comply with applicable laws, existing regulations, or the terms, conditions and stipulations of this lease, and the noncompliance continues for 30 days after written notice thereof, this lease will be subject to cancellation by the lessor only by judicial proceedings. This provision will not be construed to prevent the exercise by lessor of any other legal and equitable remedy, including waiver of the default. Any such remedy or waiver will not prevent later cancellation for the same default occurring at any other time.

Sec. 12. HEIRS AND SUCCESSORS-IN-INTEREST - Each obligation of this lease will extend to and be binding upon, and every benefit hereof will inure to, the heirs, executors, administrators, successors, or assigns of the respective parties hereto.

Sec. 13. INDEMNIFICATION - Lessee must indemnify and hold harmless the United States from any and all claims arising out of the lessee's activities and operations under this lease.

Sec. 14. SPECIAL STATUTES - This lease is subject to the Clean Water Act (33 U.S.C. 1252 et seq.), the Clean Air Act (42 U.S.C. 4274 et seq.), and to all other applicable laws pertaining to exploration activities, mining operations and reclamation, including the Surface Mining Control and Reclamation Act of 1977 (30 U.S.C. 1201 et seq.).

Sec. 15. SPECIAL STIPULATIONS -

(Continued on page 3)

Sec. 15. SPECIAL STIPULATIONS (Cont'd.) -

THE UNITED STATES OF AMERICA

By _____

_____
(Company or Lessee Name)

_____
(Signature of Lessee)

_____
(Title)

_____
(Date)

_____
(BLM)

_____
(Title)

_____
(Date)

Title 18 U.S.C. Section 1001, makes it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

(Continued on page 4)

NOTICES

The Privacy Act and 43 CFR 2.48(d) require that you be furnished with the following information in connection with the information requested by this form.
AUTHORITY: 30 U.S.C. 181 - 287 and 30 U.S.C. 351 - 359 permit collection of the information requested by this form.
PRINCIPAL PURPOSE: The BLM will use the information you provide to process your application and determine if you are eligible to hold a coal lease on public lands.
ROUTINE USES: The BLM will only disclose this information in accordance with the provisions at 43 CFR 2.56(b) and (c).
EFFECT OF NOT PROVIDING INFORMATION: Submission of the requested information is necessary to obtain or retain a benefit. Failure to submit all of the requested information or to complete this form may result in delay or preclude the BLM's acceptance of your application for a coal lease.

The Paperwork Reduction Act requires us to inform you that:
The BLM collects this information to evaluate and authorize proposed exploration and mining operations on public lands.
Submission of the requested information is necessary to obtain or retain a benefit.
You do not have to respond to this or any other Federal agency-sponsored information collection unless it displays a currently valid OMB control number.

BURDEN HOURS STATEMENT: The public reporting burden for this form is estimated to average 25 hours per response when the form is used under the authority of 43 subpart 3422 (Lease Sales), or 800 hours per response when the form is used under the authority of 43 subpart 3430 (Preference Right Leases). The estimated burdens include the time for reviewing instructions, gathering and maintaining data, and completing and reviewing the form. You may submit comments regarding the burden estimate or any other aspect of this form to: U.S. Department of the Interior, Bureau of Land Management (1004-0073), Bureau Information Collection Clearance Officer (WO-630), 1849 C Street, Mail Stop 401 LS, Washington, DC 20240.

CHECKLIST ENVIRONMENTAL ASSESSMENT

COMPANY NAME: Signal Peak Energy, LLC (SPE) **Project:** Permit Amendment No. 03, Life-of-Mine (LOM)

OPERATING PERMIT #: C1993017 **Date:** October 16, 2013

LOCATION: Bull Mountain Mine No. 1 is approximately 15 miles southeast of Roundup, MT.
T6N, R27E: Sections 3, 4, 5, 8, 9, 10, 11, 14, 15, 16, 17, 21, 22, 23, 26, 27, 28, 34

County: Musselshell/Yellowstone, MT

SURFACE PROPERTY OWNERSHIP: [X] Federal [X] State [X] Private

MINERAL PROPERTY OWNERSHIP: [X] Federal [X] State [X] Private

BACKGROUND

Surface Mining Permit C1993017 was originally issued to Meridian Minerals on October 15, 1993, transferred to Glacier Park Company on September 25, 1995, transferred to Mountain Inc., on November 20, 1995, and to BMP Investments, Inc. on July 2, 2002. BMP Investments Inc. (BMPII) was renamed Bull Mountain Coal Mining, Inc. on December 13, 2006 and the permit was transferred to Signal Peak Energy, LLC on September 15, 2008.

This Checklist Environmental Assessment has been prepared to supplement the Environmental Impact Statement titled, Meridian Minerals Company, Bull Mountains Mine No. 1, Musselshell and Yellowstone Counties, Montana, November 1992, which covered the area known as life of mine. The area within proposed Permit Amendment No. 03 (AM3) was included in the LOM area addressed by the Environmental Impact Statement (EIS). The EIS can be viewed at http://deq.mt.gov/ea/coal.mcpx.

TYPE AND PURPOSE OF ACTION:

Proposed AM3 would increase the mine permit area (LOM) of their underground coal mine (Bull Mountain Mine No. 1) by adding 7,161 acres and expanding the mine from five longwall panels (approved under Amendment No. 02) to 14 longwall panels (Figure 1). This area is included in 18 sections within Township 6 North, Range 27 East as shown below.

No changes to the reclamation plan are proposed since AM3 only addresses expansion of the permit area to allow continuation of underground mining. General plans for the mitigation of impacts to springs, seeps, and drainages were included in SMP C1993017 when originally approved. Site specific plans for the repair or mitigation of impacts related to subsidence or other mining impacts will be developed as they are identified.

SPE is the operator of Montana's only active underground coal mine. The proposed plan includes room and pillar mining to develop nine additional panels for longwall mining. If approved, AM3 would extend the Permit Boundary toward the northeast (see Figure 1) and increase the permit area by 7,161 acres for a total area of 14,896 acres. Total acreage of the underground mine plan (LOM) would be 10,569 acres. Approval of this amendment would further increase the potential of the ground surface (directly above the panels and within the angle of draw) to be adversely affected by subsidence caused by mining.

Approximately 20 acres of additional surface disturbance is expected as a result of this amendment. This amount of additional disturbance is necessary to construct temporary surface facilities that support underground mining. Temporary surface support facilities include boreholes, associated pads, power lines, and roads.

If approved, AM3 would add approximately 176 million tons of in-place coal reserves or 110 million tons of mineable coal. Of this, approximately 83 percent would be recoverable (91 million tons of coal).

The amended area includes the following:

PERMIT AMENDMENT NO. 3 AREA

	Township 6 North, Range 27 East	
Section 3	SW¼; SW¼SE¼; W½NW¼	285
Section 4	S½NE¼; NE¼NE¼; SE¼NW¼; S½	474
Section 5	S½SE¼	79
Section 8	NE¼; E½NW¼; Portion SW¼NW¼; Portion S½;	454
Section 9	ALL	637
Section 10	S½; NW¼;W½NE¼; SE¼NE¼	601
Section 11	S½SW¼; NW¼SW¼; SW¼NW¼	160
Section 14	S½; NW¼; SW¼NE¼	520
Section 15	ALL	641
Section 16	N½; SE¼; E½SW¼; Portion W½SW¼	622
Section 17	Portion E½	101
Section 21	Portion N½; Portion SE¼	306
Section 22	ALL	640
Section 23	N½; SW¼; NW¼SE¼	520
Section 26	W½; W½SE¼; NE¼SE¼; W½NE¼; SE¼NE¼	559
Section 27	E½; Portion W½	518
Section 28	Portion NE¼NE¼	12
Section 34	Portion W½NE¼	32
	TOTAL AMENDMENT NO. 3 AREA ACREAGE:	7,161

Changes to Permit Acreage	Mineral Change Amount + or -	Surface Change Amount + or -
Federal:	2,529	577
Tribal:	0	0
State:	622	622
Private:	4,010	5,962
County:	0	0
Total:	7,161	7,161

Reclamation plan:

Signal Peak Energy, LLC commits to a reclamation plan designed to restore the natural use and utility of the land affected by mining activities, including reclamation of supplemental surface support facilities and repair of any significant subsidence fractures. Additionally, ample permit commitments, permit designs, permit plans, and permit bonding exists to ensure all potential hydrologic subsidence impacts have been adequately addressed in this amendment application. The reclamation plan is in section 17.24.313 of the Mining Permit (C1993017).

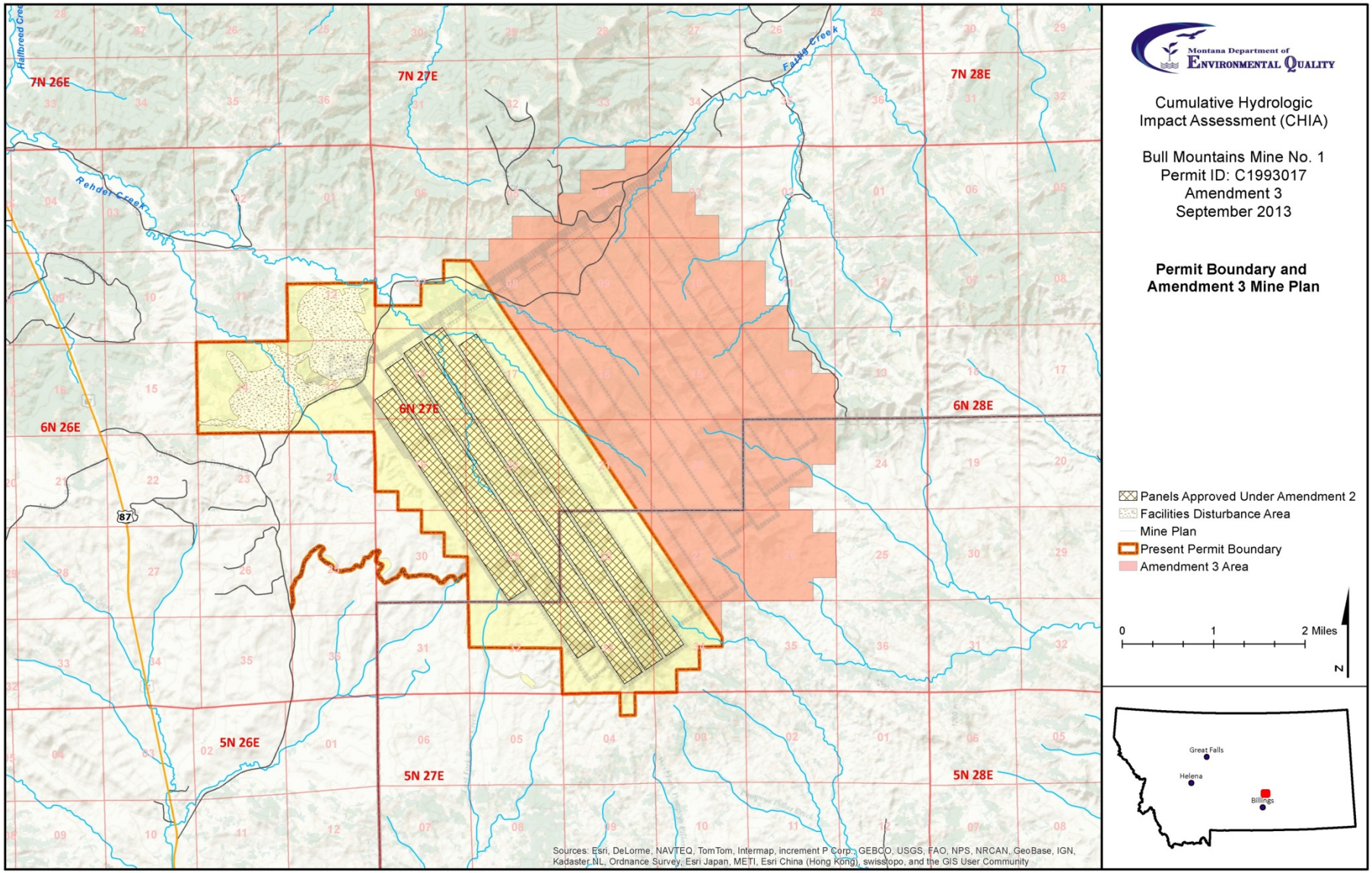


Figure 1: Bull Mountains Mine: Amendment 3 Area Map

N = Not present or No Impact will occur.
Y = Impacts may occur (explain under Potential Impacts).

IMPACTS ON THE PHYSICAL ENVIRONMENT	
RESOURCE	[Y/N] POTENTIAL IMPACTS AND MITIGATION MEASURES
1. GEOLOGY AND SOIL QUALITY, STABILITY AND MOISTURE: Are soils present which are fragile, erosive, susceptible to compaction, or unstable? Are there unusual or unstable geologic features? Are there special reclamation considerations?	[Y] The permit and proposed amendment area of Bull Mountains Mine No.1 are situated in the Bull Mountains that range in elevation from about 3,700 feet to 4,700 feet in the permit area. Topography of the area is rugged and the terrain is generally mountainous, dissected by ephemeral streams with higher areas or plateaus commonly capped by resistant sandstone and clinker. Tertiary age continental rocks (alternating sandstones, siltstones, shales, clinker, and coals) of the Tongue River Member of the Fort Union Formation are the principal rock units that would be disturbed by expanded longwall coal mining under AM 3. Field inspection by the Department of Environmental Quality (DEQ) indicated that these geologic rock units are not unusual or unstable. Soil survey data, as described in section 17.24.304(1)(k) of the permit, identified nine well developed soil series in the permit area and vicinity that are dominated by silty or sandy loams. Susceptibility of these soils to wind and water erosion ranges from moderate to high. However, expansion of underground mining would leave the soil resource in place and relatively undisturbed as successive subsurface coal panels are mined. Disturbance would consist of previously approved facility areas (e.g., office buildings, roads, a rail loop, ponds, and support for the processing of the coal) including disturbance associated with construction of borehole pads and roads. Much of the area required for these activities is already disturbed and currently permitted. Soil and suitable material salvage associated with development of the waste disposal area (WDA) created the largest surface disturbance outside the facilities area. Soil and suitable material salvage was conducted specific to the WDA. Salvage was within the bounds of law and rules while following permit commitments for soil handling and protection of the soil resource. Expanded mining operations could create surface subsidence features similar to those recorded during extraction of the first and second series of mining panels associated with Amendments No. 1 and 2 (Figure 1), respectively. Shallow sink-like depressions, linear surface fractures, and minor rockslides associated with subsidence have not had a noticeable effect upon the soil profile. Repair of subsidence features may create additional damage to soils and may not be warranted. However, repair or mitigation of subsidence features would be completed when necessary to restore stream profiles, drainages and ensure that premine land use is maintained. All areas of disturbance (e.g. facilities areas) were previously permitted with a reclamation plan that follows applicable rules and regulations set forth in the Administrative Rules of Montana (ARM).
2. WATER QUALITY, QUANTITY AND DISTRIBUTION: Are important surface or groundwater resources present? Is there potential for violation of ambient water quality standards, drinking water maximum contaminant levels, or degradation of water quality?	The main hydrologic issues surrounding the Bull Mountains Mine No. 1 are the potential for loss or diminution of the quantity and quality of groundwater and surface water, and the resulting impacts to wells, springs, ponds, and stream reaches within and in the vicinity of the mined area. These potential impacts are described below and would be expected if mining is expanded under AM3.

IMPACTS ON THE PHYSICAL ENVIRONMENT	
	[Y] Groundwater Five groundwater systems or aquifers are identified in the mined area and vicinity: the alluvial aquifer, the overburden aquifer, the Mammoth coal aquifer, the upper underburden aquifer, and the deeper underburden aquifer. Mining is expected to affect the water levels of these aquifers except the alluvial aquifer and deeper underburden aquifer. Groundwater direction in all but the alluvial aquifer is generally toward the north-northwest; alluvium within the permit boundary is generally dry except during and after significant storm events. Generally, groundwater associated with the deeper underburden, upper underburden, and Mammoth coal aquifers occurs under confined conditions and groundwater is unconfined in the overburden and alluvial aquifer systems. Groundwater enters the mine as the Mammoth coal aquifer is removed, and by development of subsidence fractures (series of vertical conduits or drains) in the overburden aquifer. Water is removed from the mine by dewatering pumps and through evaporation by ventilation fans. As the longwall panel advances, unsupported overburden rocks flex (subside), fracture (fractured zone), and begin to collapse (caved zone) into the void formally occupied by coal. The collapsed material in the mine voids is known as gob. Development of near vertical subsidence fractures in the overburden is likely responsible for much of the water in the mine as they intercept, drain, and partially dewater shallow groundwater above the mined area. Currently, the calculated drawdown (2004-2011) within the permit boundary in the Mammoth coal and upper underburden aquifers is approximately 45 feet and 25 feet, respectively [Analysis of Probable Hydrologic Consequences (PHC) addendum, 2013]. During mining, groundwater drainage into the mine voids may temporarily reduce shallow groundwater elevations and spring discharge in the immediate vicinity of the mined area. However, settling and compression of overburden rocks (e.g., low permeability shales) after mining is expected to close or seal most subsidence fractures and spring flow is expected to return to near premining discharge. If spring flow is impacted, the permittee is committed to replacing the flow using one of the methods discussed in Surface Mine Permit Volume 3, *Section 314 - 5.0 Mitigation Plans*, or another alternative approved by the DEQ. Litsky Spring (Station No. 17415), the first known spring to be affected, was undermined in late-March/early-April of 2012. Adjacent monitoring wells recorded the drop in overburden well levels as the area under Litsky Spring was mined, followed by recharge of monitoring wells as subsidence fractures healed and well levels returned to expected levels. More recent undermining of springs occurred in 2013 when several springs (17115, 17145, 17165, 17185, & 17315) were undermined as the longwall miner advanced through panel 3. While spring 17185 exhibited a brief interruption of flow immediately after undermining, flow resumed within two weeks and has shown no discernible interruption in flow since recovery. Weekly flow monitoring showed no discernible loss or interruption of spring flow for the remainder of the recently undermined springs. Continued monitoring of wells and springs will allow additional evaluation of potential impacts as longwall mining advances and additional springs are undermined. Most private water supply wells in the area of the mine are completed in

IMPACTS ON THE PHYSICAL ENVIRONMENT	
	relatively deep sandstones of the deeper underburden aquifer that are likely hydraulically isolated from shallow aquifers (e.g., upper Underburden, Mammoth coal and Alluvial aquifers) and effects of mining. Aquifer test data (Hydrometrics, 2009) indicated that these relatively deep sandstones occur under confined conditions and are not expected to be influenced by mining. SPE has committed to an additional study of the deeper underburden aquifer to confirm these conclusions. These relatively deep underburden sandstones have been identified as a source of replacement water if shallower supplies are impacted and must be replaced. Three industrial supply wells, currently used for mining operations are completed in carbonate rocks of the Madison Group, at depths greater than 8,700 feet. These wells produce hot (approximately 165^0F) and highly mineralized water that is isolated from the shallow aquifers of the Fort Union Formation by thousands of feet of confining rock units. The water contains concentrations of fluoride and radionuclides in excess of drinking water standards for groundwater that make the deep Madison well water unsuitable as potable water. This industrial-use water from the Madison wells is stored in Madison Pond No. 1, a lined pond used by the mine for coal processing in the preparation plant, and to control road dust and underground dust generated during mining. Wastewater generated from the preparation plant and underground dust control is filtered and re-used in a closed-loop system. Coal processing waste and underground mine wastes are disposed of in the WDA. Due to the use of deep Madison well water for coal processing, the potential for the accumulation of constituents from Madison wells in coal processing waste emplaced in the WDA exists, however it is not anticipated to approach levels of concern for groundwater or surface waters. Groundwater flow through the WDA is controlled to inhibit groundwater flow from the WDA to underlying aquifers, thereby limiting their potential for contamination due to WDA materials. Likewise, surface water runoff is controlled through MPDES-permitted outfalls. As stated earlier, runoff from the WDA is rare and only occurs during significant precipitation events, which would provide significant dilution of any constituent concentrations that may be present in WDA runoff water. Therefore, it is not anticipated that constituents in coal processing wastes will contribute significantly to groundwater or surface water quality conditions. A groundwater flow model (MODFLOW, 3-dimensional transient flow model) developed for SPE by Nicklin Earth & Water (March 2013) predicts that the majority of impacts or drawdown at the end of mining will be in Mammoth coal and upper underburden aquifers in the immediate vicinity of the mine and extending down gradient several miles beyond the permit boundary toward the north-northwest. The drawdown northwest of the mine (within the Mammoth coal and upper underburden aquifers) is expected to dissipate over time after mining ceases. The integrity of underground workings affects the recovery of groundwater levels after mining ceases. If the mine gate roads remain intact after mining then pooling of water in open workings would lead to raised groundwater levels in these aquifers in the northern part of the mine compared to premine water levels. By contrast, collapse of the gate roads would lead to the return of groundwater levels to near premine levels due to more uniform flow and lower tendency to pool. In any case, residual drawdown within the LOM boundary is predicted to persist for at least 50 years after mining and decreased water levels in

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	the southern part of the mine may be permanent due to the increased permeability of the mine gob. After mining, groundwater flow intercepted by subsidence fractures and drained into the mine voids could: 1) emerge as portal discharge, 2) increase the water levels in alluvial, or underburden units, 3) increase flow at springs or streams existing at lower elevations, and/or 4) emerge as new or relocated springs or streams. Any of these effects which occur would likely be more pronounced if the gate roads remain intact and fill with water, than they would if the gate roads collapse. Currently there is no evidence that mining has affected the water levels in stock or domestic water supply wells outside the permit area. Groundwater levels in all aquifers are monitored regularly in a network of 119 groundwater monitoring wells to evaluate the potential for impacts or material damage. A decline in water quality is expected in groundwater that comes into contact with the fresh mineral surfaces created by fractured rocks in and immediately above the mined out area, mainly due to increases in TDS, sodium, and sulfate. Quality of groundwater that does not come into contact with the fracture system or gob material is not expected to be affected by mining. The Montana Bureau of Mines and Geology (MBMG) (Reiten and Wheaton, 1989; Wheaton and Van Voast, 1989) conducted a hydrogeologic reconnaissance of abandoned coal mines near Roundup, Montana to study the potential for beneficial development of waters contained in the mines. Results indicated that groundwater in these abandoned mines is dominantly sodium-sulfate type with respective TDS, sulfate, and specific conductance concentrations ranging from 793 to 5,155 mg/L, 339 to 3,010 mg/L and 1,730 to 6,430 microsiemens per centimeter (uS/cm) that average 2,042 mg/L, 1,106 mg/L and 3,038 uS/cm. These results indicate that post-mining groundwater quality of mine pool water within the Bull Mountain Mine No. 1 would likely degrade from baseline groundwater quality where the average respective TDS, sulfate, and specific conductance concentrations within the Mammoth coal were 1,608 mg/L, 798 mg/L, and 2,272 uS/cm (Table 3 of the PHC). Composition of groundwater quality in abandoned mines near Roundup was found by the MBMG to be generally suitable for agricultural and livestock use. Water in the upper underburden aquifer (defined as the aquifer that extends 30 feet below the base of and likely hydraulically connected to the Mammoth coal) is also considered generally suitable for these uses. Currently, there is no evidence that groundwater quality on or off the permit area has been impacted by mining. Groundwater quality impacts are not expected during mining because mine drawdown causes groundwater to flow towards the mine. The groundwater quality of all aquifers is monitored regularly by a network of 84 groundwater monitoring wells to evaluate the potential for impacts or material damage. Particle tracking was conducted using the groundwater model to estimate the rate of movement of lower quality groundwater away from the mine in the Mammoth coal aquifer after mining ceases. The results of this modeling showed that particles placed near the edge of the mine voids traveled less than 2,000 feet in 50 years for the scenario where the gate roads remained intact forming a mine pool. Particle transport in

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	the scenario where gate roads collapsed was less than 1,000 feet in 50 years. Because the particle tracking model uses conservative assumptions which increase particle transport rates, the actual distance of movement of lower quality water from the mine pool should be less than these estimates. Particle tracking also does not consider dilution or attenuation of lower quality groundwater which would occur during transport away from the mine. Because of these factors, no degradation of groundwater quality outside the permit area is expected to occur after mining. [Y] <u>Surface Water: Streams & Springs</u> Stream reaches in the amendment area are typically dry. Notwithstanding storm events or unusually high precipitation, streamflow only occurs where shallow groundwater flow intersects stream channels, resulting in springs. Springs may form streamflow for a short reach downstream of the spring issue point, and wet or ponded surface conditions may be observed, particularly where springs have been developed for stock water use (via constructed in-channel ponds or impoundments). Spring flows and issue points within the permit area are highly variable and dependent upon local precipitation and geologic controls. Thus, the extent of flowing, wet, or ponded in-channel conditions from year to year can be attributed to the amount of recent precipitation and the recharge or diminution of shallow perched aquifers that contribute to spring flow. Springs and stream channels in the amendment area that have the potential to be impacted by mining operations include 1) those that occur in the undisturbed surface areas within the permit boundary; and, 2) those that occur within the disturbed surface areas of the Bull Mountain Mine No. 1. Undisturbed surface areas are those areas above planned longwall panels where subsidence features (fractures, depressions, and subsurface deformation) in overburden may alter the flow of surface water or shallow groundwater. Undisturbed surface areas include all mine lands within the permit that do not include the mine facilities area or waste disposal area. Disturbed surface areas of the Bull Mountain Mine No. 1 include the facilities area and the waste disposal area in the northwest portion of the permitted area. <u>Undisturbed Areas</u> In the Bull Mountains, subsidence fracture hydraulic conductivities are expected to be buffered by thick shales; however some increases in both vertical and horizontal hydrologic conductivities may occur as a result of subsidence. Subsidence fractures in areas of shallow overburden cover may cause diversion of the shallow groundwater, and some increased lateral drainage from higher overburden units to lower springs also may occur temporarily as a result of flow along subsidence fractures. Settling and compression after mining are expected to close most subsidence fractures, thereby returning the shallow groundwater flow directions, including flow to springs, to approximately the premining orientation. If, however, flow to the springs is impacted, the permittee is committed to replacing the flow using one of the methods discussed in Surface Mine Permit Volume 3, *Section 314 - 5.0 Mitigation Plans.* Seventy-two (72) mapped springs lie within the permit area. Of these 72 springs, 31 have been identified as significant springs that may potentially be impacted by mining operations (the others are wet seeps

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	or are dry during most years). To date, mining has occurred under only the first three longwall panels, and has progressed under three (3) of these 31 'significant' springs. Of these three springs, only one (Spring 17185) recorded a response to undermining. As shown from weekly monitoring data, Spring 17185 ceased to flow soon after undermining in mid-May of 2013, but within two weeks returned to normal flowing conditions. It appears that subsidence had a temporary effect on spring flow at station 17185, but, as expected, flows returned after a short period of settling and healing of subsurface subsidence cracks. Currently, there is no evidence that spring or surface water quality or quantity in undisturbed areas has been permanently affected or impacted by mining. A network of springs and surface water monitoring sites are monitored regularly to evaluate the potential for impacts or material damage during or post-mining. For significant springs with the potential to be effected by undermining, flow monitoring frequencies are increased prior to undermining, and increased monitoring frequencies are maintained up to a year following undermining. <u>Disturbed Areas</u> No permanent effects to the quantity and quality of stream flow would be anticipated from disturbed surface areas within the existing and proposed mine permit area. All flow from disturbed areas would be captured by sedimentation ponds, and is regulated under DEQ's MPDES permitting section. With the exception of extreme events, the effects of sediment pond discharges on stream water would be negligible. All sediment ponds are designed to contain the 10-year / 24-hour runoff plus sediment. Due to the low precipitation in the area, pond discharges are very infrequent (wet-weather discharges in 2011 and 2013 were the first discharges recorded since 1991). In the event that a sediment pond discharge should occur, sampling, effluent limits, and reporting will comply with DEQ requirements. Routine maintenance of the ponds maintains the storage capacity. Where practical, runoff from undisturbed areas will be diverted around the sedimentation ponds in order to decrease the quantity of water to be treated within the ponds. Some undisturbed area waters would enter the ponds, however, and would be treated and discharged under permit requirements. During the life of the mining operation, ditches and culverts would be employed to handle surface runoff within and around the mine facilities area. All ditches and culverts would be routinely inspected to ensure that accelerated erosion is not occurring at the outfalls. No long term or permanent water quality impacts are anticipated due to the emplacement of these structures.
3. AIR QUALITY: Will pollutants or particulate be produced? Is the project influenced by air quality regulations or zones (Class I airshed)?	[N] No direct impact to air quality is expected due to expansion of mining operations. Some increase in fugitive dust is anticipated due to the proposed increase in production (e.g. run-of-mine storage, coal processing, and haulage). These impacts to air quality would be addressed through review of the air quality permit.
4. VEGETATION COVER, QUANTITY AND QUALITY: Will vegetative communities be significantly impacted? Are any rare plants or cover types present?	[N] Underground expansion of mining activities within the proposed amendment would have no direct impact on vegetative communities. Subsidence resulting from underground mining would result in local areas of surface disturbance (e.g. fractures, areas of sloughing, etc.) similar to subsidence features recorded during extraction of the first two

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	panels. Areas of surface disturbance would be evaluated and a site-specific repair-mitigation plan developed and implemented unless it was determined that natural healing was the best alternative. Repair could include soil salvage, grading, soil replacement, and seeding with an approved seed mix. Subsidence of additional panels associated with this amendment would result in sequential subsidence that would have minimal effect on deep rooted plant species, such as ponderosa pine; some trees may be damaged, especially if they are located on a slough, subsidence fracture, or depression.
5. TERRESTRIAL, AVIAN AND AQUATIC LIFE AND HABITATS: Is there substantial use of the area by important wildlife, birds or fish?	[Y] Numerous springs are located within the proposed amendment area. These springs are important to grazing livestock and to the local wildlife community. Water provided by these springs helps ensure livestock distribution throughout the grazing pastures and allows for overall grazing of the area, increasing the economic return to the land owner. A variety of wildlife species, including small mammals, bats, song birds, shorebirds, upland game birds, raptors, big game, and warm-water aquatic species utilize the springs and associated areas of ponded water. Aquatic plants (periphyton), macroinvertebrates (e.g. earthworms, insects etc.) and vertebrates (e.g. tiger salamanders, painted turtles) are associated with springs and ponds [304(1) j-27]. Fish have not been found in any of the ponds or stream reaches. Currently, there is no evidence that mining has impacted aquatic or other wildlife (birds, deer, coyotes, etc.) that depend on these water supplies. No threatened or endangered aquatic species or habitat has been identified in the area. Subsidence related fractures associated with the Fractured Zone may intercept and direct shallow groundwater into the Caved Zone which may alter spring discharge and ultimately land use. Currently, there is no evidence spring flow within or near the footprint of the permit boundary or proposed amendment boundary has been permanently impacted by mining.
6. UNIQUE, ENDANGERED, FRAGILE OR LIMITED ENVIRONMENTAL RESOURCES: Are any federally listed threatened or endangered species or identified habitat present? Any wetlands? Species of special concern?	[N] No threatened, endangered, or sensitive plant species have been identified within the permit or amendment areas. Similarly, no endangered animal species have been identified within the proposed amendment area. Nineteen wildlife species of special concern have been observed in the wildlife monitoring area. These include the bald eagle, northern goshawk, Swainson's hawk, ferruginous hawk, long-billed curlew, Lewis's woodpecker, red-headed woodpecker, Cassin's kingbird, loggerhead shrike, Brewer's sparrow, lark bunting, grasshopper sparrow, chestnut- collared longspur, gray-crowned rosy finch, Townsend's big-eared bat, spotted bat, Great Plains toad, northern leopard frog, and sagebrush lizard. The majority of these species are considered transients or occasional visitors to the permit and proposed amendment areas. Three species (e.g. red-headed woodpecker, Cassin's kingbird, and northern leopard frog) have been observed on a regular basis and should be considered residents. Three other species (e.g. Townsend's big-eared bat, spotted bat, and sagebrush lizard) have been observed during regular surveys within the monitoring area; however, additional surveys are needed to better define whether or not they are residents of the area. Several of these species may be impacted if subsidence impacts springs and associated wetlands within the amendment area.

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7. HISTORICAL AND ARCHAEOLOGICAL SITES: Are any historical, archaeological or paleontological resources present?	[N] The originally approved permit area cultural resource obligations involved a Class III (Intensive) archeological/cultural inventory on all of the proposed surface disturbance area, plus a Class I literature search and rock art and standing-structure evaluation of the area overlying underground mining through life of mine. This was completed in 1989 (Rood 90 report), with supplemental intensive inventory of all known springs in 1992. Native American consultation (under AIRFA authority) was completed in 1993. In addition, the permit included a stipulation that steep-slope areas (>25%) would be upgraded to Class III before starting longwall mining. Amendment No. 03 is for extension of underground activities of an existing mine, and the only significant surface disturbance anticipated is the possibility of some surface failure in areas of steep slopes. Roads and pads will be located above the panels; however, Class III archaeological surveys are required to be completed two panels in front of mining and will allow for the identified sites to be avoided or mitigated with approval from the Montana State Historical Preservation Office (SHPO). No additional archeological or historical sites have been discovered, and no impacts to known archeological or historical sites should occur. Protection of any incidentally discovered sites is stipulated in the approved mining permit.
8. AESTHETICS: Is the project on a prominent topographic feature? Will it be visible from populated or scenic areas? Will there be excessive noise or light?	[Y] Work associated with proposed permit AM3 would lower the relief of the undermined area by approximately 7 feet or 70 percent of the extraction height (PHC). This was confirmed in August 2011 when Dunn Mountain subsided 7 feet as Panel 2 advanced beneath the mountain. Generally, this amount of subsidence is minor compared to the amount of topographic relief in the area and should not be noticed especially from a distance. However, there may be noticeable changes to the topography if subsidence and associated surface disturbance is greater than expected.
9. DEMANDS ON ENVIRONMENTAL RESOURCES OF LAND, WATER, AIR OR ENERGY: Will the project use resources that are limited in the area? Are there other activities nearby that will affect the project?	[N] Water used by the mine offices and for locker room showers is supplied by the Office Well that is completed in relatively deep underburden sandstones. This well is permitted by DEQ as a public water supply system (PWS No. 04676). Two wells completed in the Madison Formation (each approximately 8,600 feet in depth) provide water for industrial uses at the mine. An additional well has been drilled into the Madison Formation, but the casing failed and it is not producing water. Aquifer test results indicate that stock wells and domestic wells in the area will not be affected by production from these wells. For example, calculated drawdown (Hydrometrics, 2009) in monitoring well 62614-100-UB (BMP-121 - underburden monitoring well approximately one mile from the Office Well) was just over three feet after 20 years of continuous pumping (6 gpm). Similarly, pump test data (Hydrometrics, 2006) from Madison Well No.1 indicate that 18 feet of drawdown is predicted in a hypothetical well 1,000 feet from the pumping well after two years of pumping and 340 feet of drawdown after 20 years of pumping. This indicates that production (360 gpm) from the isolated Madison aquifer will not affect the yield of other Madison wells since the nearest Madison well to the mine site is approximately 17 miles. The proposed activity contemplates economic exploitation of coal resources that will not result in significant decrease in the total amount

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	of exploitable coal reserves in Montana. There are no activities nearby that will affect the proposed work.
10. IMPACTS ON OTHER ENVIRONMENTAL RESOURCES: Are there other activities nearby that will affect the project?	[Y] Livestock production and wildlife habitat would require the operator to minimize or repair subsidence features as necessary. The project area is remote and except for ranching and some hunting activities, there are no human activities in the area that would be affected by underground mining operations proposed under Amendment No. 03.

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11. HUMAN HEALTH AND SAFETY: Will this project add to health and safety risks in the area?	[Y] There is potential for injury to humans, livestock, and wildlife as subsidence features appear on the surface. A mining schedule must be published by the Operator for the respective landowners at least six months before their lands are undermined to minimize and warn of potential impact to humans and structures [ARM 17.24.911(5)].
12. INDUSTRIAL, COMMERCIAL AND AGRICULTURAL ACTIVITIES AND PRODUCTION: Will the project add to or alter these activities?	[N] Grazing or premining land use would not be significantly impacted by the expansion of underground mining activity and associated subsidence. Evidence of subsidence may include damaged fences, roads, minor rockslides, sink-like depressions, linear or en- echelon surface fractures. These features have not impacted livestock production while the first series of panels were mined and are not expected to impact production under AM3. It is expected that these surface impacts would be short-term; the operator would be required to repair the damage if extensive or impacted the postmine land use. Subsidence could impact existing wells and springs; loss of these water sources would result in development and implementation of a plan to replace them. This area is remote and with the exception of livestock grazing there are no industrial or commercial activities near the proposed amendment area.
13. QUANTITY AND DISTRIBUTION OF EMPLOYMENT: Will the project create, move or eliminate jobs? If so, estimated number.	[N] Approval of AM3 would not create, move, or eliminate jobs. Approval would add a significant amount of acreage and tonnage to the permit, which will allow mining to continue at the current rate, thus, continuing employment at approximately the current level for an additional 9 years.
14. LOCAL AND STATE TAX BASE AND TAX REVENUES: Will the project create or eliminate tax revenue?	[Y] Additional mining would increase the amount of coal severance tax available to the state. Employment of the current and projected workforce would result in additional federal and state income taxes. Musselshell and Yellowstone counties would collect taxes based on the mine development within the respective county. Property taxes would be collected on the mine facilities and equipment based on its location. It is possible that lands within the amendment area may be reassessed and taxed at a lower rate if the county determines that the value of the land has been impacted by subsidence.
15. DEMAND FOR GOVERNMENT SERVICES: Will substantial traffic be added to existing roads? Will other services (fire protection, police, schools, etc.) be needed?	[N] Proposed work would not add substantial traffic to existing roads and the demand for government services would not exceed that required for review and approval of AM3.
16. LOCALLY ADOPTED ENVIRONMENTAL PLANS AND GOALS: Are there State, County, City, USFS, BLM, Tribal, etc. zoning or management plans in effect?	[N] No locally adopted environmental plans and goals are in effect.
17. ACCESS TO AND QUALITY OF RECREATIONAL AND WILDERNESS ACTIVITIES: Are wilderness or recreational areas nearby or accessed through this tract? Is there recreational	[N] Wilderness, recreational areas, public parks, or historic sites are not nearby or accessed through the proposed permit area. Expanded mining would not adversely affect any publicly owned park or place included in the national register of historic sites. The area is controlled by private landowners. Except for limited hunting and camping, the

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potential within the tract?	area is not typically used for recreational activities.
18. DENSITY AND DISTRIBUTION OF POPULATION AND HOUSING: Will the project add to the population and require additional housing?	[N] Field inspection by DEQ confirmed that few buildings or manmade structures are near or within the area proposed for expansion of the permit. Approval of AM3 would not add to the local population; additional housing would not be required.
19. SOCIAL STRUCTURES AND MORES: Is some disruption of native or traditional lifestyles or communities possible?	[N] Inspection by DEQ confirmed that the area is remote from most human activities and communities. Disruption of lifestyles is not expected since there is minimal human activity (i.e., ranching) within or near the proposed permit area.
20. CULTURAL UNIQUENESS AND DIVERSITY: Will the action cause a shift in some unique quality of the area?	[N] The project is not expected to significantly impact any inventoried Historic and Archeological Sites (see Item 7, above).
21. PRIVATE PROPERTY IMPACTS: Are we regulating the use of private property under a regulatory statute adopted pursuant to the police power of the state? (Property management, grants of financial assistance, and the exercise of the power of eminent domain are not within this category.) If not, no further analysis is required.	[Y] Private property would be undermined and impacted by subsidence pursuant to the Strip and Underground Reclamation Act (ARM 17.24.901). (See Discussion Above)
22. PRIVATE PROPERTY IMPACTS: Does the proposed regulatory action restrict the use of the regulated person's private property? If not, no further analysis is required.	[Y] Surface uses could be limited during a period of time when mining is proceeding and risk of subsidence is present. Proposed state government activities would place some restrictions on the owner's use of the surface property, but not sufficient enough to constitute a taking because the owner is not deprived of property or all economic uses of that property.
23. PRIVATE PROPERTY IMPACTS: Does the agency have legal discretion to impose or not impose the proposed restriction or discretion as to how the restriction will be imposed? If not, no further analysis is required. If so, the agency must determine if there are alternatives that would reduce, minimize or eliminate the restriction on the use of private property, and analyze such alternatives.	[Y] DEQ has limited of discretion in its permitting decisions.
24.OTHER APPROPRIATE SOCIAL AND ECONOMIC CIRCUMSTANCES:	[N]

25. Alternatives Considered:

No Action: The proposed mine area within Application AM3 would remain undisturbed and outside the boundaries

of SMP 1993017. Mining and reclamation would continue within the remainder of the Bull Mountains Mine No.1 as currently permitted and would be completed within three to four years, but the potential of the coal reserve would be much reduced.

The effect of no-action alternative on drawdown of groundwater and impacts to surface and groundwater quality would remain the same as current mining with no additional impacts.

Social and economic impact of no-action alternative would keep employment at the mine near the same levels for three to four years until current permitted coal reserves are depleted. After the coal was mined the mine would begin a shutdown process and eventually no longer employ workers. The area surrounding the facilities would remain working cattle ranches.

Approval: Coal mining operations would continue under authority of SPE's permit (SMP C1993017) and subject to its requirements which include reclamation described in the Reclamation Plan.

26. Public Involvement: Availability of this Environmental Assessment was published in *The Billings Gazette*. The EA will also be available on the DEQ Internet site (http://www.deq.mt.gov). Copies of the application are available for public review at the Bull Mountain Mine No.1 office, the Musselshell County Courthouse in Roundup, the Yellowstone County Courthouse in Billings, and at the DEQ offices in Helena and Billings.

27. Other Governmental Agencies with Jurisdiction: USDI, Bureau of Land Management (mineral lease and surface), Montana Department of Environmental Quality, Water Protection Bureau (MPDES), Air Resources Management Bureau (air quality permit), Montana Department of Natural Resources and Conservation (water rights and mineral lease), and Office of Surface Mining.

28. Magnitude and Significance of Potential Impacts: There would be no significant impacts associated with this expansion that were not previously addressed in the EIS.

29. Cumulative Effects: SPE is currently conducting exploration activities adjacent to the permitted area. DEQ has determined that prospecting activities including drilling, overland travel, etc. will not create a significant impact as no substantial disturbance is permitted as defined by ARM 17.24.301(121). Future mining of the area being prospected is unknown at this time; therefore, is not considered a cumulative effect for this permitting action. No additional activities have been identified in the area.

The current WDA may reach capacity prior to completion of the longwall panels contained in AM3. If a second WDA area is needed, SPE would be required to submit plans for creation of a new WDA, including location, size, and operation. It is anticipated that this application would result in a significant increase in the reclamation bond as well as a change to the hydrologic balance; therefore, the application would be a major revision. A major revision would include an additional environmental review, as well as opportunity for public comment. SPE has not proposed a plan and location for a second WDA; therefore, DEQ is unable to fully analyze the environmental impacts at this time.

Recommendation for Further Environmental Analysis:

[ ] EIS [ ] More Detailed EA [X] No Further Analysis

EA Checklist Prepared By: Montana DEQ in cooperation with Montana DNRC.
Pete Schade and Martin Van Oort: Staff Hydrologists
Dave Adair: Engineer
Robert Smith: Permit Coordinator

Signal Peak Energy, LLC.

100 Portal Drive - Roundup MT 59072
Tel. 406-323-4500

October 5, 2012

Mr. Chris Yde
Coal & Uranium Program Supervisor
Department of Environmental Quality
P.O. Box 200901
Helena, MT 59620-0901

Permit ID: C1993017
Revision Type: Amendment
Permitting Action: Application
Subject**: Amendment No. 3; Increase in Mine Permit Area; "Life of Mine"**

Dear Mr. Yde,

SPE is submitting the enclosed Amendment No. 3 Application to request approval for an increase in the mine permit area.

For ease of review and file size management, the entire permit has not been re-submitted in this application. Only files that require revision for Amendment 3 are included. The "compare text" markup is utilized on the submitted text. The permit materials included in this submittal have the suffix "Amend 3_20120901" as they were prepared in anticipation of the earlier submittal date. Attachment (2) is a table that lists and describes proposed changes to permit materials in this application. Items that require detailed discussion relevant to this amendment are included in Attachment (6).

All revised permit materials included in this amendment application utilize an approved Amendment 2 and all approved minor revisions as a starting point. If any minor discrepancies in text, tables, maps, figures still exist, due to incorporating the multiple revisions into this submittal, SPE will promptly correct the minor errors in future correspondence related to Amendment 3.

The following describes attachments included in this submittal:

(1) APPLICATION FORM FOR STRIP OR UNDERGROUND MINING PERMIT_AMEND 3_20121005.pdf

Includes the following attachments within to supplement the application form:

- TABLE App-1_AMEND 3_20120901
- TABLE App-2_AMEND 3_20120901
- TABLE App-3_AMEND 3_20120901
- TABLE 303-4_AMEND 3_20120901

(2) TABLE OF MATERIALS UPDATED BY VOLUME_AMEND 3_20121005.pdf

This table is a list of permit volumes that require revisions for this amendment. The table includes further listing of all revised materials within each permit volume. Additionally, revisions made to each permit material/document are briefly described or listed on this table. For more lengthy discussion on substantial revisions to permit materials/documents refer to Attachment (6).

(3) UPDATED PERMIT MATERIALS BY VOLUME_AMEND 3_20121005.pdf

This is a pdf document that includes all the revised permit materials proposed in this amendment. When this pdf is opened, the cover page lists the permit volumes and addenda that have proposed revisions. The permit volumes are pdf attachments to the cover page pdf and the materials within each permit volume are further pdf attachments.

TOC's and volume cover pages are not included in this amendment application. Permit materials that do not require revisions are not included in this application.

(4) CAD LAYERS_AMEND 3_20121005.dwg

This .dwg contains all the updated CAD layers relevant to this submittal.

(5) LIST OF CAD LAYERS_AMEND 3_20121005.xls

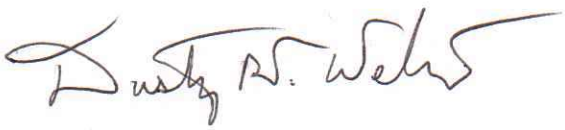
Lists the CAD layers included in CAD LAYERS_AMEND3_20121005.dwg

(6) ADDITIONAL DISCUSSION BY DISCIPLINE_AMEND 3_20121005.pdf

Items that require more explanation than the attachment (2) table can provide are included here.

Please contact me if you have any questions or concerns.

Sincerely,



Dusty R. Weber
Permitting Manager
Office: 406-375-5254 Cell: 406-855-0382
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E-mail: dweber@signalpeakenergy.com

Attachments: (listed & described above)

Montana Department of
ENVIRONMENTAL QUALITY

Steve Bullock, Governor
Tracy Stone-Manning, Director

P. O. Box 200901 • Helena, MT 59620-0901 • (406) 444-2544 • Website: www.deq.mt.gov

September 3, 2013

Mr. Dusty Weber
Signal Peak Energy LLC
Bull Mountain Coal Mine #1
100 Portal Drive
Roundup, MT 59072

Permit ID: C1993017
Revision Type: Amendment
Permitting Action: Determination
Subject: AM3: Acceptability Determination

Dear Dusty:

The Department of Environmental Quality's (DEQ) has completed its review of Signal Peak Energy LLC's application for Amendment 3 received October 5, 2012, and updated November 30, 2012, March 19, 2013, July 1, 2013, and August 2, 2013. The application was determined complete on December 14, 2012, which began the acceptability review process. DEQ has determined that the application is acceptable.

DEQ will advertise the Notice of Acceptability and availability of the Environmental Assessment in the Billings Gazette for two consecutive weeks followed by a 10-day public comment period.

Please feel free to contact Robert Smith at (406) 444-7444 with questions regarding this letter.

Sincerely,

Chris Yde, Supervisor
Coal and Uranium Program
Industrial and Energy Minerals Bureau
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C: Jeff Fleischman, OSM Casper Office
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APPENDIX 314-5

COMPREHENSIVE HYDROLOGIC EVALUATION AND ANALYSIS OF PROBABLE HYDROLOGIC CONSEQUENCES

Bull Mountains Mine No. 1

prepared by



NICKLIN

EARTH & WATER, INC.

for

Signal Peak Energy, LLC

August, 2013

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APPENDIX 314-5
COMPREHENSIVE HYDROLOGIC EVALUATION
AND
ANALYSIS OF PROBABLE HYDROLOGIC CONSEQUENCES
BULL MOUNTAIN MINE NO. 1

1.0 INTRODUCTION

1.1 Background

Mining activity resumed at the Bull Mountains Mine No. 1 in 2003 (see Figure 1 (314A)). Since that time, substantial hydrologic data have accrued as part of the environmental monitoring program at the mine.

Accordingly, this report provides both a data evaluation update and also provides an update to the Probable Hydrologic Consequences (PHC) of Section 314 of the Bull Mountains Mine No. 1 Permit No. C1993017. The data evaluation update focuses on observation data collected since 2003 and compares the more recent observations to historic data as well. Much of the analyses presented in this update relied upon the data synthesis/compilation efforts conducted by Catena Consulting, LLC (Catena Consulting) on behalf of Signal Peak Energy, LLC (SPE).

The main objectives of completing this PHC are the following:

- Provide a comprehensive evaluation of the site hydrology data for both water quantity and water quality.
- Compare the observations and interpretations with baseline study predictions.
- Update the predicted probable hydrologic consequences.

This report is organized as follows:

- The first sections, Sections 1 through 4 provide an assessment of the more recent observations collected in the last decade (since mining activity resumed).
- Section 5 summarizes the observations that are deemed to be helpful to projecting future probable hydrologic consequences.
- Sections 6 and 7 provide the probable hydrologic consequences for the proposed Life of Mine (LOM).

1.3 Overview of Analysis Efforts

The following general activities, using data collected from 2003 through 2011, were completed:

- Developed potentiometric surfaces for relevant hydrogeologic units using data from 2004 and 2010 or 2011.
- Examined the relative significance of mining on various hydrologic features of interest. In order to accomplish this, the following was done:
    - Evaluated groundwater and surface water hydrographs developed by Catena Consulting by examining for trends and assessing factors responsible for trends if they were apparent.
    - Defined the drawdown of potentiometric surfaces using 2004 and 2011 data for the Mammoth coal and upper Underburden.
    - Evaluated groundwater quality data (from monitoring wells and springs).
    - Assessed surface water flow and water quality from ponds and streams.
    - Provided additional figures, tables and appendices in order to assist in updating the site conceptual model as necessary.
- The Montana Bureau of Mines and Geology (GWIC) database was reviewed to determine if there were any additional recently installed water supply wells installed in the area.

- A narrative on Bull Mountains Mine No. 1 groundwater use is included as requested by Montana Department of Environmental Quality (DEQ).

Finally, in addition to the efforts identified above, an updated groundwater flow model was developed (see Section 314-6). This model serves multiple purposes including; projecting dewatering rates, predicting the relative degree of the impact of mining activity on groundwater conditions during mining, and predicting the post-mining response recovery.

1.4 Mining Progression

1.4.1 Past Mining

A detailed historical perspective on coal mining in the Bull Mountains is given in Section 17.24.304(1)a [page 304(1)a-1]. Surface coal mining activity by PM Coal was limited in earlier operations to a relatively small scale from 1970 to 1991. In 1991, the surface mine was converted to an underground mine. The 1 East Main was advanced about 1,200 feet. The PM mine closed in 1993. In 1995 operations commenced again by Mountain Inc. which extended 1 East Main another 2,000 feet. Mountain Inc. ceased operations in 1997. The mine began operating again following the mine purchase by Bull Mountain Investments, Inc. Coal mining resumed in August 2003 and has been ongoing.

1.4.2 Present Mining Situation

Details about the recent mining is presented in 17.24.304(1) [page 304(1)a-1]. This appendix will also discuss the relationship between this recent mining and the observed hydrologic responses that are occurring.

2.0 PRECIPITATION AND CLIMATE

This section describes climate data for the Bull Mountains Mine and vicinity. Data presented in earlier permitting efforts are updated and presented to provide a basis for evaluating hydrologic aspects of the project.

2.1 Climate

The climate in eastern Montana, including at the Bull Mountains Mine No. 1, is classified as semi-arid, continental. Precipitation and temperature measurements have been collected at the mine and at the nearby climate stations in Roundup, MT (240802) and Billings, MT (240807). Climate data are available from the Western Regional Climate Center (WRCC). The Roundup station is located about 13 miles northwest of the Bull Mountains Mine No. 1, whereas the Billings station is located about 30 miles south of the mine.

The climatic conditions at Bull Mountains Mine No. 1 are similar to the composite of climatic conditions recorded at Roundup and Billings. The period of record for the Roundup station extends from 6/4/1914 to 1/31/2012. The period of record for the Billings station is 7/1/1948 to 1/31/2012.

Mine climate data are provided in the tables provided in Attachment A to this Appendix. The available mine-specific precipitation data at Dunn Mountain extend from 2008 to 2010. There have been instrumentation reliability issues for the Dunn Mountain station. Precipitation data are presently being collected at the ambient air quality station at the mine. The ambient air quality station will serve as a mine specific weather/climate station for the future.

2.2 Temperature

Table 1 (314A) provides statistical summaries of the data collected at Roundup, MT. The average maximum and average minimum daily temperatures as measured at Roundup, MT are 88.9 ^{o}F in July and 12.1 ^{o}F in January, respectively. The maximum and minimum temperatures ever recorded at Roundup are 111 ^{o}F (7/14/2002) and -52 ^{o}F (2/15/1936).

Table 2 (314A) provides statistical summaries of the data collected at Billings, MT. The average maximum and average minimum daily temperatures as measured at Billings, MT are 86.7 ^{o}F in July and 14.5 ^{o}F in January, respectively. The maximum and minimum temperatures ever recorded at Billings are 108 ^{o}F (7/14/2002) and -32 ^{o}F (12/24/1983).

2.3 Precipitation

The average annual precipitation is 12.58 inches as measured at Roundup, MT and 14.39 inches as measured at Billings, MT. Figure 2 (314A) provides a graph showing the annual precipitation at the Roundup and Billings climate stations. This common time frame allows for a more direct comparison between the two climate stations. This figure shows that up to the mid-1980s, the total annual precipitation at the Billings climate station was usually higher than the annual precipitation measured at the Roundup station. Since then, the annual precipitation at both stations seems more closely correlated.

Cumulative departure from average (CDFA) precipitation plots are shown in Figure 3 (314A). CDFA plots are useful for defining extended periods of above average and below average precipitation. Upward trends in CDFA plots indicate periods of above average precipitation, whereas downward trends indicate periods of below average precipitation. The uppermost graph shows the precipitation trends for the period extending from 1950 to 2011 at Roundup, MT and the lower plot gives the same CDFA

for Billings, MT. The difference in annual precipitation discussed earlier is apparent when comparing the two graphs. The precipitation at the Billings station tended to be above average from the early 1960s to the mid-1970s. This trend is also apparent at the Roundup station. Figure 4 (314A) provides more recent CDFA based upon the last 30 years. As Figure 4 (314A) demonstrates, both stations show a period of below average precipitation from about 2000 to 2005. Precipitation in 2010 and 2011 for both stations has been above average. The relevance of CDFA plots is that in many instances, water levels in wells, spring flows, etc. tend to correlate to trends in climate. For instance, during periods of long-term drought, water levels in some aquifers tend to decline. During periods of above average precipitation, water levels tend to increase.

Figure 5 (314A) shows monthly precipitation averages for the Roundup, MT and Billings, MT stations. Figure 5 (314A) also plots monthly precipitation for 2011. The 2011 year was eventful as precipitation was abnormally high in May leading to substantial surface water runoff/recharge in the region, including the Bull Mountains area. This significance of the May precipitation is apparent in the water quantity and quality observations at the mine.

2.4 Evaporation

Annual pan evaporation data have been collected in the vicinity of the Bull Mountains Mine No. 1 at the Huntley Experiment climate station (244345) for a period of record extending from 1911-2005 (www.wrcc.dri.edu/htmlfiles/westevap.final.html). The pan evaporation at this station averaged 41.27 inches.

It is typical to apply a pan coefficient from about 0.7 to 0.80 to the pan evaporation data to obtain an estimate closer to the actual evaporation from a surface water body. Assuming a pan coefficient of 0.75, then the approximate annual evaporation at the Bull Mountain Mine is about 30.9 inches. Most of the evaporation occurs from April to October.

The amount of evaporation at the mine at any time is primarily dependent on the extent of the ponded surface area at mine ponds. Given that the ponded area at the mine is very limited, then the actual volume of surface water evaporation is small and considered inconsequential from an overall water budget perspective.

3.0 GEOLOGY/HYDROGEOLOGY

A detailed description of the regional geology is presented in Addendum 5 Section 304(1)F of the permit. A brief synopsis of the information provided in that section is given below.

3.1 Physiography and Topography

The study area lies within the Bull Mountains, which are part of the Northern Great Plains physiographic province. The topography of the study area consists of gently sloping valleys bounded by moderately steep, to steep ridges, capped by isolated sandstone and clinker mesas. Elevations in the study area range from approximately 3700 to 4700 feet above mean sea level. The underlying rocks are composed of interbedded shales, claystones, siltstones, coals, and sandstones. The high mesas and ridges tend to be capped by "clinker."

3.2 Regional and Local Geology

3.2.1 Stratigraphy

The stratigraphy is relatively simple and similar to that of the Northern Powder River Basin. The Bull Mountains are composed of the Tertiary Fort Union Formation. This formation contains all the commercial coal found within the Bull Mountains. The Tongue River member, from an economic perspective, is the dominant coal-forming member of the Fort Union.

This Tongue River member is composed of light-gray to brownish-gray sandstones and siltstones, light-buff to dark-gray shaley siltstones and shales, brown to black carbonaceous shales, and coals. Several thin beds of buff colored limestone also have been observed in the upper portion of the Tongue River (Woolsey, 1917). The thick sandstones were deposited by fluvial processes as point bars and channel deposits,

while the siltstones, shales, and claystones were deposited by flood plain, overbank, and lacustrine processes. The coals were deposited in peat swamps and the limestones probably were deposited in shallow lakes.

The coals of potential economic significance include the Roundup, Carpenter, McCleary, Mammoth and Rehder. The coal of primary interest at Bull Mountains Mine No. 1 is the Mammoth coal.

Relatively thin valley alluvium, colluvium and mesa forming clinker are other lithologic units exposed in the Bull Mountains. The alluvium, exposed in some of the drainage bottoms, is of Quaternary Recent age. The clinker, exposed along the ridge and mesa tops, is of Quaternary or late Tertiary age.

3.2.2 Structure

The Bull Mountains are underlain by a gently plunging syncline in the western portion of the Bull Mountains Basin (Map 304(6)-2). The axis of the syncline, based on the Mammoth coal structure, trends northwest-southeast through the central, and topographically highest, portion of the study area. An outcrop map of this Mammoth coal and other local coal units is included in Figure 6 (314A).

3.3 Hydrogeologic Overview

3.3.1 Alluvium

The alluvial or valley fill deposits in the upland reaches in the immediate vicinity of the mine are relatively permeable in comparison to the bounding Tongue River deposits. Wells penetrating this alluvium indicate that the alluvium ranges in thickness from 0 to 37 feet. However, significant fractions of these alluvial deposits are unsaturated except during episodes of major precipitation when surface water runoff from this precipitation acts to recharge these alluvial deposits (refer to Section 3.4.1 of this appendix which

discusses the distribution of dry wells in the alluvium). Spring snowmelt probably provides the major source of recharge. Some limited recharge also may occur in association with springs that issue from the Tongue River deposits that bound the alluvium.

3.3.2 Overburden

The Overburden above the Mammoth coal is comprised of interbedded sandstones, siltstones, shales, claystones, and coals. A few thin freshwater limestones have been described in several of the exploration drill holes, but these represent an insignificant percentage of the Overburden.

The sandstones in the study area exhibit a range of bed geometries. Some sandstones, in particular those above the Rock Mesa coal, are massive and are up to 80 feet thick.

Within the study area, the Overburden varies in thickness from zero feet at the coal outcrop to more than 800 feet under the highest mesas. For areas where longwall mining will occur, the Overburden is greater than 200 feet thick.

The Overburden generally yields very small amounts of water. This is due in part to the limited recharge area. The mine is located beneath the hydrologic divide between the Yellowstone River Basin and the Musselshell River Basin. Hence, the area recharging the Overburden is relatively small.

Another factor leading to low formation yields is that much of the siltstone, fine-grained sandstones, and shale possess very low hydraulic conductivity. Testing performed in baseline studies determined that the geometric mean horizontal hydraulic conductivity in the Overburden deposits is 0.013 ft/day in the Upper Overburden, and is 0.018 ft/day for the Overburden as a whole (adapted from Table 304(5)-5-2 of baseline studies).

Additional statistics on hydraulic characteristics are summarized in Table 1M of Appendix 314-6. The statistics demonstrate that the Overburden generally possesses very low hydraulic conductivity, which is generally not conducive to yielding much water.

Another factor relevant to the groundwater conditions at the mine is that vertical hydraulic conductivities tend to be a few orders of magnitude smaller than the horizontal hydraulic conductivities in Tongue River Member strata. For instance, ratios of vertical to horizontal hydraulic conductivity of about 10^{-3} to 10^{-4} have been quantified in this same geologic member in other portions of Montana (e.g., NE&W, 2011). The net effect of the very low vertical hydraulic conductivity is that it impedes, or limits, vertical flow of surface recharge from reaching to lower portions of the Overburden at the mine. This causes a tendency, for the limited recharge that occurs, for the water to perch upon shale, or upon the fractured/colluvium/alluvium mantle. This also limits the amount of local recharge through the Overburden into the underlying Mammoth coal and Underburden.

The net effect of the lack of recharge to relatively deeper portions of the Overburden, coupled with the low hydraulic conductivities of the Overburden, is that it is infeasible to install a well in the Overburden and expect it to produce sufficient water for beneficial use. Although the dependability of the Overburden to supply groundwater to wells is limited, there is sufficient recharge water to yield groundwater flow at springs in the area.

The spring discharges are generally associated with a mantle of fractured and weathered bedrock and unconsolidated valley fill deposits. Spring appearance and flow correlate to locations where groundwater flows within the base of fractured/ unconsolidated deposits and where the less permeable beds upon which the water flows either outcrop or come near to the surface. In effect, these natural features act as groundwater “collectors” in some areas leading to these springs.

3.3.3 Mammoth Coal

The Mammoth coal is continuous throughout the study area to the outcrop limits east and west of the mine (see Figure 6 (314A)). Within the permit area, the Mammoth coal ranges from 8 to 10 feet thick. In the eastern portion of the mine plan area, where the Mammoth coal and Rehder coal merge, the thickness of the combined Rehder-Mammoth is approximately 13.5 to 15.0 feet.

Recharge reaches the Mammoth coal via its exposed outcrops/subcrops in the area (e.g., south, east and west), and also from infiltration through the Overburden.

The geometric mean hydraulic conductivity for the Mammoth coal is 0.16 ft/day. Although the hydraulic conductivities for the Mammoth coal are relatively higher than the Overburden, they are generally inadequate to provide a reliable source of well water. It has been reported in baseline studies that a few domestic wells tap the Mammoth coal as a water supply source.

The Mammoth coal near its outcrop areas is typically unconfined. Relatively deeper toward the axis of the synclinal trough, the Mammoth coal is confined. Within the proximity of the permit and amendment boundaries, the Mammoth coal tends to be unconfined near the south and west portions of the permit area, whereas, it is confined in more northeastern/north central portions of these boundaries.

3.3.4 Underburden

The Underburden is the first unit beneath the Mammoth coal. The Underburden is recharged both by infiltration at outcrops, and by some leakage from overlying units. For convenience, the Underburden is subdivided into the “Upper” Underburden which is nearer the Mammoth coal and the “Deeper” Underburden or Underburden aquifer. This

aquifer provides much of the well water supplies in the general area of the Bull Mountains Mine No. 1.

The Upper Underburden possesses very low hydraulic conductivities. The geometric mean for hydraulic conductivity of this Upper Underburden was determined to be 0.013 ft/day. This portion of the Underburden does not yield substantive amounts of groundwater to wells.

The Deeper Underburden aquifer provides sufficient water for domestic/stock use, and the Bull Mountains Mine public water supply. This unit represents a large fluvial channel deposit which is a 50 foot thick massive fluvial sandstone at a depth of about 350 feet below the Mammoth coal. This unit is tapped by the recently installed (2009) Office Well 1 where a sandstone was observed from 355 to 405 feet below ground surface. A pumping test performed on this well showed a transmissivity of 192.1 ft^2/d. This would equate to a hydraulic conductivity of 3.8 ft/d. For comparative purposes, this deeper sandstone possesses a hydraulic conductivity two orders of magnitude higher than the Upper Underburden and one order of magnitude higher than the Mammoth coal. It possesses the characteristics necessary to provide an ample supply of potable water for the mine and other users in the area, and hence, is an aquifer.

3.4 Observations – Groundwater Quantity

This section focuses on transitions in water levels over time for each hydrogeologic unit assessed. Potentiometric head contours and hydrographs assist in supporting any conclusions that are drawn. Potentiometric contours were developed using an iterative combination of Golden Software Surfer Mapping System combined with some assumptions and interpretative assessments.

Groundwater observation locations are shown in the following figures:

- Figure 7 (314A) – Springs
- Figure 8 (314A) – Alluvial monitoring wells
- Figure 9 (314A) – Overburden monitoring wells
- Figure 10 (314A) – Mammoth coal monitoring wells
- Figure 11 (314A) – Underburden monitoring wells

3.4.1 Alluvium

Interpretative potentiometric head contours for the alluvium are shown on Figure 12-1 (314A) Page 1 and 2. The abnormal amounts of precipitation of May 2011 led to atypical, or unusually high, water level conditions in alluvial monitoring wells in October 2011. Hence, the January 2011 data were used, as opposed to measurements from October 2011, as the January data are considered more typical/representative of water level conditions for the alluvial deposits in the mine vicinity. Other measurement dates could be employed to develop potentiometric head maps as well. The resulting potentiometric head maps would be very similar to those developed using the January 2011 data.

A majority of alluvial monitoring wells tend to be dry (see Figure 12-1 (314A) – Page 1). Hence, the potentiometric head contours are considered highly interpretative. Potentiometric mapping was completed for the alluvium in Rehder Creek. Many portions of this drainage network did not possess a sufficient saturation for it to be practical to develop representative water level contours in many of its tributary drainages.

The potentiometric heads shown in Figure 12-1 (314A) are similar to baseline potentiometric head mapping for the Rehder Creek alluvium. Refer to Attachment F for comparison purposes.

Potentiometric contours were developed in a limited portion of the Fattig Creek drainage (Figure 12-1 (314A) – Page 2). Additional alluvial monitoring wells are recommended for the Fattig Creek drainage network to assess the nature of the Fattig Creek alluvium (e.g., saturated or dry). See Attachment 3M of Appendix 314-6 for recommendations for added alluvial monitoring well locations in upper portions of this drainage.

The relative response of Rehder Creek alluvial wells over time is depicted with the aid of hydrographs on Figure 12-2 (314A) – Page 1. It is noted that more detailed hydrographs, including data qualifications, are included in the 2011 Annual Hydrology Report for the mine (Catena Consulting, 2012). Groundwater levels in several wells were observed to increase beginning in about 2010 with the most significant increase occurring in association with the May 2011 significant precipitation/runoff events. For instance, monitoring well BMP 33 showed water level increases up to about 23 feet (see upper left corner of Figure 12-2 (314A)) – Page 1. Monitoring well BMP 88, which has normally been dry, showed an even greater response in water year 2011 with increases in observed water levels of about 30 feet.

The hydrographs presented in Figure 12-2 (314A) – Page 1 clearly demonstrate that the water level responses observed in 2011 were much greater in more down-gradient portions of the Rehder Creek alluvium beginning at about Fattig Creek Road (or near BMP 1). Factors likely contributing to this response in 2011 include the following:

- Ponding occurred in Rehder Creek upgradient of Fattig Creek Road. This ponding was apparent as this road was breached in several places, causing road washouts in 2011. This would have required ponding in order for water to flow over the elevated road embankment.
- There is a gravel pit just north of Fattig Creek Road which fills during significant runoff events. This pit is estimated to be about 30 feet deep, 200 feet long and 100 feet wide. According to mine personnel, this gravel pit was full of water from

about May 2011 to July 2011. Furthermore, mine staff have observed this pit to immediately fill up from surface water runoff during significant precipitation and runoff events.

- Use of spreader dikes in the Rehder Creek floodplain. Ponded water from these dikes and other dikes was observed from about BMP 1 to areas downgradient during the spring and summer of 2011.
- There may be other potential unknown hydrogeologic anomalies.

Later sections will discuss the significance of this 2011 recharge event on the observations in the Overburden, Mammoth coal, and Underburden in this portion of the Rehder Creek drainage.

The relative response in more up-gradient areas of the drainage network during the 2011 water year has generally been much more subtle. For instance, BMP 19, BMP 72, and BMP 62 showed water level changes (increases) of about 5 to 7 feet in 2011 (see Figure 12-2 (314A)) – Page 1. Otherwise, water levels in these wells have been relatively stable over time. Wells BMP 62 and BMP 72 show a few feet of seasonal variation in water levels.

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 extending from resumption of mining in 2003 through 2011. However, nearly all the alluvium above areas that have been long-walled mined to date is unsaturated or dry. Hence, there is no basis to presently infer that alluvial groundwater would be impacted at this stage in mining. Furthermore, in the event that any alluvial aquifer system response to mining did occur, it may have been masked by recharge associated with the May 2011 precipitation/runoff event.

3.4.2 Overburden

The Overburden monitoring well locations are shown on Figure 9 (314A). These monitoring wells are placed in the following designated intervals:

- Overburden 1 (OB-1): Above Summit Coal
- Overburden 2 (OB-2): Between Summit Coal and Lower Strait Coal
- Overburden 3 (OB-3): Between Lower Strait Coal and Wescott Coal
- Overburden 4 (OB-4): Between Wescott Coal and Matt Coal
- Overburden 5 (OB-5): Between Matt Coal and Rock Mesa Coal
- Overburden 6 (OB-6): Between Rock Mesa Coal and Rehder Coal
- Overburden 7 (OB-7): Between Rehder Coal and Mammoth coal

Potentiometric head contours are shown on Figure 13-1 (314A) for the Overburden. These contours utilized observations from OB-5 (sandstone above Rock Mesa Coal).

The contours rely on October 2010 monitoring well water levels. The October 2010 data were selected for use due to the anomalously high groundwater levels observed in October 2011, which are deemed as unrepresentative of typical groundwater levels for the Overburden. Potentiometric head contours were developed only for 2010 as there is little change in water levels in the Overburden for the time frame extending from 2004 to 2010. Other measurement dates could be employed to develop potentiometric head maps as well. With the exception of the post May 2011 data, the resulting potentiometric head maps would be very similar to those developed using the October 2010 data.

The relative response of all the Overburden wells over time is indicated on Figure 13-2 (314A) [pages 1 and 2]. For those wells possessing enough “non-dry” readings to develop a meaningful hydrograph, groundwater levels tended to be stable or increasing over time up to 2011. Again, relatively substantial increases in water levels were observed in many wells in association with the May 2011 precipitation events. The following are some more specific observations made from Figure 13-2 (314A):

- Water levels in Overburden wells in some portions of the mine increased significantly, especially in 2011, for the following:

    - BMP 29 (near the railroad loop, south and upgradient)
    - BMP 2, BMP 47, BMP 52 (likely in association with recharge from water spreading and ponding along Rehder Creek described previously).
    - North portion of mine (near confluence of two Rehder Creek tributaries, north portion of mine area).
    - BMP 34 and BMP 60 (over active mine).

- The water level in Overburden Well BMP 58 (Overburden Unit 5) has shown a very small, subtle, decline. This may be a response to mining of gate roads 2R and 3R as they were constructed on each side of, and below, this well (see Figure 1 (314A). Note that the "R" designation refers to gate roads that are to the right (south of East Main).

- Other well water levels generally remained either stable or increased over time until October of 2011. Those wells remaining stable (no trend in water levels) are generally relatively deeper Overburden wells (e.g., BMP 07, BMP 10, BMP 22). The lack of response at such deeper wells likely relates to the dampening effect due to greater hydrogeologic isolation from nearer surface recharge associated with the 2011 precipitation events. On the other hand, the wells showing the most dramatic changes in water level (e.g., BMP 2, BMP 29, and BMP 47) are generally shallower Overburden wells. These shallower wells are more likely to show a direct response to episodic surface recharge events, such as that associated with 2011 precipitation.

More recently, beginning in October of 2011, water levels in two monitoring wells, BMP 60 and BMP 90, have responded to nearby/adjacent long-wall mining activity. Continuous recorders installed in these wells provide detailed hydrographs as shown in Attachment B. Since October, 2011, the maximum declines in these wells are

approximately 20 feet and 8 feet respectively in response to the long-wall mining. As long-wall mining has moved to the north of these wells, the wells have exhibited some limited recovery.

Attachment B also provides well logs and construction diagrams for BMP 60 and BMP 90. BMP 60 is screened from 40 to 50 feet below ground surface. BMP 90 is screened from 18 to 30 feet below ground surface. A grey shale extends from 30 to 39.5 feet below ground surface. Hence, BMP 90 is screened above this shale whereas BMP 60 is screened below this shale. The upper portion of the well screen in BMP 60 is exposed to a grey sandstone whereas the remainder of the well screen penetrates into a gray shale. It is unknown how thick this gray shale is beneath BMP 60.

Subsidence associated with long wall mining yields three different zones of deformation which are summarized as follows (after Agapito and Maleki, 1990 and 1989):

- Zone 1: Fragmented zone includes the immediate roof and may extend upward to a height approximately equal to 2 to 10 times the mining height. The strata in this zone will fracture and collapse into the mined out area.
- Zone 2: Fractured zone may extend upward to a height approximately equal to 30 to 50 times the mining height. The strata deform and fracture, but maintain their continuity. Bedding plane separations can occur.
- Zone 3: Deformation zone extends upward from the top of the fractured zone to the surface. The strata deform without significant fracturing, forming compression zones at the surface near the center of the panel and tension zones at the edges of the excavation. Bedding plane separations can occur.

The fragmented zone represents that overburden material that fragments or “breaks apart” when dropping into, or subsiding into, the cavity that is left following long-wall mining. It represents the lowermost of those zones defined above. The fractured zone

represents that material which remains intact, but develops fractures with the subsidence. The deformation zone does not fracture upon subsidence.

The actual thicknesses of each zone can vary. It is deemed that if a well is completed in the fragmented zone, then complete dewatering should ensue once long-wall mining has passed. On the other hand, if a well is screened in the fractured zone, then complete dewatering may not occur. However, declines in groundwater levels should be anticipated in response to increases in vertical hydraulic conductivity (or leakance) resulting from fracturing. Given the apparent short term dewatering of well BMP 60, it could be argued that this well may be screened at/near the top of the fragmented zone. Another potential explanation may be that a temporary breach of this well's seal occurred. However, if such a breach did occur, the more recent observations at BMP-60 suggest that the seal has at least "partially healed." If the latter explanation is the case, then the declines in this well may actually be associated with the fractured zone rather than the fragmented zone.

BMP 90 did not completely dewater, and hence, this suggests that this well is screened in the fractured zone. Finally, both wells are showing some signs of recovery which may be related to the presence of shale shown in the well logs. If the fractures in the shale "re-seal," then water levels should recover to a greater degree than if the shale fractures do not "re-seal."

In summary, two Overburden observation wells, BMP 60 and BMP 90, have responded to long-wall mining in their vicinity. One well, BMP 58, may be showing a very small response, but more data will be required over time to confirm this is the case. Overburden well BMP 34 is likely to respond in the future as long wall mining approaches as it is screened in interval OB-5. This well is likely to be affected by either the fragmented, and/or fractured zone once long-wall mining moves past this well. See Attachment B for additional details regarding observation wells BMP 60 and BMP 90.

The results at BMP 60 and BMP 90 demonstrate that a drawdown “cone-of-depression” is developing in the Overburden. However, with the potential exception of BMP 58, none of the other Overburden observation wells show measureable evidence of drawdown. Hence, it is not practical to develop an Overburden drawdown contour map at this time.

3.4.3 Mammoth Coal

The locations of Mammoth coal monitoring wells are shown on Figure 10 (314A).

Potentiometric heads are shown for the Mammoth coal for October 2004 and October 2011 on Figures 14-1 (314A) and 14-2 (314A), respectively. Note that mining dewaters the Mammoth coal as gate roads are constructed. Hence, potentiometric head contours behind (west) of gate roads were truncated as the coal had been dewatered to the west of each easternmost constructed gate road (per Figure 14-2 (314A)).

It is noteworthy that the October 2011 event showed anomalously high water levels at BMP 3. It is deemed that use of the October 2010 data for BMP 3 is a more representative example of recent potentiometric head for the Mammoth coal than the October 2011 data in this portion of the mine. Hence, the October 2010 data for BMP 3 were used for potentiometric head contours. Also, the water level in BMP 86 was not used as this well is normally dry. Yet, substantial increases in the water level occurred in this well in response to the May 2011 precipitation and recharge.

One reason for removing highly anomalous temporal observations was to obtain a better perspective of net Mammoth coal potentiometric head drawdown in response to mining from 2004 to 2011. Figure 14-3 (314A) shows the computed drawdown associated with the response to mining for this period. The most significant drawdown,

estimated to be about forty-five feet, occurred over gate road 3s in the north central portion of the mine.

Note that drawdown in the Mammoth coal toward northern portions of Permit area, and in areas outside the mine, is affected by the degree of saturation in the alluvium. The magnitude of this effect was very apparent in 2011. It appears at least in this area, where the thickness of the Overburden between the alluvium and Mammoth coal is about 69 feet, that this recharge affects the hydraulic response for all hydrogeologic units under evaluation in this vicinity of the mine. It is likely that recharge from the Rehder Creek alluvium has acted to “mitigate” the magnitude of drawdown associated with mining in the Mammoth coal that otherwise would have occurred near the north periphery of the mine.

The relative response over time for all the Mammoth coal wells is depicted in the hydrographs presented in Figure 14-4 (314A). The following are some specific observations made from this figure:

- Water levels in central to northern portions of the mine have decreased:
    - BMP 37 (between gate roads 2S and 3S) has decreased about 31 feet. Most of this decrease occurred when gate road 2S was constructed west of this well. The water level in this well decreased even further when gate road 3S was completed to the east of the well.
    - BMP 8 (located about 3,800 feet east of gate road 3S) has shown water level decreases of about 12 feet).
    - BMP 25 may have responded to mining activity. However, this supposition is not conclusive without obtaining more data over time.
    - BMP 3 exhibited a significant increase in water level associated with the May 2011 precipitation/recharge event.

- Other wells have generally exhibited stable or slight increases in water level over time.

The radius of influence is greater moving east toward the axis of the syncline in the Mammoth coal simply because the coal is confined in this vicinity. The radius of influence where the Mammoth coal is unconfined is small (nearer Mammoth coal outcrops). This lack of drawdown is due to the limited degree of saturation in the Mammoth coal. It is also due to the fact that unconfined "aquifers" have relatively higher storativity. In effect, for unconfined aquifers, drainage water is derived primarily by gravity locally. Hence, the relative drawdown in the Mammoth coal to the south and west, where the Mammoth coal is unconfined is very limited, if it exists at all.

The magnitude of drawdown for areas to the north of the mine is presently limited to a significant degree by the recharge associated with the shallow alluvium discussed previously. It is unknown what the extent and magnitude of the drawdown would have been in this area if it were not for the recharge event that occurred in 2011. Additional discussion regarding the significance of confining conditions within the LOM boundary is given in Section 6.5.2. Also, additional analysis is provided in Appendix 314-6.

3.4.4 Underburden

The locations of Underburden monitoring wells are shown on Figure 11 (314A).

Potentiometric head contours for the Underburden for October 2004 and October 2011 are on Figures 15-1 (314A) and 15-2 (314A), respectively. The interpretative water levels were limited to wells with recorded water levels during these months.

Figure 15-3 (314A) shows the computed drawdown associated with response to mining from 2004 to 2011. The most significant drawdown, interpreted to be about 25 feet, is

projected over gate road 3s in the north central portion of the mine. The Underburden wells shown in Figure 15-3 (314A) within the LOM boundaries possess “tops” of screen which range in depths from 2 to 131 feet beneath the Mammoth coal. This interval is well above any existing Underburden aquifer.

Note that the nature of the drawdown and the shape of the potentiometric contours are affected by the recharge that occurs from the vicinity of Rehder Creek at/near the north portion of the permit boundary. The saturated alluvium of Rehder Creek acts to “mitigate,” or partially offset to some degree, the magnitude of drawdown that would likely have occurred otherwise in the Underburden near the north portions of the mine.

The water level hydrographs for Underburden wells are shown on Figure 15-4 (314A). The following are some specific observations from Figure 15-4 (314A):

- Water levels in central to northern portions of the mine have decreased:
    - BMP 44 (east of north portion of gate road 3r) has decreased about 28 feet.
    - BMP 9 (located about 3,800 feet east of gate road 3r) has shown water level decreases of about 12 feet. The response in this well is very similar to the response in Mammoth coal well BMP 8.
    - BMP 56 (located about 3,400 feet east of gate road 3r) has declined about 12 feet.
    - BMP 31 and BMP 39 may have responded to mining activity. However, this supposition is not conclusive as climate may have been a factor as well.
    - BMP 12 located in the south central portion of the mine has shown declines of about two to three feet. This decline appears to be in response to mining activity.

  - BMP 38 has shown significant increases in water level and these increases are likely associated with the 2011 recharge event described before.
  - BMP120, which is located southeast of the existing permit area, showed an increase in water level of about 8 feet in 2011.

- Other wells have generally exhibited stable or slight increases in water level over time.

The radius of influence from mine dewatering is greater in more easterly sections of the mine area simply because the Upper Underburden (as is the Mammoth coal) is confined to the east (toward axis of the syncline). Another factor leading to this magnitude of drawdown is the degree of the Upper Underburden's relative hydraulic connection to the Mammoth coal, which is also drawn down in the area. Since most of the Underburden wells are screened in relatively shallower portions of the Underburden immediately beneath the Mammoth coal, there is less impedance and a more direct hydraulic connection to the Mammoth. Thus, similarities of how the Upper Underburden wells and the Mammoth coal wells respond to mining should be anticipated.

The magnitude and extent of drawdown in the Underburden to the south, and to the west, are very limited to non-existent. The magnitude of drawdown for areas to the north of the mine is presently limited to a significant degree from the recharge associated with the shallow alluvium discussed previously. In effect, groundwater levels in the Underburden actually increased (as opposed to being "drawdown") north of the mine because of the above normal recharge that transpired in 2011.

More discussion on projected future responses to LOM and thereafter is provided in Appendix 314-6.

3.4.5 Springs

The locations of springs within the footprint of the life of mine boundary are shown on Figure 7 (314A).

The discharge rates for springs in the immediate vicinity of the Amendment 3 boundary are shown in the hydrographs plotted on Figure 16-1 (314A) and Figure 16-2 (314A). More detailed hydrographs, and information about observation limitations for all springs in the LOM area are presented in the 2011 Annual Hydrology Report for the Bull Mountains Mine No. 1 (2012, Catena Consulting).

Since spring flow rates are highly variable over time, semi-log plots were used to assist in visually presenting these rates. The maximum spring flow documented from 2003 to 2012 in the permit area, as shown in Figures 16-1 (314A) and 16-2 (314A), is 90 gpm (5/7/09) at spring 16365. During most of 2011 and 2012 no flow measurements were possible at this spring, as the water was over the issue point.

A majority of the springs shown on these figures either exhibited no flow from 2003 to the end of 2012 or occasional flow, i.e. not enough to develop a meaningful hydrograph. It is also worthwhile noting that the majority of springs for which a hydrograph is shown tended to be dry during most observation events extending from 2003 through most of 2006. The dry measurements over this latter period are likely due to the extended drought that occurred in the early 2000's, as previously discussed. No flow (dry) observations have been recorded for all springs which have been monitored since 2003.

Flows have tended to increase in some of the springs in association with the greater precipitation since the late 2000s to present. The spring flow response was most pronounced in 2011 (e.g., spring 17415 on the left of Figure 16-1 (314A)).

Long-wall mining has progressed by springs 17415, 17115, 17145, 17165 and 17185. One spring, 17185, was deemed to have exhibited a short-term response based upon weekly flow monitoring conducted by SPE. Mine staff on May 29, 2013 reported that flows dropped from prior weekly readings of 0.5 to 0.75 gpm to no flow as mining moved past this spring. However, on June 3, 2013, flows were observed to recommence at a rate of 2 gpm. Hence, any effects of mining on flow at this spring seem to have been temporary. It should also be noted that this spring does have a history of frequent "zero" flow readings, so it is possible as well that this spring's "zero" flow reading was not a direct result of mining activity. In any event, there presently is no evidence or confirmation that there have been long-term adverse impacts to spring 17185 or other springs by current mining activity (see Attachment B). More insights will be attained about the significance of long-wall mining with continued monitoring, and as this mining progresses beneath other springs with time.

3.5 Observations – Groundwater Quality

This sub-section provides a summary of accrued water quality data from 2003 through 2011.

Table 3 (314A) presents an overall summary of the groundwater quality characteristics of the four primary hydrogeologic units being evaluated in the Bull Mountains Mine area. Water quality statistics for this 2003-2011 period are also compared in this table to water quality statistics of the 1989-1991 baseline data reported in permit C1993017. This comparison shows that the water quality data from both observation periods are similar.

Figures 18-1 (314A) through 18-4 (314A) provide both Piper and Stiff diagrams for the hydrogeologic units monitored. These diagrams show recent major ion concentrations available for each well in the Bull Mountains area.

In order to evaluate the possibility of water quality impacts associated with mining activity, time series graphs were created using “indicator” parameters, Total Dissolved Solids (TDS), sulfate and chloride. These times series are provided in Attachment C. This attachment subdivides the time series graphs into each hydrologic unit being evaluated. These three analytes are used as “indicator” parameters as they often become elevated in response to disturbance from mining activity.

Specific conductance (SC) data are used to classify groundwater as described in 17.30.1006 and Circular DEQ-7 (DEQ-7) [October 2012 edition]. Table 4 (314A) presents these beneficial use classifications for groundwater. For instance, if classification changes occur over time, say from Class II to III, and there is mining in the immediate vicinity, such a classification change could be deemed to be associated with mining activity. Generally, groundwater in the vicinity of LOM area is either Class II or Class III. More details regarding groundwater classification on a unit by unit basis follows in the subsections below.

3.5.1 Alluvial Wells

Figure 18-1 (314A) shows that the dominant anion in alluvial groundwater is sulfate, whereas the dominant cation is magnesium. The highest sulfate concentrations are present in groundwater near the western boundary of the mine permit area.

Time series graphs for alluvial wells are included in the first part of Attachment C-1. Review of those graphs does not show any evidence of responses, or trends, which can be related to mining. All alluvial wells showed increases in all three parameters (TDS, chloride, and sulfate) 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.

Table 4 (314A) presents an overview of the DEQ-7 water quality standards andshows the beneficial use classifications for groundwater. Most alluvial monitoring well water in the mine area is Class II water. Five wells within the permit area (BMP 26, BMP 27, BMP 32, BMP 45 and BMP 72), and two wells approximately 3 miles northeast of the mine (BMP 77 and BMP 93), yield water in 2011 defined as Class III water. Well BMP 62, which is located upgradient of the mine (eastern edge of the permit boundary), possesses Class I groundwater.

One alluvial well sample (BMP 27) contained a nitrate plus nitrite nitrogen concentration in excess of the DEQ-7 standard of 10 mg/L. No other exceedances of DEQ-7 standards were observed for alluvial wells.

In summary, based upon monitoring well information, there is no evidence of any mining related impacts to alluvium water quality in the vicinity of the Bull Mountains Mine No. 1.

3.5.2 Overburden

Figure 18-2 (314A) shows that sulfate and magnesium are the most dominant ions in Overburden groundwater. The Stiff diagrams show that wells BMP 63 and BMP 78 possess the highest quality water. These two wells are the shallowest Overburden wells in the Bull Mountains mine area. This is consistent with baseline evaluations which predicted increased mineralization within the Overburden with depth.

Time series graphs are included in Attachment C-2 for the Overburden wells. These graphs show that there are no persistent trends upward or downward in water quality. About half of these Overburden wells showed relatively higher chloride, sulfate and TDS concentrations in 2011. Again, a higher concentration spike in 2011 was observed in area Overburden wells irrespective of their location, either near, or remote from present

activities. 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 concentration increases observed.

On average, water from the Overburden wells is Class II water. Three Overburden wells in the permit area (BMP 29, BMP 34 and BMP 73), and three wells near the eastern edge of the LOM boundary (BMP 22, BMP 81 and BMP118), contain Class III water. Wells BMP 78, BMP 63 and BMP 13, all located east, and outside of the permit area, consistently show Class I groundwater.

One Overburden well has shown concentrations in excess of DEQ-7 groundwater standards. The arsenic concentration in well BMP 10, located east of the current permit boundary, has been higher than the 0.01 mg/L standard. The highest arsenic concentration in this well was measured in 2006 (0.051 mg/L). The source of this arsenic is unknown. Since 2006, the arsenic concentration in this well has been decreasing. By 2011, the arsenic concentration was below the laboratory detection limit.

In summary, based upon monitoring well information, there is no evidence of any mining related impacts to Overburden water quality in the vicinity of the Bull Mountains Mine No. 1.

3.5.3 Mammoth Coal

Figure 18-3 (314A) shows that in the Mammoth coal groundwater, the most dominant anion 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). Slagle, et al, state that the shallow groundwater in the area, which is the first to receive recharge water from precipitation, is generally characterized by higher

concentrations of calcium, magnesium and bicarbonate. As the water percolates through the underlying hydrogeologic medium, sodium and sulfate concentrations typically increase.

Time series graphs are included in Attachment C-3 for the Mammoth coal. These show that there are no persistent trends upward or downward in water quality. The average specific conductivity of water produced by Mammoth coal wells is higher relative to the alluvial and Overburden hydrogeologic units (Table 3 (314A)). About one-half of the Mammoth coal wells produce Class II water, while the other one-half produce Class III water. The location of the wells with regard to the mine is not an apparent factor with respect to the water classification for beneficial use of the groundwater. No exceedances of DEQ-7 standards were observed for any of the Mammoth coal wells.

In summary, based groundwater quality data, there is no evidence of any mining related impacts to Mammoth coal water quality in the vicinity of the Bull Mountains Mine No. 1.

3.5.4 Underburden

Figure 18-4 (314A) shows that in the Underburden groundwater, the most dominant anion is sulfate, whereas, sodium and magnesium are the most dominant anions. As was the case for the alluvial wells, the highest sulfate concentrations exist near the western permit boundary.

Time series graphs are included in Attachment C-4 for the Underburden. These show that there are no persistent trends in water quality. The average specific conductivity of water produced by Underburden wells is higher than for the overlying aquifers. About half of the Underburden wells exhibit Class II water, while the other half exhibit Class III water. Class III water may not be suitable for watering all livestock. The location of the wells with respect to the mine has no bearing on the beneficial use class of the

groundwater that is present. No exceedances of DEQ-7 standards are observed for any of the Underburden wells.

In summary, based groundwater quality data, there is no evidence of any mining related impacts to Upper Underburden water quality in the vicinity of the Bull Mountains Mine No. 1.

3.5.5 Springs

Figure 18-5 (314A) shows a Piper diagram and individual Stiff diagrams for all springs in the permit area. The Piper diagram for all springs combined shows that, regardless of their location with respect to the mine, the most dominant anions are bicarbonate and sulfate, whereas magnesium is the most dominant cation. Compared to alluvial groundwater, the spring water is slightly richer in bicarbonate ions. According to Slagle et al. (1986), this is normal since shallow deposits in the area are being more directly recharged by precipitation, the net effect is water containing higher concentrations of calcium, magnesium and bicarbonate. The Stiff diagrams show that the bicarbonate concentrations in spring water are much less variable versus other ion concentrations observed in the springs.

Time series graphs are included in Attachment C-5, spring section. These show that there are no persistent trends in water quality. About half of the springs in the Bull Mountains Mine area exhibited relatively higher chloride, sulfate and TDS concentrations in 2011. This increase in concentrations was observed throughout the area and these increases do not correlate to mining activity. Rather, again, the spike in concentrations is due to the abnormally high precipitation events of May 2011.

Table 5 (314A) provides a summary of the water quality statistics for the springs in the Bull Mountains area. This table demonstrates that the spring water quality data

collected in the 2003-2011 period are very similar to the baseline data collected in 1989-1991.

The average beneficial use class of the spring water is Class II. Springs 16356 and 16355 near the eastern edge of the permit area boundary generally yield Class I water. Several other springs in the vicinity of the eastern edge of the permit boundary (16135, 16255, 71115, 72155) yield mainly Class I water. Similarly, a few other springs north (41215) and south (81235, 81335) of the permit area produce Class I water. Springs that exhibit Class III water are all located outside the LOM boundary.

A one-time lead concentration above the DEQ-7 standard was observed in spring 41125 during April 2010. The lead concentration was below detection limit for all other samples taken from this spring. Two springs exhibited zinc concentrations above DEQ-7 standards: 14785 located north of the permit area and 81185 located south of the permit area. The spring baseline data from the 1989-1991 period reported in permit C1993017 indicate that elevated zinc concentrations in springs are not uncommon in the area. No other exceedances of DEQ-7 standards were observed in other spring water samples.

In summary, based upon water quality sampling data, there is no evidence of any mining related impacts to spring water quality in the vicinity of the Bull Mountains Mine No. 1.

3.6 Groundwater Use Supplement

The wells, springs (including springs which have ponds associated with them), and ponds not associated with springs have been identified within the Bull Mountains Mine No. 1 study area as shown on Maps 304(5)-3 and 304(5)-2, respectively. Those that have active water rights are tabulated in Tables 304(5)-4 and 304(6)-28.

3.6.1 Added Private Wells

A private well inventory is provided on Map 304(5)-3 which shows wells constructed in the area of the mine. In order to determine if any additional wells had been completed since the permit was issued, the Montana Bureau of Mines and Geology Groundwater Information Center Database was reviewed. According to information in that database, there are nine additional wells. Those wells are shown on Figure 17 (314A). Details about these wells are provided in Attachment D.

3.6.2 Mine Supply Wells

Groundwater supply sources in the vicinity of the mine include wells constructed in relatively deeper portions of the Underburden, and industrial wells constructed into the Mississipian Madison Formation. Discussion about these wells is given below.

3.6.2.1 Office Supply Well

A public water supply (PWS) well for mine offices and locker room showers (Office Well) was installed in the summer of 2009. The Office Well was permitted through the DEQ and the PWS system number is 04676. SPE was assisted in well construction, permitting, and testing by Hydrometrics, Inc. A new monitoring well, well 62614-100-UB (now termed BMP 121) was drilled and completed in the same sandstone unit to monitor for any changes in groundwater levels that could occur at the mine, and possibly between the mine and nearby private wells (See Figure 19 (314A)). Well logs for both the Office Supply Well and 62614-100-UB are provided in Attachment E. The Office Well is screened at a depth from 356 to 396 feet below ground surface. It taps a fine-grained sandstone in a relatively deeper section of the Underburden that extends from 355 to 405 feet below ground surface.

The daily average pumping rate for the Office Well is projected as 6 gpm. A 24-hour pumping test on this well was conducted at an average rate of 9.5 gpm. The

transmissivity and hydraulic conductivity were respectively 191 ft^2/d and 3.82 ft/d. The storativity was determined to be 3.16 x 10^{-4} indicating a confined aquifer.

The depth to water at the start of Office Well water use was 308.70 feet in August 2009. The depth to water on December 21, 2011 was 311.14 feet. Hence, the net water level change to date in BMP 121, since the Office Well was put into use, is a decline of 2.44 feet (refer to Figure 15-4 (314A)). Most of the observed change occurred prior to June, 2010. Since June, 2010, water levels have remained relatively steady. Given that this well is relatively close to mining operations when compared to domestic wells tapping the same aquifer in the region, drawdown in domestic wells should be substantially less than 2.44 feet. As a result, it is considered highly unlikely that any properly constructed domestic well completed in the same aquifer as the Office Well could be adversely impacted by Office Well pumping.

It is noted that there are other potential considerations with regard to the deeper Underburden groundwater supply that need assessment. These include the following:

- Areal extent of the productive horizon; and
- Plans to use this portion of the Underburden to supply mitigation water for livestock, domestic use, and also for wetland and streamflow mitigation purposes if mitigation is required.

While the evidence to date suggest that the deeper Underburden aquifer has the characteristics to meet existing demands, what is not so clear is does that aquifer have the capacity to provide full-scale mitigation water for wetland and stream reaches. For instance, depending upon the degree of impact to springs and stream reaches, flows exceeding 100 gpm may be required to full-fill existing mitigation plans. The relative degree of impacts and/or consquences of demands of this magnitude has not been previously assessed. Hence, a followup or expanded investigation of the deeper Underburden aquifer is warranted and recommended as described in Attachment 3M of Appendix 314-6.

3.6.2.2 Madison Formation Process Supply Wells

Three Madison wells have been used to supply industrial water for the mine. One of the Madison Wells #1 is damaged and is no longer used. The two wells actively used are Madison Wells #2 and #3.

The depth of these wells is very significant as they are completed at depths over 8,000 feet below ground surface. These wells tap water from the Madison Group and are isolated from shallower groundwater by multiple confining layers.

The combined total average pumping rate for Madison Wells #2 and #3 in year 2010 was 358 gallons per minute (gpm).

The groundwater from these wells is not suitable for potable purposes as it contains high hydrogen sulfide concentrations, elevated fluoride and radionuclides. Also, the water is geothermal with temperatures of the water being very high with a field measured temperature of 165.4 ^{o}F (Madison Well #2). Attachment E provides a laboratory report from a Madison Well #2 well water sample.

The hydrogen sulfide concentrations are treated at the mine through an aeration pond designated as the Madison Pond. Once the hydrogen sulfide levels (vapors) are at an acceptable level, the water is used for equipment cooling, dust suppression, and coal processing, etc. Any excess water is pumped back into the Madison pond for recycling purposes. Any on-site residual water ultimately ends up in the coal processing waste disposal area which serves to contain waste that is compacted to 90 percent. None of the Madison water is discharged to surface waters.

4.0 SURFACE WATER

A detailed discussion of surface water is provided in Addendum 5 Section 304(1)f Hydrologic and Geologic Description of the baseline studies. A brief synopsis of this section is provided below.

The Bull Mountains mine is situated near the drainage divide between the Yellowstone River and Musselshell River basins. A majority of the drainage beneath the LOM boundaries is within the Musselshell River drainage.

Most of the Bull Mountains No. 1 lies within the Rehder Creek drainage which encompasses an area of about 23.1 square miles. More limited portions of the mine overlie the Fattig Creek drainage. Both Rehder Creek and Fattig Creek are tributary to the Musselshell River. Portions of Railroad Creek, Pompey's Pillar Creek and Razor Creek drainages lie beneath southern/southeastern portions of the proposed LOM footprint. These latter three drainages are tributary to the Yellowstone River. The sub-drainages relevant to each of these drainages are shown in see Figure 20 (314A).

All these sub-drainages are ephemeral, typically showing little flow, except in instances of significant precipitation and runoff. Although very limited reaches of some of these drainages do contain water, this water typically is sourced by spring flow which originates from perched zones, such as a weathered fractured rock interface. Whether the surface expression of flow meets the definition of an intermittent or ephemeral waterbody is a regulatory determination made by the Water Quality Standards Section of the DEQ. Baseline studies identified 57 ponds and twelve permanent surface water monitoring sites which are indicated on Figure 21 (314A).

4.1 Observations – Hydrologic

4.1.1 Ponds

A majority of pond observations exhibited dry conditions during the monitoring interval extending from 2003 through 2011. A majority of those showing some flow only manifested it recently in response to the May 2011 precipitation events. Hence, meaningful hydrographs could not be developed in such instances. A summary of the hydrograph information for ponds is presented on Figure 21 (314A).

A potential factor contributing to the lack of flow at the ponds for much of the period from 2003 to 2011 was the extended drought which ended in about 2006.

As there was a lack of flow and water in the ponds, there are limited pond water quality data as well. Only two ponds, 52227 and 93157, had sufficient data to create indicator parameter time series which are provided at the end of Attachment C. The results of those time series also showed an increase or spike in dissolved constituents in 2011 in response to the May 2011 precipitation events.

4.1.2 Streams

Monitoring of the stream reaches showed limited flow data that were collected within the LOM area from 2003 to 2012. Figure 22 (314A) shows the hydrographs for three stations at which continuous flow data are collected. The hydrographs illustrate the ephemeral nature of streamflow at these locations. Again, much of the lack of flow through much of the 2000s time frame can be attributed to drought conditions. However, there are some streamflow measurement issues which need to be resolved which may have affected the frequency of documented flow events.

Recent surface water quality data are presented in Table 6 (314A). Table 6 (314A) also gives a statistical summary of stream water quality data collected in the Bull

Mountains mine area from 1989 to 1991. These baseline data statistics were calculated from 10 water quality samples collected at 8 sites, one of which was site 71426.

Since the recent stream water samples were not taken in the vicinity of mining activities, all surface water quality data presented in Table 6 (314A) are considered representative of baseline conditions. The recorded range of total dissolved solids concentrations, suspended solids concentrations (TSS) and specific conductivity values illustrates the high variability of stream water quality in the vicinity of the LOM. An example is the TSS concentration at station 53796, which varies from below detection limit to 17,500 mg/L. The variability in stream water quality is likely related to the ephemeral nature of stream flow described above.

Baseline arsenic, barium, cadmium, chromium, lead and nickel concentrations in excess of the DEQ-7 human health standards for surface water have been observed at one or more of the monitored streams sites. Note that with the exception of the arsenic and mercury standards, DEQ-7 standards for aquatic life are lower than the human health standards (Table 4 (314A)).

5.0 SUMMARY OF OBSERVATIONS

This section summarizes the observations to date and assesses their relevance to predicting probable hydrologic consequences.

5.1 Quantitative Hydrology

5.1.1 Springs

Long-wall mining has just recently progressed by springs 17415, 17115, 17145, 17156 and 18175. Presently, there is no confirmation that flows in the springs that have been mined under have been adversely impacted (see Attachment B). More insights will be attained about the significance of long-wall mining with continued monitoring and as mining progresses beneath other springs.

5.1.2 Alluvium

There is presently no evidence that water levels in the alluvium have been affected by mining. Although long-wall mining has passed beneath alluvial deposits, these deposits are generally unsaturated. Presently, the mining has not progressed to the point where saturated alluvium is prevalent. Hence, impacts to alluvium would not have been anticipated to occur to date. Attachment F, Figure F-1, provides a comparison of recent versus baseline mapping of the alluvium. This figure shows that there is a great deal of similarity between current and baseline observations.

5.1.3 Overburden Impacts

Draining or leakage from the Overburden has been observed using recent water level observations at wells BMP 60 and BMP 90. The decline in water levels in these Overburden wells indicates drainage likely associated with the underlying fragmented zone. However, more recently, water levels in these Overburden wells have shown recovery. Attachment F, Figure F-2, provides a comparison of recent versus baseline

mapping of the Overburden (sandstone above the Mesa coal). This figure shows that there is a great deal of similarity between current and baseline observations.

5.1.4 Mammoth Coal Impacts

The most significant drawdowns, and the greatest radius of influence, have been observed in the Mammoth coal. The down-gradient impacts have been limited. These down-gradient impacts were affected by recharge associated with the above normal recharge in 2011 from the alluvial deposits.

Attachment F (Figure F-3) provides a comparison of recent (2004) potentiometric head mapping compared to baseline mapping for the Mammoth coal. A comparison of these maps demonstrates that some drawdown in the Mammoth coal had occurred by 2004 in association with a combination of the historic mining (from 1991 to 1997) and with the resumption of mining activities in 2003. Drawdown in the Mammoth coal from 2004 to 2011 in response to recent mining was discussed in Section 3.4.3 and is shown on Figure 14-3 (314A).

5.1.5 Underburden Impacts

Observations at deep Underburden observation well, BMP 121, indicate that drawdown near the mine from office and bathhouse use is about 2.4 feet since pumping began in 2009. This change is consistent with drawdown that would be expected from pumping the Office supply well. Water levels in BMP-121 stabilized in 2010 and have remained relatively steady since then. The lack of drawdown at BMP-121 also provides evidence that the effects of Office supply well pumping and Mammoth coal mining have not affected the deeper Underburden aquifer. Nonetheless, based upon the significance of this deep Underburden aquifer to serve as the primary water source in the vicinity of the Bull Mountain Mine, and the plans to use this same aquifer as a primary mitigation source as necessary, additional hydrogeologic investigations and aquifer hydraulic characterizations are warranted and planned as set forth in Appendix 314-6

(Attachment 3M). In effect, if this aquifer is to be used to serve the existing uses, and also to serve potentially as a mitigation sources, a better understanding of its overall capacity to meet existing and potential future demands is necessary.

5.1.6 Shallow Underburden

Physical observations made by Nicklin Earth & Water, Inc. during two underground mine visits indicate that little water is being contributed from the Underburden to mine gate roads. Rather, most water is being contributed from the Mammoth coal, and to a lesser degree, from the Overburden above the gate roads. It is noted that the potentiometric head in the shallow Underburden does respond to mining of Mammoth coal. This response is likely associated with relatively direct hydraulic communication between the Mammoth coal and the immediately underlying Underburden.

Attachment F (Figure F-4) provides a comparison of (2004) potentiometric head mapping compared to baseline mapping for the shallow Underburden. A comparison of these maps demonstrates that some drawdown in the shallow Underburden had occurred by 2004 in association with a combination of the historic mining (from 1991 to 1997) and with the resumption of mining activities in 2003. Drawdown in the Underburden from 2004 to 2011 in response to recent mining was discussed in Section 3.4.4 and is shown on Figure 15-3 (314A).

5.1.7 Streamflow

Runoff in the permit area occurs in direct response to significant precipitation events. Given the lack of response of alluvial wells to mining activity to date, and given that the alluvial water does not contribute to streamflow, there is no basis to conclude that stream flows have been affected by mining activity performed to date.

5.2 Water Quality

5.2.1 Surface Water

There is presently no evidence of surface water quality impacts associated with mining.

5.2.2 Groundwater

Presently, there is no evidence of a degradation of water quality that can be attributed to mining for any of the hydrogeologic units and springs monitored to date. However, more monitoring in the future will provide additional insights of the potential effects on groundwater quality as mining progresses.

6.0 PROBABLE HYDROLOGIC CONSEQUENCES

Subsidence associated with the underground mine has occurred and will continue as the mine expands. Also, dewatering occurs with the construction of gate roads and the long wall panel mining. These facets of the mine operation will lead to transitions in both groundwater quality and quantity.

6.1 Potential for Impacts to Hydrologic Balance

Mining activity will alter the hydrologic balance as mine drainage occurs as a result of both construction of gate roads and advancement of long wall panels. Impacts on groundwater flow due to mine subsidence are expected to be focused primarily in the fragmented zone. The shallow bedrock aquifer system may be isolated from the drainage to the mine by shales and other low permeability lithologies, especially in areas of greater overburden thickness. Hence, impacts on recharge are expected to be limited. The mine will receive some inflow from the underburden, and intercept some recharge to the underburden, but effects on the underburden aquifers should be limited.

The net effect of the mine dewatering will be a net temporal reduction of groundwater storage resulting from drawdown during mining. A majority of this reduction will occur in the immediate vicinity of the mine. After mining ceases, there will be a gradual recovery of groundwater storage with time. Following recovery, there will be a net redistribution of aquifer storage, primarily where the Mammoth coal is replaced by mine gob. There will also tend to be a long-term reduction in groundwater storage in the shallow Underburden in areas proximate to the mine to the south, east and west. Areas to the north of the mine will tend to fully recover storage, and will likely see an increase in groundwater storage. Simulation efforts provided in Appendix 314-6 provide more details and the basis for the inferences described heretofore.

Some draining of "perched" zones aquifers may occur, which could result in variable impacts to some spring sources in the area. Since this potential is difficult to quantify, extensive monitoring of the springs is being conducted and will continue be conducted throughout the life-of-mine. An evaluation of the potential impact to springs is found within Section 6.5.1.

With regard to the hydrologic balance of the shallow alluvium, it is likely to remain the same both before, during and after mining. Any flows in this shallow alluvium are largely dependent upon precipitation and runoff events which are independent of mining activity. There is the potential for some localized and very limited effects if a subsidence fracture causes a localized depression in the alluvium. However, when the drainage is considered as a whole, this potential impact is considered to be immeasurably small.

There is potential that groundwater flow within the alluvium downgradient of the mine could be reduced to a very limited degree owing to the apparent direct hydraulic connection between the alluvium and the underlying Mammoth coal. However, many portions of this alluvium tend to be dry so that any such affects are likely to be isolated.

If monitoring indicates that water levels drop substantially in the shallow aquifer system downstream from mining and such changes would lead to an adverse impact, the permittee will consult with the Department regarding a need to replenish the water.

Surface disturbances will be minimal due to the use of underground mining methods. Recharge in the vicinity of the mine will remain approximately the same as before mining. There is the possibility of some increase in recharge capacity associated with fracturing or subsidence cracks appearing in shallow Overburden deposits within long-wall subsidence areas. It is anticipated that through time, any limited or localized

increase in recharge will likely dissipate with time as the fractures “heal”, reseal, or are reclaimed.

There may be some very localized increases in recharge associated with detention ponds in some instances and localized decreases associated with structures, pond liners, etc., in the facilities area. However, the use of approved of approved reclamation practices such as regrading and revegetation will restore near-natural recharge conditions. However, even in the short or long term, any such changes are inconsequential when the overall hydrologic balance is considered. In effect, recharge capacities should suffer no adverse impact due to mining activity at the Bull Mountains Mine No. 1.

In summary, it is very unlikely that recharge rates would decrease at any time during operational or post-mining activities.

The surface water budget will not be adversely affected given the fact that the mine is underground. There will be a temporary detention/retention of surface water runoff associated with sediment control structures and ponds placed at the mine. However, their relative significance on the surface water flow budget is not, and will not be detectable when the watershed drainages are considered as a whole during mining. Following mining, such control structures will be reclaimed in accordance with requirements of MDEQ. Hence, after mining, there will be no detectable/measurable difference for hydrologic budget from the perspective of surface water flow.

In summary, the overall hydrologic balance changes that will accrue at the mine are limited primarily to temporal changes in groundwater storage. Storage will recover over time, although it will be redistributed as a result of hydraulic changes of the mine gob and underground workings when compared to the Mammoth coal and the adjacent/overlying Overburden. None of these changes are anticipated to cause

adverse affects to existing users. However, if such adverse affects do arise, SPE is committed to mitigating impacts and will coordinate with DEQ accordingly as to the appropriate mitigation approach.

6.2 Potential for Impacts to Groundwater Quality

The quality of groundwater that does not come in contact with the highly fractured rocks immediately above the mined out area or the gob (mine waste) should not be affected by mining. Based upon analysis of observed data collected to date and described in Section 3.5, there is no evidence that groundwater quality has been affected by mining activity in the Overburden, Mammoth coal or Underburden. Any impacts to the groundwater quality are anticipated to be limited to the mine gob, and perhaps, to a limited portion of the upper Underburden that is in direct hydraulic communication with the mine gob.

No significant change in acidity is anticipated to occur in the operational or post-mining groundwater resources in the Bull Mountains Mine No. 1 permit, mine plan, and down-gradient areas. A general increase in total dissolved solids, sodium and sulfate concentration is anticipated in the groundwater that flows through the gob and potentially in the highly fractured zones immediately above the mined out area; however, groundwater quality will continue to be suitable for the current and post-mining uses of watering livestock and wildlife. These changes will result primarily from chemical reactions that may occur as the fragmentation and collapse of the overburden expose new mineral surfaces to oxygen and groundwater. Some portions of the mine gob will become resaturated. However other portions of the mine gob are predicted to remain unsaturated even after mining (refer to Appendix 314-6). Hence, exposure of fragmented facies to oxidizing conditions are predicted to occur well into the future after mining.

6.2.1 Montana Bureau of Mines and Geology Assessments

Some of the better data to indicate the probable quality of post-mining water has been obtained from a study conducted by the Montana Bureau of Mines and Geology (Reiten and Wheaton, 1989; Wheaton and Van Voast, 1989). They conducted a hydrogeologic reconnaissance of abandoned underground coal mines near Roundup, Montana to investigate the potential for beneficial development of the waters contained in these mines. The results of this study to date indicate that water in the abandoned mines is predominantly sodium-sulfate type with calculated dissolved solids ranging from 1,325 to 5,155 mg/L (refer to Table 314-16 of 17.24.314). Historical water quality data from several mines indicate that dissolved solids, sodium and sulfate concentrations have steadily increased over time while calcium and bicarbonate have decreased. No acidic waters were encountered in any of the mines sampled, and the pH of the water samples ranged from 7.2 to 8.2.

The results of paste extracts from overburden samples from the study area and groundwater analyses from baseline monitoring of Mammoth coal and lower overburden wells were evaluated. Table 314-18 (17.24.314) summarizes these results. Table 314-18 also presents, for comparison, the postmining concentrations predicted by Thompson (1982) in his study of the Bull Mountains area. Thompson also used saturated paste extracts for his predictions. There is a good correlation between the ionic concentrations predicted by the current study and the Thompson study (Table 314-18, 17.24.314).

The paste extract predictions and the existing mine water quality data in the Roundup area both suggest that TDS, sodium and sulfate concentrations in the groundwater of the mine workings will increase following mining. The paste extract predictions are reasonably consistent with actual mine water quality measurements fromexisting mines, although a few of the mines show higher TDS, sodium and sulfate.

6.2.2 Potential Applicability of Other Mining – Powder River Basin

Another possible means of projecting future concentrations is to evaluate water quality transitions at surface coal mines the Powder River Basin. The baseline water quality characteristics of the overburden groundwater at Bull Mountains mine are similar to those observed in other overburden wells throughout the Powder River basin. For instance, Keith Thompson (1982) reported that the median specific conductance from groundwater in the Bull Mountains area, 1,880 umho/cm, is slightly lower than what is observed in the Birney-Decker and Colstrip area which were defined as 2,250 and 2,100 umhos/cm respectively.

It is conceived as likely that the level of disturbance associated with surface mines is much more significant when compared to formation collapse/fragmentation from subsidence which is the primary mechanism leading to mine gob at the Bull Mountain Mine. Hence, if coal surface mines are to be used as an indicator to project transitions in water quality at the Bull Mountain Mine, such indicators should be considered to be very conservative predictions.

A recent analysis of water quality transitions comparing overburden water quality to resulting mine spoils groundwater was conducted for the Rosebud Mine at mine areas designated as Area A, Area B, and Area C by NE&W (2012). For purposes of assessment in the Bull Mountain Case, the analysis from Areas A, B, and C of the Rosebud Mine were composited. A relative ratio of spoils water quality to overburden water quality was developed and the results are given below for selected analytes:

- Total Dissolved Solids (1.9 times as high in spoil groundwater compared to overburden baseline)
- Specific Conductance (1.7 times as high)
- Sulfate (2.046 times as high)
- Sodium (1.5 times as high)
- Calcium (2.4 times as high)

- Magnesium (1.8 times as high)
- Chloride (2.7 times as high).

In the case of the Bull Mountain Mine (see Table 3 (314A)), the following are the mean values of the same analytes for Overburden (prior to mine impacts):

- TDS (mg/l): 1,115
- Specific Conductance (uhmos/cm): 1,588 uhmos/cm
- Sulfate (mg/l): 470
- Sodium (mg/L) 169
- Calcium (mg/L) 77
- Magnesium (mg/L) 90
- Chloride (mg/l): 8

Applying the ratios of the prior paragraph, and assuming that they represent a "worst-case" projection of future mine gob water quality, then the following are the resulting estimates at the Bull Mountain Mine (values rounded off):

- TDS : 2,100 mg/l
- Specific Conductance: 2,700 uhmos/cm
- Sulfate: 900 mg/l
- Sodium: 250 mg/l
- Calcium: 190 mg/l
- Magnesium 160 mg/l
- Chloride: 20 mg/l

The TDS projections made using the above methodology can be compared as well to investigations conducted by the MBMG (Reiten and Wheaton) who found that concentrations for TDS concentrations in mine water samples ranged from 793 mg/L to 2,530 mg/L, with an average value of 1,324 mg/L. Note that this MBMG investigation focused on the Roundup Coal which is stratigraphically beneath the Mammoth coal. It is obvious that if the Rosebud Coal Mine analogy is used, it clearly should be treated as a "worst-case" scenario.

6.2.3 Implications of Madison Well Process Water

Another factor to consider in the Bull Mountain Mine is the use of Madison Formation water as part of the coal mining process. The groundwater from the Madison wells is not suitable for potable purposes as it contains high hydrogen sulfide concentrations, elevated fluoride and radionuclides. In order to eliminate the high hydrogen sulfide concentrations, the pumped water is subjected to aeration in a storage pond. Hence, hydrogen sulfide is eliminated as a potential issue in the mine gob after mining. Once the hydrogen sulfide has been removed during aeration, the Madison groundwater is then pumped into the mine for coal dust control/processing.

With regard to the implications to the mine gob water quality, it is noted that a substantial fraction of this Madison process water becomes entrained in the coal as it is removed from the mine. Much of the entrained water is hygroscopic and other fractions are retained in the processed coal voids. It is expected that only very small quantities of Madison water will be left in the mine after mining is completed as the process water is captured via sumps and either recycled for use, or transferred to the WMU. Any water that remains would contain elevated fluoride and radionuclides. However, the significance of remaining fractions must be kept in perspective as described below:

- Residual fractions of Madison water that remain after processing, and after mining, will be limited to gate roads since that is where water is used, captured, detained, and or recycled. The gate road floors constitute about 5 percent of the overall areal space of the mine footprint (includes longwalls, pillars and gate roads combined).
- It is projected that very limited portions of the gate road floors would ultimately retain Madison water after mining ceases. However, as a simple illustration, let it be assumed that less than two inches of gate road floor detritus will be saturated with Madison water which should be very conservative given that most water is pumped out during mining. As a point of emphasis, there is no evidence that two inches of saturated material would arise in association with residual Madison

water. The main purpose of this calculation is to illustrate the relative significance of residual amounts of Madison water from a water quality perspective. Under this assumption, the net volume compared to the saturated thickness of the Mammoth coal (pre-mine) would constitute about 2 percent of that volume of the Mammoth coal along the gate roads.

Given that most of the coal resides outside the gate roads, the net percentage of Madison water compared to the overall volume of water filling the total mine gob voids would constitute less than 0.1 percent. Thus, it is deemed that any changes water quality attributable to the presence of Madison water would be inconsequential and too small to detect analytically.

6.2.4 Projections of Water Use Classifications

Given that the water in the mines in the Roundup area has tended to show a general degradation in water quality over time, it is likely that a similar degradation of water quality, such as increased TDS and sulfate, will occur during the operation of the Bull Mountain No. 1 Mine. Overall long term effects on groundwater quality will depend to a large extent on the degree of groundwater flow through the collapsed mine workings. Postmining groundwater quality within the collapsed zone will probably stabilize at a slightly degraded level compared with baseline coal quality unless the mine water is periodically pumped or otherwise removed.

Presently, the pre-mine mean groundwater water quality (Table 5 (314A)) exceeds sulfate and total dissolved solids standards for livestock (Attachment G). The groundwater generally classifies as either Class II or Class III groundwater. This will be the case after mining. However, there is potential that some of this groundwater will change from a Class II to a Class III designation. On this basis, post-mining groundwater quality will fall within either the Class II or Class III designation of the State (Table 4 (314A)). The groundwater for either classification would also be suitable for livestock watering (See Attachment G).

6.2.5 Trace Elements – DEQ-7 Standards

An evaluation of the project specific database reveals that the only observations that exceed DEQ-7 human health standards are the following locations:

- BMP010 [overburden well] (arsenic has been observed to range from 0.005 to 0.051 mg/l). It is noted that these arsenic concentrations are declining over time and they are presently below the DEQ-7 standard of 0.01 mg/l. In addition, the elevated arsenic concentrations were observed to preceed any mining activity at this well location.
- BMP027 [alluvial well] (nitrogen at nitrate was observed at 23.8 mg/l when measured in October 2011). This well is located at the west edge of the permit but in an area that is not affected by long-wall mining.

Generally, with the aforementioned exceptions, groundwater quality meets DEQ-7 standards. It is anticipated that there will be some increase in trace element concentrations within the mine gob. However, given that trace elements to date tend to be far below DEQ-7 standards, there presently is no basis to assume that the overall groundwater quality will be degraded by proposed mining to the point it exceeds standards.

6.2.6 Groundwater Quality Transitions with Time

The rate of groundwater quality transitions over time is difficult to project owing to the complex hydrogeochemical reactions that are involved as the groundwater level recovery commences. These transitions may be tempered to some degree by the fact that the Overburden that serves as the mine gob was previously saturated in many portions of the mine. Groundwater will tend to move freely at first through the gob as a result of its relatively higher permeability than the native stratum that was displaced (Mammoth coal). However, as this groundwater reaches the native strata at the mine boundary, groundwater will tend to seep very slowly outside the mine area, which in turn

will retard the rate of flow in upgradient portions of the mine gob. In essence, ultimately a new hydrodynamic and hydrogeochemical equilibrium will eventually be established. This time frame cannot be reliably predicted because of the overall system complexity. It is anticipated that early water quality observations in the mine will be comparatively more degraded than later water quality. As recharge occurs over time, or as water contributes to the mine gob, a relative gradual improvement in water quality is anticipated.

6.2.7 Potential for Mine Pooling and Transport Outside LOM

Some degree of mine pooling is likely to occur following the cessation of mining activity and mine dewatering. The actual degree of pooling will in large part depend upon the nature of the hydraulic properties of the mine gob as well as the integrity of the mine gate roads following mining. Presently, the mine gate roads have tended to remain relatively intact. Hence, if they main relatively intact into the future, then there will likely be increased mine pooling, or groundwater levels in northern portions of the mine will tend to be greater over time than would have transpired had these gate roads collapsed. Two model simulations in an attempt to “bracket” this uncertainty (see Appendix 314-6). One scenario (Scenario 1) assumes the gate roads collapse. The other scenario (Scenario 2) assumes that the gate roads remain intact. It may well be that some gate roads remain intact and yet others collapse into the future. It is also possible that gate road collapsing will occur gradually over time. In any event, Scenario 2 simulations project the greater degree of mine pooling in the event the roads remain intact. Based upon the limiting assumptions inherent in that modeling effort, the simulated mine pool elevation is projected to be within 5 feet of the mine portal invert 50 years into the future.

In the event that the mine pool elevations ultimately exceed the mine portal invert, any flows leaving the mine portal would pool or pond outside the portal entry. It is highly unlikely that groundwater flow could enter PM Draw as surface water flow since any pending pool would have to reach an elevation exceeding about 3864 feet. This is

because a local ridge (about 3864 feet) exists between the mine portal area depression and PM Draw. Furthermore, the bounding geologic medium between this depression and PM Draw consists of low permeability upper Underburden. Hence, no potential impacts on the hydrologic balance of PM Draw are expected in association with mine portal discharge. In the improbable event that ponding increased to a level where surface water flow into PM Draw would be pending or occurring, SPE would coordinate with DEQ as to a proper course of action. Such action options could include implementation of water treatment depending upon the nature of the mine gob water quality and/or additional containment measures as necessary.

The model simulation results shown in Figure 13M of Appendix 314-6 predict that a majority of the simulated head increase from mine pooling (Scenario 2) will occur in northern portions of the mine. Near the northern border/edge of the LOM boundary, this increase is predicted to be about 20 feet compared to base line or modeled steady state conditions. This simulated increase in water level dissipates quickly with distance from mined areas as the undisturbed strata tend to have very low hydraulic conductivity. These same simulations predict that increases in Mammoth coal water levels near Mammoth coal outcrops/subcrops that are relatively remote from the mined areas should be very limited. This would also indicate that issuance of new springs at these outcrops are unlikely to occur. If they do, the rates would likely be very small and involve seeps as opposed to springs. Given their remoteness from the mined areas, if seeps do arise, any water quality impact associated with mine gob is considered highly unlikely to occur.

In terms of the alluvial deposits north of the mine, the relative contribution of the bedrock (e.g., Mammoth coal) to the much more permeable alluvium is very low. In essence, from an overall water budget perspective, it is deemed that the relative contribution of water from any sub-cropping Mammoth coal would be inconsequential.

The manner the mine gob resaturates is significant from a water quality perspective. The primary issue here is deemed that if greater mine pooling occurs, it will increase the likelihood that mine pool water will be transported from the northern edge of mined areas. However, this will be limited by the hydraulic properties of the undisturbed strata and the adsorption and desorption (sorptive) properties of that medium. Given the very low hydraulic conductivity of the consolidated media bounding the mined areas, any such transport will occur very slowly over time.

A conservative means of evaluating the potential transitions in groundwater quality outside the mined portions of the Bull Mountain Mine is to utilize particle tracking based upon the simulation modeling effort defined in Appendix 314-6. It is considered conservative for the reason that it neglects to account for sorptive properties of the geologic media. Such sorptive properties typically lead to a reduced rate of transport or a retardance of inorganic constituents. See Section 4.1.6 of and Figure 14M from that report for additional information. Again, the degree or rate of transport is projected to be a function of the degree of pooling that occurs after mining is completed. The particle tracking results predict that in the case of gate roads collapsing (Scenario 1) that the extent of transport will be substantially less than what would occur if these same gate roads were to remain intact (Scenario 2).

In the case of Scenario 1, groundwater leaving the mine workings is predicted to remain well within the LOM permit boundary at the end of 50 years (see Figure 14M – upper panel). In the case of Scenario 2, a few model tracking particles were observed to move just outside the mine LOM boundary (Figure 14M – lower panel).

There are several other factors that need to be reiterated in the cases of both Scenarios 1 and 2 and these are the following:

- Particle tracking simply tracks the predicted groundwater flow direction and the travel distance that particle travels over time.
- Particle tracking does not account for adsorption and desorption of analytes of concern. In effect, transport velocities of reactive inorganics are normally substantially less than predictions made based upon particle tracking.
- There are other factors as well that are not accounted for in particle tracking including the effects of groundwater mixing, dilution from other contributions, etc.
- Preferential flow paths along potential fractures or joints.

In summary, it is considered highly unlikely that groundwater quality will be degraded outside the mine permit boundary within the next 50 years. Any issues that may occur at some time in the distant future are likely to be limited to groundwater in the Mammoth coal as it is relatively more permeable than either the Overburden or Underburden. Hence, any transport would preferentially flow through the Mammoth coal. Therefore, focus on monitoring any potential impacts should be placed on the Mammoth coal. Presently, there are two Mammoth coal monitoring wells near/north of the LOM northern boundary, BMP003 and BMP005. These two wells will serve as water quality monitoring locations to confirm the predictions that have been made heretofore.

Determining any direct users of Mammoth coal water that are proximate to the northern and northeastern portions of the LOM boundary will be the focus of the on-going well inventory evaluations in assessing the potential for water quality degradation associated with the mine.

One well [GWIC ID 168805], near the LOM boundary, was identified from the well inventory evaluation that is reported to be at least partially dependent on the Mammoth coal (source aquifer listed as Mammoth coal/Underburden). This well is within the LOM but outside the planned mine area. Hence, it is possible that this well's water quality could at some time within the next 50 years be impacted by groundwater from the mine

gob. Other wells located at or near the northern portions of the LOM tap groundwater from different strata (underburden, overburden, alluvium, etc.). It is highly unlikely that such wells could be impacted by groundwater from the mine gob.

It is anticipated that groundwater quality in the shallow fractured and weathered bedrock, which sources most spring flow, will not be degraded by mining activities, especially in the topographically higher areas. Hence, spring water quality should be similar before, during and after mining.

In summary, any groundwater quality degradation that occurs is likely to be associated with desaturation/saturation of the mining gob during and following mining activity. Degradation is predicted to remain within, or very near the mine workings and permit boundaries, for the next 50 years assuming that the mine gate roads remain intact (Scenario 2). If the gate roads collapse (Scenario 1), then any potential migration of degraded groundwater will be much slower. Otherwise, it is unlikely that there will be a diminution of groundwater quality outside the LOM boundary that could adversely affect domestic, agricultural or other legitimate uses of groundwater. It is considered highly likely that water use classifications will remain the same after mining as it was before mining for areas outside the LOM.

In the unlikely event that impacts do occur as a result of mining, and if a given beneficial use cannot thereby be maintained, Signal Peak Energy is committed to the appropriate mitigation measure as approved by DEQ. This could include replacing wells with deeper Underburden wells, or using other measures that DEQ agrees are appropriate.

6.2.8 Waste Disposal Area – Water Quality Implications

The waste disposal area (WDA) is used to store coal processing waste (CPW). Potential factors that were considered in the design of the WDA are the potential for

vertical infiltration through the underlying substrate and for discharge as surface water flow. These factors are discussed below.

The potential for vertical Infiltration into native substrate is a consideration. The WDA is required to attain a minimum of 90% compaction of lifts that range from 6 inch lifts up to a maximum of 2 foot lifts. The net effect of this compaction is to reduce vertical permeability so that it is very low. According to mine staff, the level of infiltration is so low that any precipitation tends to run off versus infiltrate. In addition, the WDA Pond 1 is typically completely dry about nine months of the year. Madison water that is added to the coal processing waste (CPW) acts to either evaporate or to assist in facilitating the compaction process. This WDA is situated on Overburden and in areas that will not be subjected to long-wall mining activity. This Overburden is also hydraulically isolated by the drainages on each side of the WDA.

During May 2011, the pond within the WDA was breached because of an extreme (rare) precipitation event that occurred. The spillway breaching that occurred during 2011 led to the mine enlarging the pond capacity. The storage capacity of the pond before the pond was enlarged was 22.2 acre-ft to the spillway. Following expansion, the pond storage was expanded to 32.4 acre-ft storage to the spillway. Thus, an additional 10.2 acre-ft of storage was added. Also, the spillway was armored with grout footer and gabion baskets to inhibit the potential of spillway breaching.

It is noteworthy that another anomalously large precipitation/runoff event was encountered in May of 2013. A short duration discharge did occur in association with Pond A, Pond F and outfall 010 in response to the highly unusual amount of rain. Precipitation during the month of May 2013 totaled 6.80 inches with one large event of 2.62 inches in a 28 hour period and another large event of 3.20 inches in a 54 hour period. The spillway remained intact in response to the May 2013 runoff. Hence, the breaching that occurred during 2011 was not again encountered during 2013.

In summary, the potential for impacts to groundwater from the WDA are considered very limited. It is highly unlikely that any user of the underlying groundwater system in areas neighboring the mine could ever be affected by groundwater transport from the WDA. The potential for future off-site surface water quality impacts associated with breaching of the WDA pond is considered limited at this stage unless very large runoff events are encountered, such as the event of 2011, which is considered unique, and also because the pond was redesigned to withstand a precipitation event of this magnitude.

6.3 Surface Water Quality

The effects of sediment pond discharges on stream water quality will be negligible. All sediment ponds are designed to contain the 10-year/24-hour runoff plus sediment. Due to the low precipitation in the area, pond discharges should be very infrequent. In the event that a sediment pond discharge should occur, sampling, effluent limits, and reporting will comply with DEQ requirements. Routine maintenance of the ponds will maintain the storage capacity. Where practical, runoff from undisturbed areas will be diverted around the sedimentation ponds in order to decrease the quantity of water to be treated within the ponds. Some undisturbed area waters will enter the ponds, however, and will be treated and discharged under permit requirements.

During the life of the mining operation, ditches and culverts will be employed to handle surface runoff within and around the mine facilities area. All ditches and culverts will be routinely inspected to ensure that accelerated erosion is not occurring at the outfalls.

In summary, sediment will be controlled during mining. After mining, sediment control structures will be reclaimed in accordance to requirements of the DEQ. As a result, there are projected to be no adverse impacts to surface water quality associated with sediment yields from the disturbed area.

There are unlikely to be any changes to surface water quality constituents for either suspended or dissolved solids as surface water quality runoff is dominated by surface water runoff associated with precipitation and/or snowmelt events. There are localized reaches of channels which receive some flow from springs. However, as discussed in Section 6.2, the shallower Overburden springs are unlikely to exhibit degradation of water quality. Hence, it is unlikely that water quality of the limited reaches of channel which manifest flow associated with springs would be altered as a result of mining.

6.4 Flooding/Streamflow Alteration

There will be no surface disturbances associated with the Amendment 3 Area that would lead to flooding or streamflow other than that which occurs under natural conditions. Stream flows in the Permit Area are ephemeral and dependent upon episodic precipitation and/or snowmelt runoff events.

6.5 Groundwater Availability

6.5.1 Potential Impact to Groundwater - Springs

Approximately 144 springs and seeps have been identified within and adjacent to the study area. Most of these springs have been monitored as part of the baseline and operational program.

There are 61 springs in the Amendment 3 Anticipated Life-of-Mine Area, which directly overlie the proposed mine workings, or lie within the subsidence angle of draw (Table 2-1, 313-2). All of the other springs occur outside the areas that will be affected by mining.

There are inherent difficulties in reliably predicting the consequences of long-wall mining on springs. Several factors are relevant in affecting a given spring within a subsidence zone. These include the following:

- Depth of mining from the ground surface (at spring);

- Thickness and type of strata between the spring and mine;
- Nature of subsidence ;
- Percentage of watershed contributing to the spring;
- Land slope;
- Local geologic anomalies associated with the spring; and
- That spring's yield.

Owing to the complexity of all the variables set forth above, it is impractical to meaningfully project the likelihood, or probability, that a given spring will, or will not be, affected by long-wall mining and its associated subsidence. On the one hand, observation data may indicate that a given seep does not yield water, or it has been observed to be dry, since measurement efforts recommenced in 2003. In this instance, it is difficult to ascertain or conclude that this "dry" seep/spring can be affected, or that a mitigation plan is even appropriate for such a "dry" seep/spring. On the other hand, if a spring produces a substantive amount of water sufficient to provide a beneficial use, say to livestock, wildlife, or habitat, then the attendant risk associated with its loss is more significant and an appropriate mitigation plan should be considered in this case. In any event, any decision as to the need for mitigation, and the appropriate measures for mitigation, will be coordinated with DEQ accordingly.

In consideration of the above uncertainty, there are several distinct possibilities that can arise relative to Bull Mountain springs in association with mining:

- Spring flow is lost permanently;
- Spring flow is lost temporarily;
- Spring flow is lost in one location and appears in another location (vertically or laterally);
- A new spring arises;
- A given spring's flow increases; and
- A given spring's flow decreases.

Ultimately, the nature of the spring response to mining will not be known until mining nears and/or passes beneath that spring. In the event that spring flow changes to the point it leads to adverse impacts, mitigation plans will be implemented through coordination with DEQ.

6.5.2 Potential Impact to Groundwater – Mammoth Coal/Upper Underburden

The Mammoth coal will be the most impacted unit due to its removal during mining. Dewatering of the Mammoth coal and the adjacent strata will occur in association with long-wall mining. In order to quantify the effects of dewatering, an updated groundwater model was developed (see Appendix 314-6).

The following summarizes the predictions on groundwater flow from that modeling effort:

- The Mammoth coal will be dewatered over the footprint of the active mine.
- The off-site radius of influence for drawdown from mining activities will be much greater to the north/northwest of the mine at the end of mining when compared to the east, south and west of the mine. The primary reason for this result is that the coal north/northwest of the mine tends to be confined and also because the pre-mine potentiometric head above the base of the Mammoth coal is greater in this portion of the mine (see Figure 12M of Appendix 314-6). However, the actual radius of influence is likely significantly influenced from episodic recharge events along Rehder Creek when surface water flow from major precipitation events arises. In effect, if such events are repeated during the LOM in the future as occurred in 2011, then the actual changes in groundwater levels to the north of the mine will likely to be much smaller than were predicted in Figure 12M at LOM.
- The off-site radius of influence of drawdown is predicted to recede following the cessation of mining in areas north of the mine (see Figure 14M, pages 1 and 2 of

Appendix 314-6). If the gate road integrity persists far into the future after the Amendment 3 mining ceases, then it is projected that groundwater levels north of the mine will actually increase over pre-mine conditions. Otherwise, water levels are predicted to recover to normal levels north of the mine for both the Mammoth coal and the Upper Underburden.

- The radius of influence of drawdown to the east, south and west of the mine will tend to expand with time for the Upper Underburden simply because permanent desaturation of the mine gob will persist in the southern portion of the mine after mining ceases.
- Some drawdown is simulated to occur in the deeper Underburden aquifer as mining progresses to the LOM. The drawdown is projected to partially recover with time after mining ceases. The attendant uncertainties associated with predicting the affects of mining on the deeper Underburden aquifer water levels are set forth in Appendix 314-6.

6.5.3 Potential for Impact to Wells

Three of the 157 private wells, 62613ACB (possible overburden well), 6277CCD (possible Mammoth coal well), and 62718BBA (possible Mammoth coal well) will be removed during the first 5-years of mining. Two other private wells, 6271OBBB (possible Mammoth coal well) and 62711CCD (possible underburden well), are located within the life of mine plan area.

Private wells 6277ACB (possible overburden well) and 72635BBA (possible Mammoth coal well) are located within 2,200 feet of the proposed area of active mining or are completed in the Mammoth coal. These wells will not be physically removed by mining. However, these and possibly other wells could be impacted if the mine induced cone-of-depression is significant enough. An example could include a reduction in the static well water column so that a pump would not function properly.

Again, SPE is committed to addressing any potential adverse affects by implementing the necessary mitigation which could include, but is not necessarily limited to, well deepening, installing another well, etc. Any required mitigation effort(s) will be coordinated with DEQ accordingly.

6.5.4 Potential Impact to Groundwater – Deeper Underburden Aquifer

Some drawdown is simulated to occur in the deeper Underburden aquifer as mining progresses to the LOM. The drawdown is projected to partially recover with time after mining ceases. The attendant uncertainties associated with predicting the affects of mining on the deeper Underburden aquifer water levels are set forth in Appendix 314-6.

A deeper Underburden monitoring well, BMP121, which is located in western portions of the permit area, presently shows little evidence of mining effects on water levels in the deeper Underburden aquifer. However, as mining progresses, it is possible that this well could, in the future, respond to mining dewatering. Present changes in water levels at BMP121 are likely associated with pumping at the Office Supply well as discussed in Attachment E.

The existing potentiometric head in BMP 121 is over 150 feet, which is very significant for a pumping well. In effect, even if mining drawdown were significant, it would not adversely affect the pumping head in this well. It is recognized that the available pumping columns in domestic/stock wells may vary throughout the area, including in the deeper Underburden. Hence, the threshold limitation for drawdown may be less or more than what is the case at well BMP121. Hence, it is possible that if substantial drawdown becomes manifested in the deeper Underburden, that a well could be adversely impacted, if the necessary pumping column head is not available.

In any case, it is important that BMP121 be monitored over time in the future to ascertain the degree that this well responds, or does not respond, to mine dewatering activity.

In addition to the potential for drawdown directly associated with mining, there will be a potential need to mitigate spring flows using deeper Underburden wells. Also, it is possible that relatively shallower wells (e.g., north of the mine) may need to be deepened or constructed into the deeper Underburden. If significant mitigation flow from the Underburden either evolves, or becomes necessary, additional hydrogeologic evaluations will be necessary to ensure that existing groundwater users dependent upon the deeper Underburden are not adversely affected. Attachment 3M of Appendix 314-6 sets forth a plan for a deep Underburden supplemental investigation to assist in defining the capability of this aquifer to provide sufficient water for the present and future demands that could ensue if significant volumes of water were required for mitigation purposes.

6.6 Surface Water Availability

No permanent effects to the quantity and quality of stream flow are anticipated from disturbed areas within the mine plan area. Since this is an underground operation, the total disturbed surface acreage will be small. All flow from these disturbed areas will be treated in sedimentation ponds and will meet approved DEQ discharge criteria prior to discharge into P.M. Draw. Reclamation and revegetation of the disturbed areas will prevent detrimental impacts from occurring. All flow is ephemeral in the mine plan area; therefore, flow impacts will be negligible.

7.0 SUMMARY OF PROBABLE HYDROLOGIC CONSEQUENCES

A summary of the probable hydrologic consequences, their significance, and potential mitigation measures is provided in Table 314-11 (17.24.314).

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APPENDIX 314-6

GROUNDWATER MODEL
Bull Mountains Mine No. 1

prepared by



NICKLIN

EARTH & WATER, INC.

for

SignalPeakEnergyLLC

March, 2013

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APPENDIX 314-6
GROUNDWATER MODEL
BULL MOUNTAINS MINE NO. 1

1.0 INTRODUCTION

1.1 Background

This report summarizes a modeling effort completed for Signal Peak Energy, LLC (SPE) by Nicklin Earth & Water, Inc. (NE&W) to project the probable hydrologic consequences associated with Bull Mountains Mine No. 1 projected Life of Mine (LOM) plans (see Figure 1M). The model discussed herein supersedes prior modeling efforts completed for this mine.

1.2 Groundwater Modeling Objectives

The three primary groundwater modeling objectives are the following:

- Objective 1: To summarize the conceptual understanding of the hydrogeologic regime in the vicinity of Bull Mountains Mine No. 1.
- Objective 2: To develop a calibrated model with reliable predictive capability.
- Objective 3: To predict temporal and long-term hydraulic/hydrologic responses associated with the proposed mining activity.

Objective 1 is achieved through the baseline studies of the mine area hydrology; the existing Probable Hydrologic Consequences (PHC) assessment; and the completion of the PHC Addendum (provided as Appendix 314-5). A combination of these efforts provide substantial information for formation of a numeric simulation model which can be used to emulate the existing system responses to date, and then used to predict future system responses to mining activity.

The primary focus will be to evaluate the responses anticipated as the mining extends through Amendment 3 or Life of Mine (LOM).

1.3 Modeling Approach

The groundwater modeling (modeling) effort is subdivided into the following elements:

- Element 1 - Development of the conceptual groundwater model;
- Element 2 - Definition of model structure and conducting model calibration effort;
- Element 3 - Utilization of the calibrated model to evaluate hydraulic responses related to mining at Bull Mountains Mine No. 1.

Each of these phases is summarized in this report. In order to complete these elements, the following activities were performed:

- Developed model structure including model domain extent, steady-state model boundary conditions, and steady-state model stresses.
- Conducted steady-state model calibration.
- Completed steady-state sensitivity analysis.
- Ran transient simulations through the period of record to test the adequacy of the steady-state calibration effort.

Following the model development and calibration efforts, the following applications were performed:

- Simulated groundwater level changes over time.
- Simulated water budget changes associated with mining.

1.4 Overview of Conceptual Model

1.4.1 Hydrogeologic Overview – Mine-Area Specific

The five primary hydrostratigraphic units of interest are the following:

- Alluvium
- Overburden
- Mammoth Coal
- Underburden
- Deep Underburden

A brief overview of these units is given below (substantially adapted from Appendix 314-5 and from baseline studies).

1.4.1.1 ***Alluvium***

The alluvial or valley fill deposits in the upland reaches in the immediate vicinity of the mine are relatively permeable in comparison to the bounding Tongue River deposits. Wells penetrating this alluvium indicate that it ranges in thickness from 0 to 37 feet. However, significant fractions of these alluvial deposits are unsaturated except during episodes of major precipitation when surface water runoff from this precipitation acts to recharge these alluvial deposits. Rehder Creek in relatively lower portions of the drainage near, or beyond, areas of the mine is the only alluvium which has a tendency to be saturated.

Aquifer test data for alluvium (and other strata) in the vicinity of the mine are discussed in Table 304(5) – 5-2 of the permit. A summary of those statistics is given in Table 1M.

1.4.1.2 ***Overburden***

The Overburden above the Mammoth Coal is comprised of interbedded sandstones, siltstones, shales, claystones, and coals. Relatively shallower overburden tends to be unsaturated except in instances of perching.

It is deemed that the most relevant Overburden deposit in the vicinity of the Bull Mountains Mine No. 1 mining activity is the sandstone above the Rock Mesa Coal. There appears to some tendency for this unit to respond to mining activity. In addition, site reconnaissance activity shows roof leakage from the portion of the Overburden immediately overlying the Mammoth Coal in gate roads. Hence, modeling efforts represented both the sandstone above the Rock Mesa Coal and the Overburden immediately above the Mammoth Coal. It should be noted that in the event that

perching of water on strata above the Mammoth Coal occurs, including the sandstone above the Rock Mesa Coal, this cannot be practically or reliably quantified using groundwater modeling. In the event that there is direct hydraulic connection, or hydraulic continuity, then the units above the coal can potentially be successfully represented using a numerical model. It is clear that relatively shallower deposits which source springs tend to be associated with perched zones. Hence, it is inferred that the model developed herein cannot be used to reliably predict the consequences of the impacts of long-wall mining on these springs.

Table 1M provides a summary of “aquifer” test data for the Overburden. Note that these data are subdivided into two categories: 1) shallow fractured/weathered Overburden, and 2) consolidated Overburden. The fractured/weathered Overburden tends to possess hydraulic conductivities that are about two orders of magnitude greater than the consolidated Overburden.

1.4.1.3 ***Mammoth Coal***

The Mammoth Coal is continuous throughout the study area beneath the mine footprint. Within the Amendment 3 area, the Mammoth Coal ranges from 8 to 15 feet thick with the greater thicknesses in eastern portions of the area, where the Mammoth Coal and Rehder coal merge.

Recharge reaches the Mammoth Coal via its exposed outcrops/subcrops in the area (e.g., south, east and west), and also from the portion of infiltration ultimately passing through the Overburden.

The Mammoth Coal near its outcrop areas is typically unconfined. Relatively deeper toward the axis of the synclinal trough, Mammoth Coal is confined. Within the proximity of the permit and amendment boundaries, the Mammoth Coal tends to be unconfined

near the eastern, southern and western portions of the permit area, whereas, it is confined in more central portions of this area.

1.4.1.4 ***Underburden***

The Underburden is the first unit encountered beneath the Mammoth Coal. The Underburden is recharged both by infiltration at outcrops, and by some leakage from overlying units.

The Upper Underburden, immediately beneath the Mammoth Coal, possesses very low hydraulic conductivities. This portion of the Underburden does not yield substantive amounts of groundwater to wells.

There are more permeable sections of Underburden present much deeper than the Upper Underburden that provide sufficient water for domestic/stock well use. These relatively more productive sections often represent large fluvial channel deposits. For instance, one monitoring well, designated as 62720-03, was completed within a 50 feet thick massive fluvial sandstone at a depth of about 350 feet below the Mammoth Coal. Another example involves the recently installed (2009) Office Well 1 where a sandstone was observed from a depth of 355 to 405 feet below ground surface. A pumping test performed on this well showed a transmissivity of 192.1 ft^2/d. This would equate to a transmissivity about two orders of magnitude higher than the Upper Underburden and one order of magnitude higher than the Mammoth Coal. It does possess the characteristics to provide an ample supply of potable water for the mine and other users in the area.

2.0 MODEL DEVELOPMENT

2.1 Model Code Selection

The modeling effort was conducted using the program entitled MODFLOW: “A modular three-dimensional finite difference ground-water flow model developed by the United States Geological Survey” [McDonald and Harbaugh, 1988).

The three-dimensional movement of ground water of constant density through porous earth material may be described using the following partial differential equation:

$$\frac{\partial}{\partial x}\left(K_{xx}\frac{\partial h}{\partial x}\right)+\frac{\partial}{\partial y}\left(K_{yy}\frac{\partial h}{\partial y}\right)+\frac{\partial}{\partial z}\left(K_{zz}\frac{\partial h}{\partial z}\right)-W=S_s\frac{\partial h}{\partial t}$$

K_{xx}, K_{yy} and K_{zz} are values of hydraulic conductivity along the x, y, and z coordinate axes; h is the potentiometric head; W is volumetric flux; S_s is the specific storage; and t is time.

2.1.1 Rationale for Using MODFLOW

MODFLOW is a three-dimensional finite difference numerical simulation tool used to solve the above equation for a variety of complex conditions. MODFLOW, which is a public domain code, is the most widely used ground-water flow code. The code has been validated and most ground-water hydrologists/ hydrogeologists are familiar with MODFLOW.

2.1.2 MODFLOW Packages

MODFLOW consists of a Main Program which utilizes a series of highly independent subroutines called “modules.” These modules are grouped into packages. The packages may be combined to simulate a variety of ground-water flow conditions. In a sense, the manner that these packages may be pieced together is akin to “à la carte”

dependent upon the situation. Some of these packages are required while others may be used for site-specific circumstances.

The following are packages which have been developed for MODFLOW. Parentheses () indicate if a package is required or discretionary. Brackets [ ] identify packages which were employed in the SPE model.

- Basic Package (required) ***[BAS1 used]***.
- Block Centered Flow Package [BCF used]
- Solver Package (one of these is required):
    - Strongly Implicit Procedure (SIP1)
    - Pre-Conditioned Conjugate Gradient (PCG1, PCG2, PCG3) ***[PCG2 used]***
    - Slice Successive Overrelaxation (SOR1)
- Recharge Package (discretionary) ***[RCH used]***
- Evapotranspiration (discretionary)
- Drain Package (discretionary) ***[DRN used]***
  River Package (discretionary)
  General Head Boundary Package (discretionary) ***[GHB used]***
  Well Package (discretionary)
  Horizontal Flow Barrier (discretionary)
  Stream Package (discretionary)
  Time Variant Specified Head (discretionary).

The packages that were employed in the SPE model are briefly reviewed below.

2.1.2.1 ***Basic Package***

The basic package serves as the administrator for MODFLOW. It has the following purposes:

- Identifies all the other packages which are to be incorporated into the model;
- Defines the active portions and grid characteristics of the model (that portion of the model domain which is included in the simulation process);
- Establishes initial conditions (e.g., starting heads);
- Defines stress periods and stress period lengths (e.g., the length of time, and the manner the time in each model run is subdivided);
- Computes the volumetric budget for entire model (e.g., summarizes all the inflows, outflows and changes in water storage in the model domain); and
- Defines the output control (portions of the modeling information that will be printed to output files).

2.1.2.2 ***Block Centered Flow Package***

The Block Centered Flow Package is used to perform the following tasks:

- Defines whether the simulation is to be steady-state or transient;
- Develops the row and column sizes;
- Describes the layer type (confined or unconfined);
- Defines the storage properties;
- Defines model layer parameters;
- Transforms the input parameters to coefficients for the numerical matrices; and
- Determines the rate that flow moves into and out of storage at each model cell.

2.1.2.3 ***Solver Package***

There are several numerical tools for solving the model's mathematical structure once it has been created to represent the ground-water flow system. As stated before, there are three classes of solvers commonly employed with MODFLOW. The choice of the appropriate solver varies from application to application as one solver may work well for

one problem, but not work so well on another. The PCG2 solver worked the best for this model simulation effort.

2.1.2.4 ***Recharge Package***

The Recharge Package (RCH) is designed to simulate areal recharge over a model domain. For Bull Mountain Mine 1, this package was used to represent the net recharge less any direct abstractions such as evaporation and evapotranspiration. All water added over areal portions of the model domain is via the recharge package.

2.1.2.5 ***Drain Package***

The purpose of the Drain Package is to simulate the effect that certain types of sinks, such as agricultural drains, have on ground-water systems. An inherent assumption in using the drain package is that drains can only remove water from a ground-water system. In essence, the ground-water potentiometric head must be above the base of the drain for it to remove water. When simulated heads are below the drain, no flow exits from a model cell used to emulate a drain.

The rate that flow passes from a drain is also directly proportional to the conductance of the drain. In essence, the Drain Package applies a numerical form of Darcy's Law in accounting for the rate that water leaves the subsurface via a drain.

The Drain Package was used to represent some of the larger channel, coulee, gully and/or ephemeral stream features in the mine vicinity.

The Drain Package was also used to represent the hydraulic sinks associated with the mining process during the transient modeling phases, i.e., the East Main Road and gate roads.

2.1.2.6 ***General Head Package***

The General Head Package was used in portions of the relatively deeper hydrostratigraphic units. No constant head or general head boundaries were employed in the immediate vicinity of the mine. The primary reason for this is that such boundaries can unduly influence the model calibration and application effort results. One purpose of employing this package was to allow groundwater to enter and exit the model domain.

2.1.3 Graphical User Interfaces/Automatic Parameterization

Graphical User Interfaces (GUIs) were applied extensively in the Bull Mountain Mine modeling effort. The GUIs were used as follows:

- Compile all relevant hydrologic/hydrogeologic information into a relational database and into a visual format.
- Assist in creation of initial model structure and input files;
- Revise the model structure as necessary during the course of the modeling effort;
- Create and modify parametric zones;
- Modify parameters within zones during calibration;
- Provide calibration statistics during model calibration; and
- Develop presentation graphics for exhibiting simulation results.

ARCVIEW was used to develop model background images. In addition, drawing files from Bull Mountain Mine were used to define mine progression over time.

Groundwater Vistas (GV), which was developed by Environmental Simulations, Inc. of Herndon, Virginia, was used as the numerical interface for conducting ground-water simulations via MODFLOW.

For additional details about GV, the documentation associated with GV should be referenced.

2.1.4 Model Construction/Calibration/Application Approach

The primary steps used to construct the ground-water model were the following:

- Step 1: The ARCVIEW database was constructed using a combination of the data available in Montana's Natural Resource Inventory System (NRIS) [coordinates were in NAD-83 State-Plane, feet].
- Step 2: Relevant graphical files were exported from ARCVIEW and then imported into Groundwater Vistas to assist in defining the following components of the model structure:
    - Model domain. The approximate model dimensions are about 11 miles (N-S) by 12 miles (E-W).
    - Model grid spacing. A uniform grid density was employed using grid-cell sizes which allowed sufficient resolution to represent gate roads.
    - Model layers.
- Step 3: Initial model transmissivity and hydraulic conductivity values were assigned values similar in magnitude to those quantified in baseline studies.
- Step 4: Recharge values were initially distributed assigning a value of 0.25 inches per year. Values were modified during the course of model calibration efforts.
- Step 5: The following model parameters were modified areally as necessary to achieve as reasonable an approximation to potentiometric head as feasible:
    - Transmissivity
    - Recharge
    - Leakance (represents relative ease at which water may flow vertically). Note that leakance was defined on the basis of assigning model layer vertical hydraulic conductivity and leakance.
- Step 6: A steady-state model calibration effort was first completed using the calibration targets presented in Table 2M and Figure 2M. The focus of target

selection was to use water level data collected before the impacts of mine disturbance were significant. In some instances, mining had occurred prior to the collection of ground-water level data (e.g., BMP039, BMP107, etc.) An emphasis was also placed on using data from wells deemed to be representative of actual conditions. In particular, wells showing highly aberrant water level changes or those wells showing highly anomalous observations were not used as steady-state calibration targets. The steady-state calibration effort included modifying transmissivity, recharge, and vertical hydraulic conductivity (or leakance) using a combination of the following:

  - Trial and error variation of parameters; and
  - Use of the auto-sensitivity run feature of GV which allowed multiple simulations to be run automatically, thus accelerating the calibration process.

- Step 7: A series of transient models was constructed for each year of the mining process starting on May 31, 2005 and ending on June 19, 2012 to test the ability of the ground-water model to project water levels and extraction rates over time.
- Step 8: Transient model simulations were performed for the Amendment 3 permit (extending through June 2035) to project dewatering rates and also to project the long-term ground-water level responses both at the end of mining and for a time period extending up to 50 years after mining.

2.1.5 Summary of Model Construction

2.1.5.1 ***Areal Domain***

The areal domain of the ground-water model relative to the Bull Mountain Mine No. 1 is is shown in Figure 3M. The domain varies by layer.

2.1.5.2 ***Vertical Discretization***

The hydrogeology was represented in the model using a seven-layer model with each layer. All layers except for model layer 1 were assumed to possess constant saturated

thickness (confined). A limiting factor in selecting the most applicable criterion (confined versus unconfined) is the fact that some areas of the aquifer system in the vicinity of simulated area may be confined and others may be unconfined. Furthermore, even individual stratigraphic units can vary geographically from confined in one instance to unconfined in other cases (e.g., nearer outcrops). Note that alternative simulations were also performed to test the use of confined versus unconfined assumptions for the Mammoth Coal. The alternative simulations produced similar results.

The model layers were assigned as follows below (pre-mine conditions):

- Layer 1: "Shallow" Overburden and alluvium (unconfined)
- Layer 2: "Intermediate" Overburden and alluvium (confined)
- Layer 3: "Deeper" Overburden and alluvium (confined)
- Layer 4: Mammoth Coal (confined)
- Layer 5: Shallow Underburden (confined)
- Layer 6: "Intermediate" Underburden (confined)
- Layer 7: "Deeper" Underburden(confined)

Note that portions of model layers 4 and 5 nearer outcrops are likely to possess unconfined conditions. Even though a confined assumption was employed, model storativities were assigned to much higher values nearer the same outcrops in order to better represent unconfined conditions. The goal was to emulate unconfined conditions in these areas even though a confined model is used.

2.1.5.3 ***Horizontal Discretization***

The model grid structure consists of 147 rows and 160 columns that are uniformly spaced at 400 feet by 400 feet. Again, the approximate model dimensions are therefore about 11 miles (N-S) by 12 miles (E-W).

2.1.5.4 ***Boundary Conditions***

General Head Boundaries (GHB) were applied to model layers 5 through 7 at the northern edge of the active model domain. The primary purpose of these GHB was to allow groundwater flow that entered the model domain to exit the model domain. A GHB boundary is applied in layer 7 (deeper Underburden) at the southern boundary of the model domain to allow water to enter from the boundary into layer 7. Again, all GBH were applied remotely from the mine (laterally and deeper) in order to eliminate/minimize any potential influence on simulation results in the immediate vicinity of the mine.

Drains (DRN) represent sinks associated with ephemeral streams. Drains representing streams are in model layers 1 through 6.

As stated before, drains also represented sinks associated with mining progress (e.g., gate roads) over time.

2.1.5.5 ***Areal Sources/Sinks***

Again, the source of flux into the model was application of water via the recharge package (RCH). The actual quantity of recharge is low.

There were no additional areal sources or sinks included in the model structure other than those defined previously.

3.0 MODEL CALIBRATION PROCESS

The model calibration process was conducted using the statistical evaluation packages contained in GV. Thirty wells (Table 2M) were selected as calibration targets for the steady-state modeling effort.

Several thousand simulations were conducted to achieve a reasonable representation of the aquifer system during the calibration process.

Calibration during the steady-state calibration process focused on matching the water levels defined at the targets. During the transient application phase, which is discussed later, some focus was placed on matching mining discharge rates. However, as will be discussed later, there are practical limitations in quantifying/estimating actual discharge rates. In effect, for a model to have predictive capability, both simulated water levels and simulated discharge rates should be reasonably consistent with the observations.

3.1 Results

3.1.1 Statistical Summary

Table 3M shows the calibration results and Table 4M provides a summary of the calibration statistics with the results being discussed below.

The residual mean is 0.79 feet. A residual is the difference between the observed potentiometric head (well water level) and the computed potentiometric head. The residual mean is the average of the residuals for all observation points. This mean represents the tendency of the model to either over-predict or under-predict water levels. There is limited tendency to under-predict observed well water levels. Most of this tendency is limited to Overburden wells.

The residual standard deviation is 10.18 feet. This statistic is simply the standard deviation representing the dispersion of model residuals computed.

The absolute residual mean is 7.98 feet. The absolute residual mean represents the magnitude of the difference between the measured water levels and the simulated water levels for the simulated region as a whole. The absolute residual mean was the primary statistic employed during the model calibration process and the goal was to minimize the value of this statistic until no further significant reduction could be attained.

The sum of squares is 3,126. The sum of squares is the sum of each residual squared. In effect, the smaller this value the better the model fit. The size of this value is also dependent upon the number of observation points. The root mean square error (RMS), 10.21, is computed using square root of the sum of squares divided by the number of observations.

The minimum residual was -20.18 feet (negative implies over prediction) at BMP043 (overburden well). In effect, it states that actual water level is 20.18 feet lower than the simulated value. Note that this well is not in the immediate vicinity of the area of interest.

The maximum residual was 23.86 feet at BMP079. This is the equivalent of stating that the actual water level is 23.86 feet higher than the simulated value.

The scaled absolute residual mean is 0.033. This statistic is often used to determine if an adequate calibration is achieved. According to James Rumbaugh, developer of Groundwater Vistas, a typical modeling effort should obtain a value less than 0.1. Based upon this criterium, the model provides a reasonable fit to the observation data.

Figure 4M provides statistical plots comparing observed and simulated water level observations. The upper plot in Figure 4M compares the observed potentiometric head values with the simulated potentiometric heads. Ideally, the more linear the plot, the better the model represents the aquifer system being modeled. Since these upper plots are linear, it demonstrates that the model reasonably represents the observed potentiometric heads. The lower portion of Figure 4M provides a plot of simulated model residuals versus observed values. If such a plot indicates a trend in the residuals, there may be areas of the model where improvements can be made. Since the residuals are randomly distributed about the axis, it is deemed that there is no basis for making substantial model changes for improving the model calibration.

Figure 5M provides steady-state simulated potentiometric heads for the Mammoth Coal (Layer 4) and Upper Underburden (Layer 5). Figure 6M provides a mapped depiction of residuals for each model layer possessing targets.

3.1.2 Model Parameter Zonation

Figures 7M through 9M show the parameter zonation of the calibrated model. Again, the following were the three parameters that were the focus of the calibration effort:

- Transmissivity (hydraulic conductivity)
- Leakance; and
- Recharge

It is noted that zones were added only as deemed necessary to improve the model calibration results.

The calibrated transmissivity (hydraulic conductivity) zonation are values reasonably with data collected in base line studies (refer to Table 1M). Leakance values employed are similar to values employed by NE&W in other simulation efforts involving the Tongue River Formation.

The calibrated recharge values require some discussion. The average recharge rate applied was 0.12 inches per year for the simulation area as a whole. Relatively higher recharge rates (up to 0.30 inches/year) were added in the immediate vicinity of the Bull Mountain Mine in areas coincident with southern outcrops of Layers 1 through 5). Note that actual recharge rates are likely higher overall than what is used in the calibrated model. The reason that actual recharge rates are likely higher is that some fraction of this recharge is lost to spring flow. Again, most of these springs are likely associated with perching conditions, the springs cannot be viably represented in a modeling effort.

In effect, the model recharge employed represents the “net recharge,” or recharge after spring flow abstractions and other losses (e.g., evapotranspiration). This is also the same as recharge required to create a viable representation of groundwater flow in the Overburden, Mammoth Coal and Underburden.

3.1.3 Volumetric Budget

Table 5M presents the mass balance results from the MODFLOW simulation. A low mass balance difference of -0.000487 percent was obtained. For the model simulation, the model fluxes for the aquifer system were the following:

- Recharge (represents all areal recharge) [1.2 cfs]; and
- Drains (from drain cells representing ephemeral drainages creeks, alluvial deposits in such drainages, etc.) [0.25 cfs].
- General head boundary [net] (0.95 cfs).

Again, it should be noted that the simulation model does not account for water issuing from perched zones (e.g., springs).

3.1.4 Steady-State Model Sensitivity Analysis

The steady-state model sensitivity analysis is provided in Attachment 1M. The following summarizes the conclusions of that sensitivity analysis:

- The steady-state model is modestly sensitive to transmissivity for the viable range of this parameter in the model domain.
- The model is highly sensitive to changes in recharge.
- The model is highly sensitive to changes in leakance (or vertical hydraulic conductivity).

It is noted that the sensitivity analysis indicates that slight improvements in calibration could be attained. However, none would lead to application results that are significantly different than what was obtained as described below.

4.0 MODEL APPLICATION PROCEDURE/TRANSIENT EVALUATION AND RESULTS

Following the completion of the steady-state model calibration process, a series or cascade of MODFLOW models was created in order to represent the following mining phases:

- Recent mining since 2002 to 2012.
- Future mining to Life of Mine (per Amendment 3).
- Two post-mine scenario simulations were run to 50 years in the future to evaluate the long-term response to mining at Bull Mountain Mine No. 1.

For simulations representing mining activity, the focus of the transient simulations was on the relative changes in water levels and the projected formation dewatering rates.

4.1.1 Procedure

The impacts of the mine dewatering process were represented by using the Drain Package of MODFLOW (see Figure 10M). The drains were added sequentially to represent the effect of constructing gate roads. These roads act as linear hydraulic sinks as mining progresses within the Mammoth Coal seam. The drains were also activated over time in conformance with projected mining plans. It is noted that gate roads are added well in advance of the long-wall panel mining. Observations to date indicate that placement of gate roads acts to dewater the Mammoth Coal west (up-gradient) of these roads.

In order to represent the effects of long-wall mining, formation parameters were revised as follows:

- Gob replacing the Mammoth Coal (following fragmentation) – Hydraulic conductivity assigned as 16 feet/day [versus 0.20 feet/day before long-wall mining] (note that it is assumed that mine GOB consists of mixture of large low permeability boulders mixed with finer fragments/fractions that are present in the boulder interstices).
- Gob replacing the Mammoth Coal (following fragmentation) – Storativity assigned as 0.05 [versus either 0.01 or 0.0001 before long-wall mining].
- “Deeper” Overburden (following fragmentation/fracturing) – Storativity is assigned as 0.003 [versus 0.0001 before long-wall mining].

Other tests on formation parameters were made. The changes that were tested did not seem to improve the transient calibration results. Hence, the parameter changes assigned above were used for the transient simulation applications.

Ultimately, 40 transient stress periods were used to represent the time extending from 2005 to 2024. The time represented by each stress period varied from as low as 32 days to as high as 1000 days. Table 6M provides a summary of the transient steps

(stress period lengths) that were employed. The primary reasons for the differences in stress period lengths are two-fold: 1) Variations in mine activity progression, and 2) Convenience in representing discretized stress periods.

It is not feasible to develop a single model to represent the transient effects of mining simply because of the formation changes described above. Hence, an individual model was developed for each stress period. This yielded a cascade of 40 MODFLOW models in order to represent the mine dewatering over the LOM. The resulting heads from a single transient simulation were then employed as the starting heads for the next simulation.

In addition to the 40 transient models developed above, two additional MODFLOW models (Scenarios 1 and 2) were developed for projecting post mine response/recovery over a period of time extending to 50 years after mining.

4.1.2 Flow Evaluation

In order for the model to be representative of the hydrogeologic media and the mining process it should also provide reasonable predictions of discharge. Water balance data for water pumped into the mine and water pumped from the mine are being tracked by SPE. A summary of those data are provided in Attachment 2M. Based upon that attachment, the net difference between readings for water entering and exiting the mine averages about 30 gpm. However, the data in Attachment 2M do not account for the water budget associated with moisture changes in the coal (from in-situ to post-processing).

According to conversations with SPE staff, about 1,000,000 tons of coal are presently removed from the mine monthly. Crosscut moisture measurements of in-situ Mammoth Coal show coal moisture content averages about 17.28 %. Mine staff estimate that the moisture content of the coal as it leaves the mine and prior to stock-piling is about 20 %.

This would yield a difference in moisture content of about 2.72 %. This would add an equivalent flow rate of about 150 gpm. Adding the resulting difference of 30 gpm, then the estimated amount of water be drawn from the coal is about 180 gpm.

It should be noted that the flow estimate of 180 gpm should be considered highly qualitative because of uncertainties associated with the actual moisture content of the processed coal as it leaves the mine.

4.1.3 Transient Mass Balance Summary – Simulated Dewatering Rate

Table 7M provides a summary of simulated mine dewatering over the LOM or extending historically from 2005 to the future ending in about 2024. Generally, the dewatering rates summarized in this table reasonably conform with flows from mining over the period of record extending from 2002 to present. In early phases of mining, very little groundwater was encountered. As mining progressed eastward or toward the axis of the syncline, rates of water flowing into the mine have increased substantially and are generally consistent with rates described in this table.

4.1.4 Projected Changes in Water Level

4.1.4.1 ***Life of Mine***

Figure 11M (page 1) provides projected simulated potentiometric heads for Layers 4 and 5 at LOM. Again, the Overburden deposits tend to have perched water levels and layers associated with these deposits are not indicated. It is noted that most of Layer 4, which represents the footprint of the Mammoth Coal being mined, is simulated as being dewatered at LOM.

Figure 11M (page 2) provides simulated drawdown for Layers 4 and 5 at LOM. The Mammoth Coal shows that the maximum drawdowns are projected north/northwest of the Amendment 3 boundary. However, it should be noted that it is anticipated that

some of this drawdown will be subdued because of the episodic flow/recharge events that occur in the Rehder Creek drainage. In effect, the projected drawdown outside the mine to the north is considered to be conservative.

4.1.4.2 ***Post Mine Simulation Results***

The nature of the post mine response will be highly dependent upon the long-term integrity of the gate roads. In the event the gate roads remain intact, they will serve as long term sinks. The gate roads would then convey groundwater northward where it would "pool" in northern portions the mine. On the other hand, if the gate roads collapse, the fragmented zone would be more uniform, the groundwater flow would be more uniform, and the tendency to pool would be less significant as well. Presently, the gate roads are remaining intact. However, this does not necessarily confirm that the gates will remain intact in the future. In order to "bound" the range of uncertainty, the following two model scenarios were established:

- Scenario 1: Gate roads collapse; and
- Scenario 2: Gate roads remain intact.

For model Scenario 1, model drains associated with gate roads were removed and properties over the entire footprint of the mined area were assumed to be uniform as described heretofore. For model Scenario 2, the drains were removed as well. However, for Scenario 2, a hydraulic conductivity of 100,000 ft/d was assigned for the gateroad alignments. This high hydraulic conductivity value emulates the affect of gateroads as it facilitates the simulated flow of water to move freely down gate road alignments akin to what would occur if the gate roads remained intact.

Figure 12M, pages 1 and 2, provide simulated potentiometric heads (layers 4 and 5) for Scenarios 1 and 2 respectively at 50 years. A comparison of these figures shows that Scenario 1 would predicts a more uniform hydraulic gradient in northern portions of the mined area, while, Scenario 2 predicts a "flat" mine pool of about 3,850 feet in elevation. It is noted that the invert of the mine portal entry is 3,855 feet in elevation. In other

words, the simulation predicts that for Scenario 2, the mine pool will be about 5 feet below the mine portal invert. For Scenario 1, it predicted that the coal/fragmented zone will be unsaturated in the vicinity of the mine portal.

Figure 13M, pages 1 and 2, provided simulated residual (remaining) drawdown projections at 50 years for each scenario. Scenario 1 shows drawdown projections in areas north of the LOM boundary that predict groundwater levels will return near to pre-mine levels. On the other hand, the fragmented zone to the south and portions of the remaining coal in these areas will remain unsaturated. The drawdown in the Upper Underburden is projected to persist in areas to the south, east and west, of the LOM boundaries as well.

Scenario 2, Figure 13M page 2, predicts that water levels in some northern portions of the mine footprint, and in areas to the north will show increased water levels at 50 years. However, the fragmented zone to the south and portions of the remaining coal in these areas will remain unsaturated. A zone of relatively greater drawdown is predicted in the Upper Underburden at the southwest corner of the mine footprint when compared to Scenario 1. However, the relative radius of influence of both Scenarios 1 and 2 are projected to be similar for areas to the east, south and west of the Amendment 3 boundary.

4.1.5 Relative Impacts on Deeper Underburden

The Bull Mountain Mine model is developed to focus on potential changes to groundwater in the general area where mining is planned. In addition, a model layer 7 was added to represent the deeper Underburden. An evaluation of the results for the deeper Underburden indicates the potential that the proximity of the boundary condition influences the magnitude of simulated drawdown in layer 7. Hence, a separate focused model is being developed to address the potential influence of mining activity on the deeper Underburden. In order to properly develop a focused model, additional

information are required. A conceptual plan for collecting the necessary information is provided in Attachment 3M.

4.1.6 Particle Tracking Evaluation

The two modeling scenarios described above were used to conduct a particle tracking assessment. The following were the attributes and assumptions employed in the particle tracking effort:

- Flow from the mine gob will preferentially flow into un-mined (intact) Mammoth Coal at the periphery of mine sections. The predominant direction of flow will be northward and/or northeastward. The intact overburden and underburden bounding the mined sections possesses much lower permeability than the Mammoth Coal. Hence, any transport in such material will be much smaller than in the intact Mammoth Coal. Thus, placing particles in the Mammoth Coal serves as a conservative indicator of the rate of transport from the mine.
- Particles were placed just outside the mined areas to the north and northeast. MODPATH was used to conduct the particle tracking simulations.
- The cleat porosity of the Mammoth Coal is assumed to be 5 %.
- The particle tracking was conducted using a 50 year time frame simulation.

It is noted that particle tracking does not account for potential influence of adsorption/desorption influences for given analytes. Rather, it simply simulates and tracks flow paths. Particle tracking also does not account for effects of dilution as other contributions to groundwater flow occur (e.g., recharge, etc.) In effect, particle tracking serves as very conservative predictor of the implications of solute transport.

The particle tracking results for Scenario 1 (see Figure 14M – upper frame) show that given the limiting assumptions described in the flow modeling effort, and also in accordance with the limitations described above, it is projected that any inorganic constituents emanating from the mine gob will be retained within the mine permit boundary.

The particle tracking results for Scenario 2 (see Figure 14M – lower frame) shows that with the same limiting/conservative assumptions described heretofore, that it is possible that some flow from the mine gob may flow just outside the permit boundary.

5.0 SUMMARY AND CONCLUSIONS

The following summarizes the results of this ground-water modeling effort:

- The model provides a conservative and consistent basis for comparing the hydrologic response and relative impacts to the ground water associated with mining in the proposed disturbance area.

- The steady-state calibrated model utilizes hydraulic parameters that are consistent with baseline data.

- The model is sensitive to changes in transmissivity over the likely range of values for this parameter in the mine vicinity. The model is most sensitive to leakance (or vertical hydraulic conductivity) and recharge. Low values of leakance and low rates of recharge were generally required to match both discharge rates and water levels.

- The model produces simulated water levels that are in reasonable conformance with water level observations over time. In addition, the same transient simulations that had been conducted demonstrated that the model provided discharge rates reasonably consistent with observations.

  The results of the simulation effort conducted for the Bull Mountain No. 1 model predict that a majority of the impacts will arise in the immediate vicinity of the mine, and to areas north/northwest of the mine. Much of the drawdown to the north/northwest of the LOM boundary will dissipate with time. If the mine gate

roads remain intact after mining, the resulting mine pool would lead to raised groundwater levels in the Mammoth Coal and Upper Underburden in areas that are north/northwest of the mine when compared to pre-mine water levels.

- Significant residual drawdown is predicted to remain after mining for portions of the mine within the LOM boundary area for the Mammoth Coal (and fragmented zone).

- Residual drawdown is predicted to remain in areas east, south and west of mine and Upper Underburden to the east, south and west of the LOM boundary. In effect, such simulated residual drawdown is associated with differences in the hydraulic properties of the Mammoth Coal compared to the mine gob.

- Particle tracking simulations project that in the event that mine gate roads collapse, that flow from the mine gob will be limited to areas very near that mine gob (Scenario 1). In the event the mine gate roads remain intact, then flow from the mine gob may reach just outside the mine boundary in limited areas within 50 years after mining.

6.0 LIMITING ASSUMPTIONS OF THE MODELING EFFORT

There are limiting assumptions that should be noted when applying this flow model including the following:

- Models are predictive tools and they represent simplifications of complex systems.

- The model assumes each saturated zone for layers 2 through 7 is of constant thickness. The actual saturated zones are of variable thickness spatially and temporally.

- The mine stress periods assume a stress is instantaneously applied at each drain used to represent gate road construction. In reality, the gate roads are constructed more uniformly over time.

- There is uncertainty about the magnitude of various formation parameters including hydraulic conductivity (transmissivity), leakance, storativity, porosity and recharge rates.

- There is no unique modeling solution to a complex natural system. In essence, there are alternative conceptual and hydraulic models which could be applied to Bull Mountain Mine area.

Table 1M
Hydraulic Conductivity Summary
Bull Mountains Mine No. 1

	Parameter					
	Mean	Geometric Mean	Median	Max	Min	N
Alluvium	69.3	23.3	65.0	150.0	0.075	6
Overburden - Shallow Fractured/Weathered	7.34	4.97	6.20	19.0	1.50	5
Overburden - Consolidated	0.091	0.025	0.020	0.600	0.000	11
Mammoth Coal	0.863	0.157	0.090	6.20	0.011	15
Upper Underburden	0.138	0.025	0.019	1.00	0.002	16

Note: For locations with multiple tests, the average test result was used.
Based upon data compiled in Table 304(5) - 5-2 of permit.

Table 2M
Calibration Targets

Site ID	Model Coordinates X	Y	Model Layer	Observed Water Level Feet
BMP003	2248346	744994	4	3804.41
BMP005	2255685	749245	4	3802.82
BMP006	2255689	749234	5	3800.71
BMP007	2255451	737490	2	3978.93
BMP008	2255438	737503	4	3866.35
BMP009	2255467	737476	5	3874.76
BMP010	2256494	730204	2	4012.12
BMP011	2256494	730189	4	3910.33
BMP012	2256498	730171	5	3907.10
BMP014	2266253	749127	4	3801.91
BMP015	2266241	749123	5	3799.28
BMP021	2271846	737779	4	3897.62
BMP037	2250727	736294	4	3862.32
BMP038	2243694	743879	5	3771.90
BMP039	2244751	740072	5	3805.38
BMP043	2248761	741080	2	3900.93
BMP044	2248786	741132	5	3818.05
BMP056	2253775	739349	5	3848.36
BMP065	2261665	746686	4	3815.68
BMP066	2261656	746663	2	3915.76
BMP070	2261798	725406	4	3951.05
BMP071	2261811	725405	5	3944.71
BMP074	2257911	753212	4	3790.00
BMP079	2257898	753211	5	3789.39
BMP081	2270773	734245	2	3999.33
BMP082	2270770	734261	4	3919.00
BMP083	2270766	734272	5	3894.62
BMP092	2268496	746997	4	3818.56
BMP102	2254188	729897	2	4009.87
BMP107	2244933	739032	2	3934.91

Table 3M
Calibration Results

Site ID	Model Layer	Observed Water Level Feet	Simulated Water Level Feet	Model Residual Feet
BMP003	4	3804.41	3804.41	-0.40
BMP005	4	3802.82	3806.77	-3.95
BMP006	5	3800.71	3867.17	-0.82
BMP007	2	3978.93	3912.15	-1.82
BMP008	4	3866.35	3814.79	-12.88
BMP009	5	3874.76	3893.06	4.56
BMP010	2	4012.12	3866.45	-4.13
BMP011	4	3910.33	3830.99	-15.31
BMP012	5	3907.10	3785.40	4.60
BMP014	4	3801.91	3907.98	11.02
BMP015	5	3799.28	3818.81	-0.25
BMP021	4	3897.62	3804.38	-3.67
BMP037	4	3862.32	3864.71	10.05
BMP038	5	3771.90	3909.45	-2.35
BMP039	5	3805.38	3809.75	-10.47
BMP043	2	3900.93	3792.08	-20.18
BMP044	5	3818.05	3816.75	-11.37
BMP056	5	3848.36	3817.87	0.18
BMP065	4	3815.68	3850.82	-2.46
BMP066	2	3915.76	3938.09	12.97
BMP070	4	3951.05	3934.55	10.16
BMP071	5	3944.71	3783.04	6.35
BMP074	4	3790.00	3904.28	-9.66
BMP079	5	3789.39	3955.07	23.86
BMP081	2	3999.33	4005.15	6.97
BMP082	4	3919.00	3896.29	4.64
BMP083	5	3894.62	3921.56	-5.80
BMP092	4	3818.56	3983.49	15.84
BMP102	2	4009.87	4012.23	-2.36
BMP107	2	3934.91	3914.43	20.48

Table 4M
Statistical Summary

Statistic	Result
Residual Mean	0.79
Absolute Residual Mean	7.98
Residual Standard Deviation	10.18
Sum of Squares	3126.13
Residual Root Mean Square Error (RMS)	10.21
Minimum Residual	-20.18
Maximum Residual	23.86
Number of Observations	30
Range in Observations	240.22
Scaled Standard Deviation[1]	0.042
Scaled Absolute Mean[2]	0.033
Scaled RMS[3]	0.042

1 - Ratio of residual standard deviation divided by range in observations.
2 - Ratio of absolute residual mean divided by range in observations.
3 - Ratio of RMS divided by range in observations.

Table 5M
Mass Balance - Steady State Model

Boundary Type	Inflows	Outflows
General Head Boundary	33,615.18	115,789.67
Drain[1]		21,780.02
Recharge	103,953.84	
Totals	137,569.02	137,569.69
	Percent Error	-0.000487%

1 - represents ephemeral drainage sinks
All units in ft^3/day

Table 6M

Transient Model Representation of Long Wall Mining

Stress Period	Days	Gate Road First Start (1)	Long Wall Panel Start (2)
1	1000		
2	395	1S	
3	549		
4	367		
5	121	1R	
6	153		
7	122		Long Wall 1 (LW1)
8	166	2R	
9	199		
10	120	3R	
11	170		LW2
12	115		
13	99		
14	122	4R	LW3
15	149		
16	33		
17	122	5R	
18	148		LW4
19	65		
20	90	6R	
21	153		LW5
22	37		
23	145	7R	
24	122		
25	32		
26	120	8R	LW6
27	122		
28	177	9R	
29	145		LW7
30	238	10R	
31	151		LW8
32	214	11R	
33	151		LW9
34	230	12R	
35	361	13R	LW10
36	283	14R	LW11
37	194	15R	LW12
38	223		
39	321		LW13
40	305		LW14

1 - Represents starting time when gate road work activited. Note that gate roads assumed to remain intact once completed through life of mine. Also, the Main Road was gradually extended in concert with the design plans set forth by Signal Peak Energy.

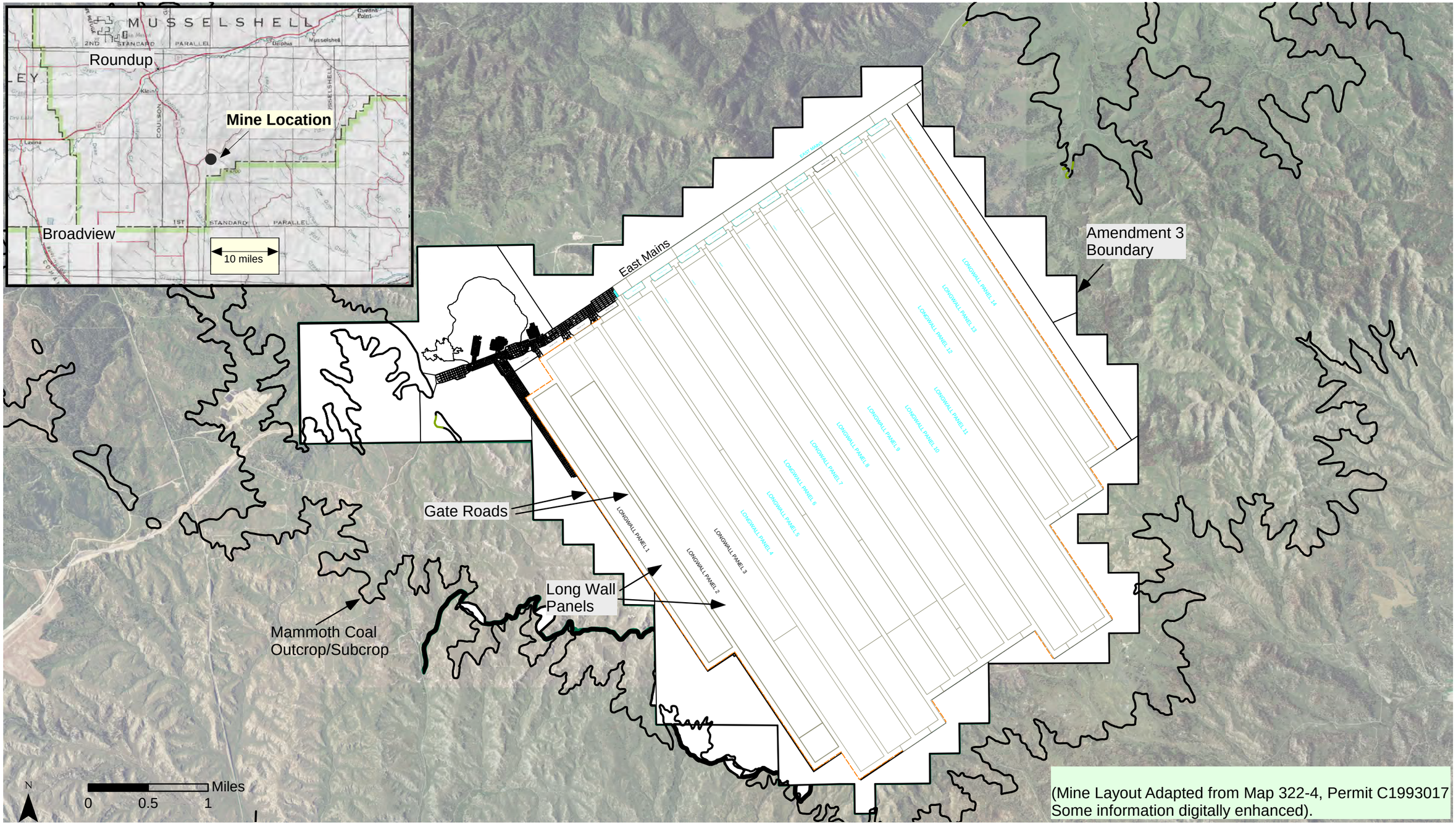
2 - Represents starting time when long wall work initiated.

Table 7M

Simulated Discharge Over Time

Stress Period	Stress Period Length, Days	Date Start	End	Simulated Drain Flow gpm
1	1000		05/30/05	5
2	395	05/31/05	06/30/06	7
3	549	06/30/06	12/31/07	6
4	367	12/31/07	01/01/09	6
5	121	01/02/09	05/02/09	6
6	153	05/03/09	10/02/09	16
7	122	10/03/09	02/01/10	19
8	166	02/02/10	07/17/10	46
9	199	07/18/10	02/01/11	86
10	120	02/02/11	06/01/11	95
11	170	06/02/11	11/18/11	92
12	115	11/19/11	03/12/12	125
13	99	03/13/12	06/19/12	150
14	122	06/20/12	10/19/12	136
15	149	10/20/12	03/17/13	160
16	33	03/18/13	04/19/13	181
17	122	04/20/13	08/19/13	142
18	148	08/20/13	01/14/14	146
19	65	01/15/14	03/20/14	123
20	90	03/21/14	06/18/14	185
21	153	06/19/14	11/18/14	173
22	37	11/19/14	12/25/14	177
23	145	12/26/14	05/19/15	213
24	122	05/20/15	09/18/15	222
25	32	09/19/15	10/20/15	218
26	120	10/21/15	02/17/16	214
27	122	02/18/16	06/18/16	211
28	178	06/19/16	12/13/16	216
29	145	12/14/16	05/07/17	229
30	238	05/08/17	12/31/17	249
31	151	01/01/18	05/31/18	239
32	214	06/01/18	12/31/18	245
33	151	01/01/19	05/31/19	237
34	230	06/01/19	01/16/20	252
35	361	01/17/20	01/11/21	257
36	283	01/12/21	10/21/21	260
37	194	10/22/21	05/03/22	277
38	223	05/04/22	12/12/22	271
39	321	12/13/22	10/29/23	230
40	305	10/30/23	08/29/24	240
41	305	08/30/24	06/30/25	252

Weighted Average (from 5/31/05) 159.9



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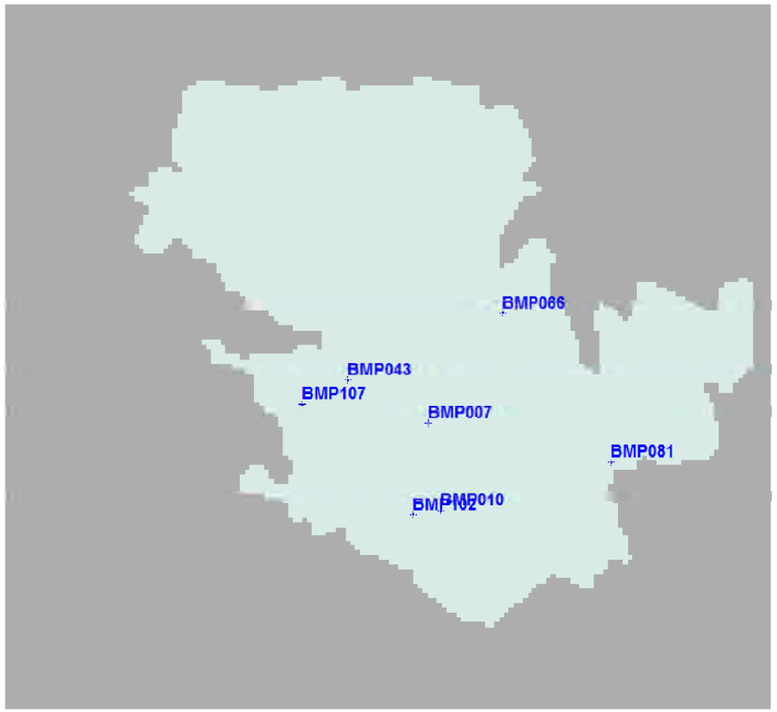
Date: 8/26/2012 Name: Figure 01M for Model Report.cvx

Notes:
1) Aerial Photographs: 2009 NAIP

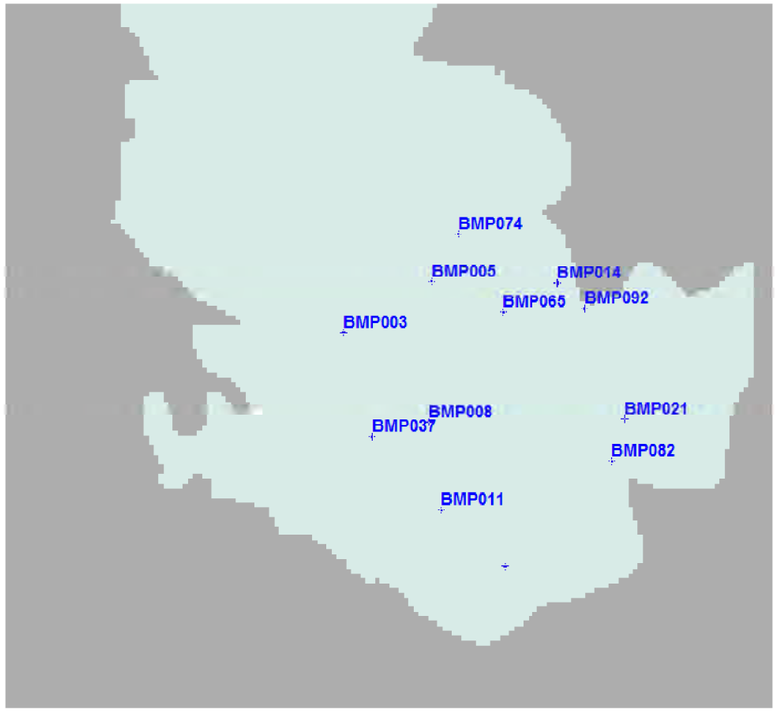
Signal Peak Energy
100 Portal Drive Roundup, MT 59072
(406) 323-4500

SIGNAL PEAK ENERGY

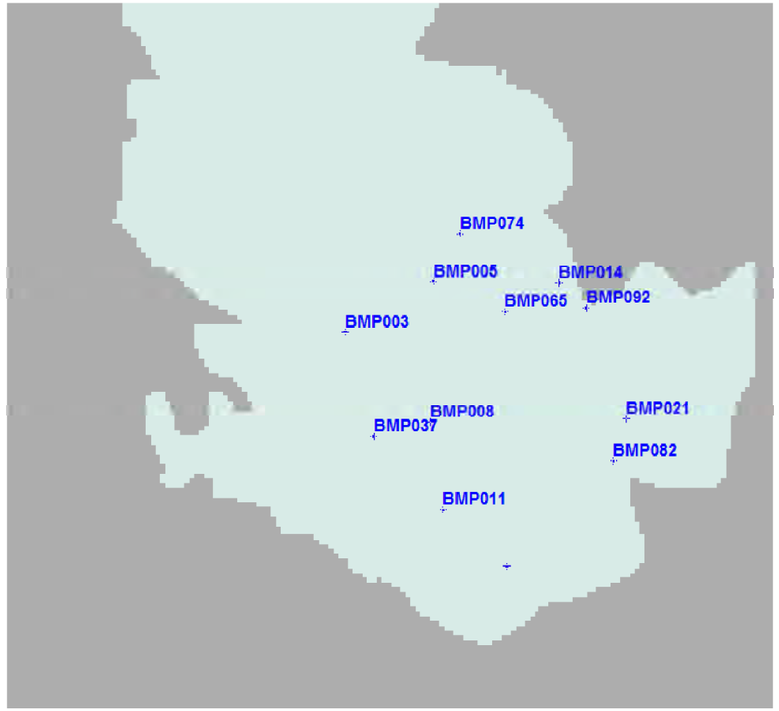
Figure 1M
Amendment 3 Permit Boundaries
Bull Mountains Mine No. 1



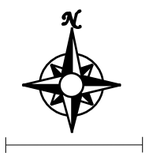
Potentiometric Head Targets - Layer 2
(represent OB-5)



Potentiometric Head Targets - Layer 4
(represent Mammoth Coal)



Potentiometric Head Targets - Layer 5
(represent upper Underburden)

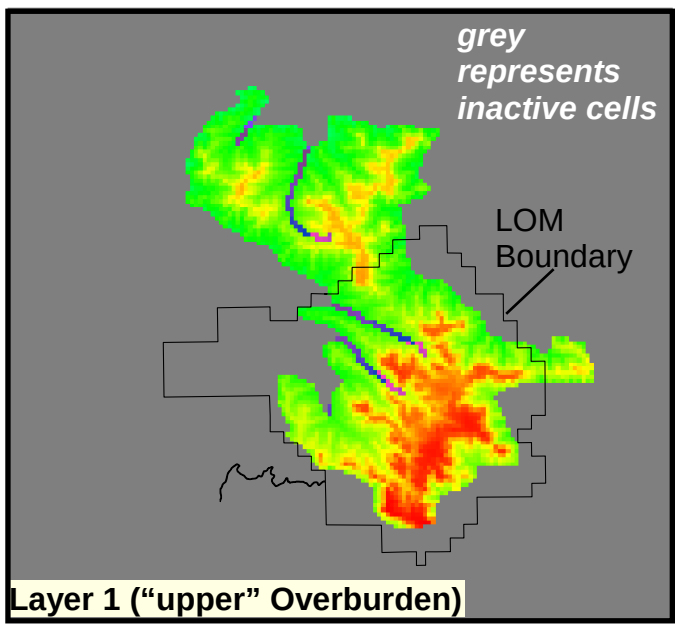


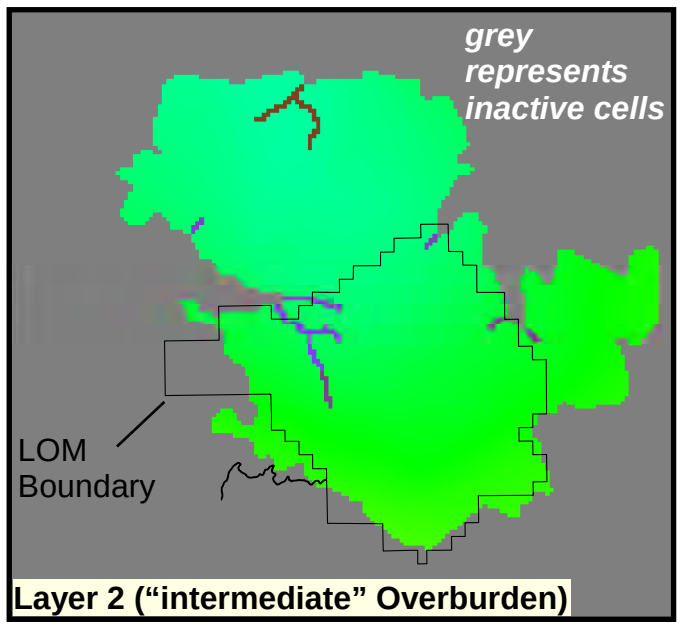
Date: 08/30/12
d:\SP-PHC\Fig_02M.cvx
For Signal Peak Energy

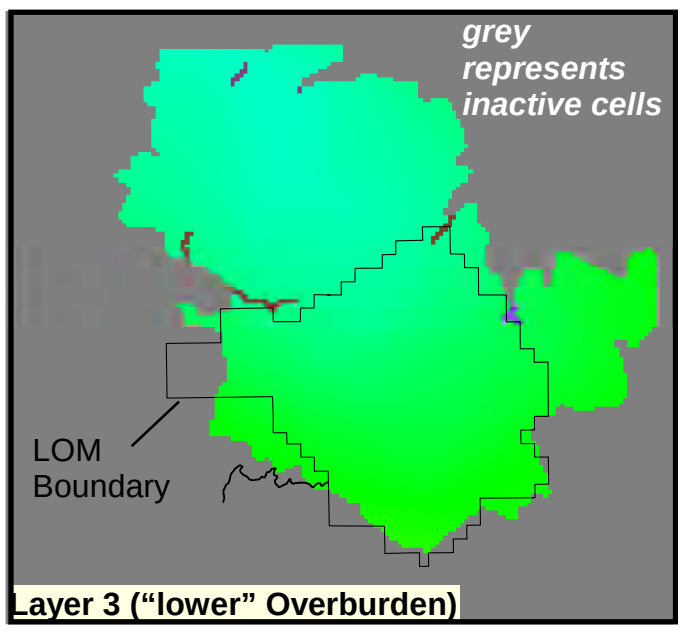
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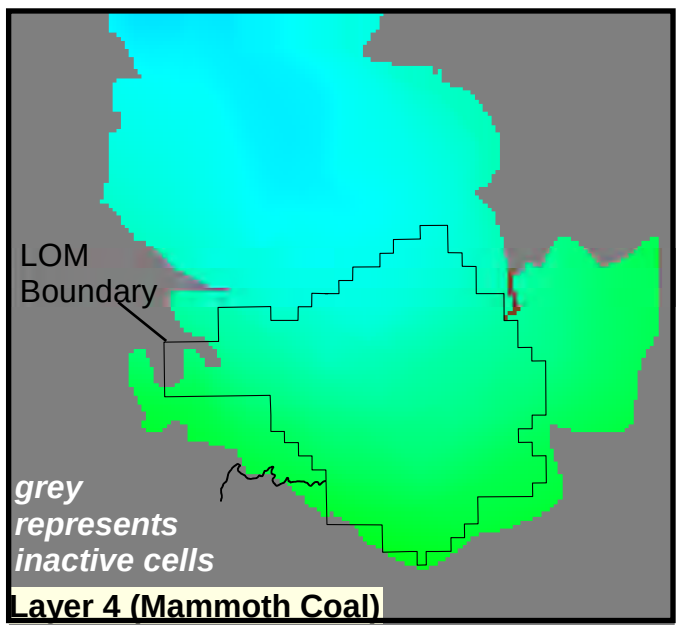
Locations of Calibration Targets
Bull Mountain Mine No. 1 Model

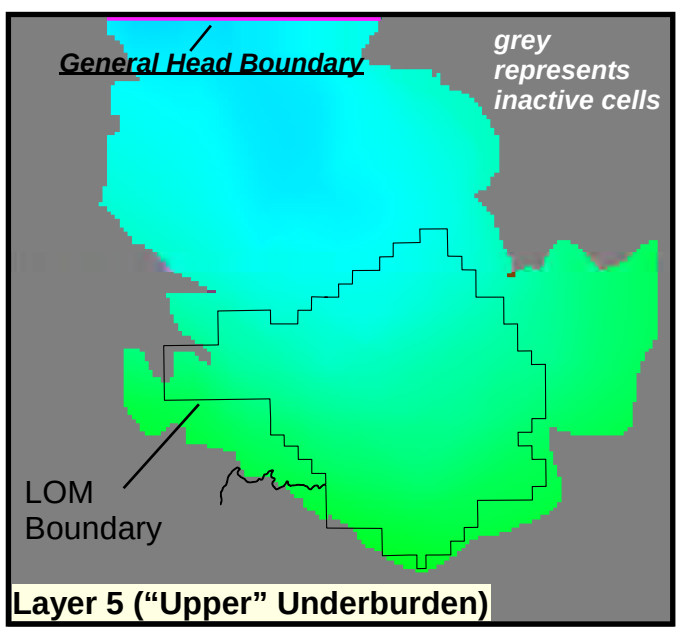
Figure 2M

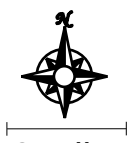


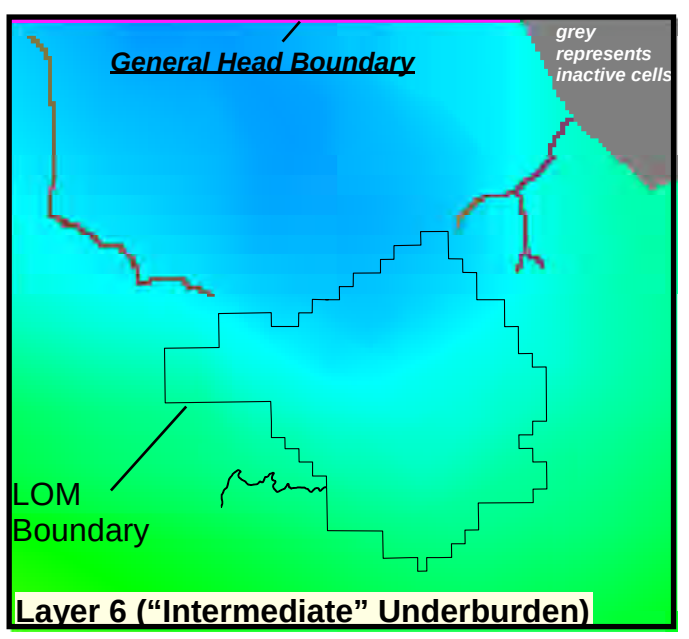


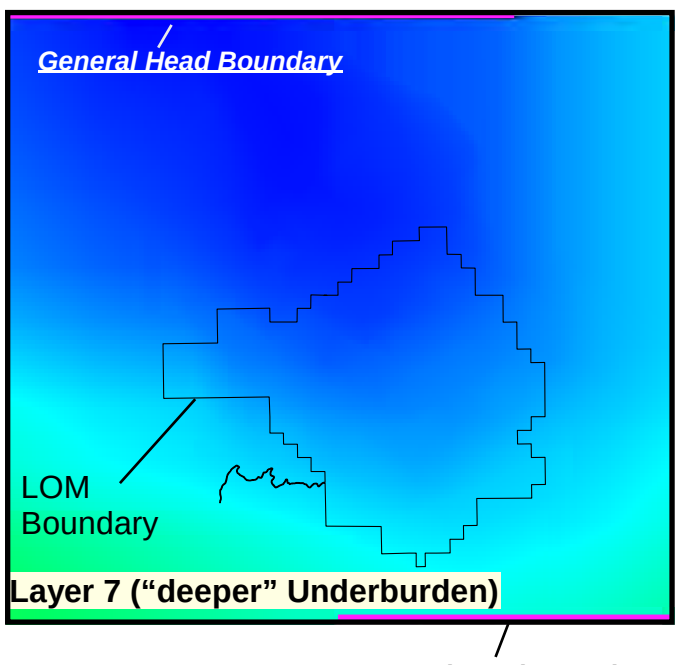


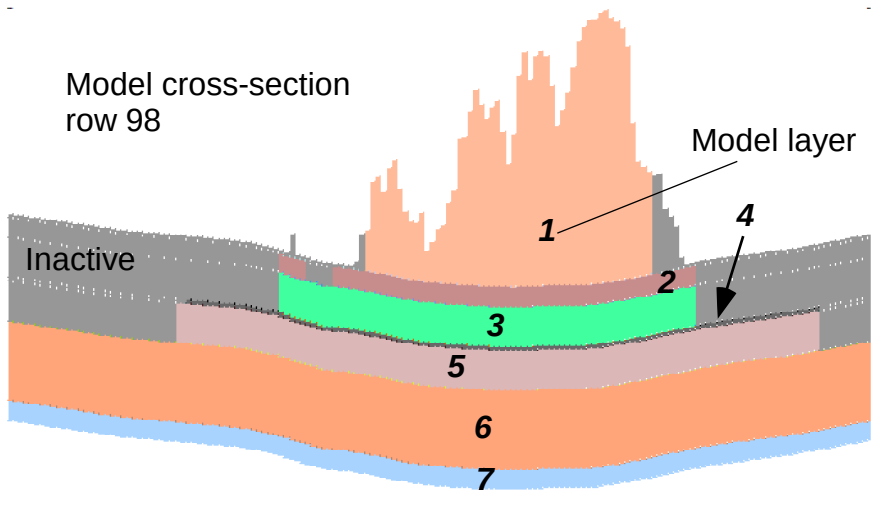






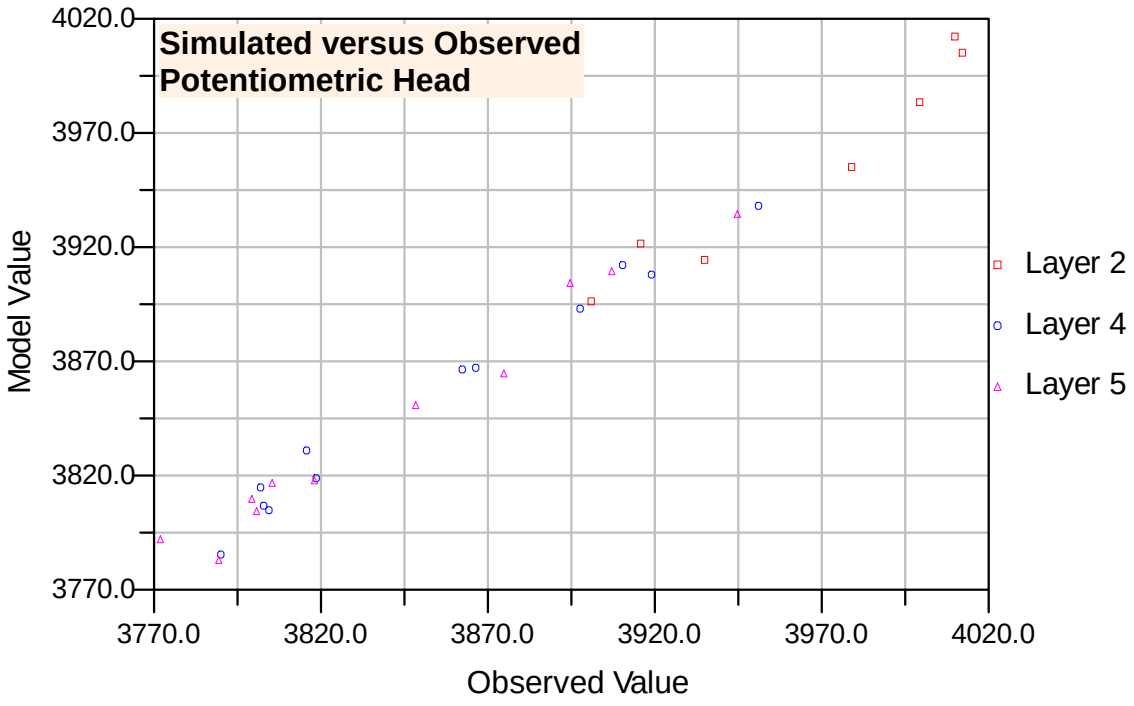


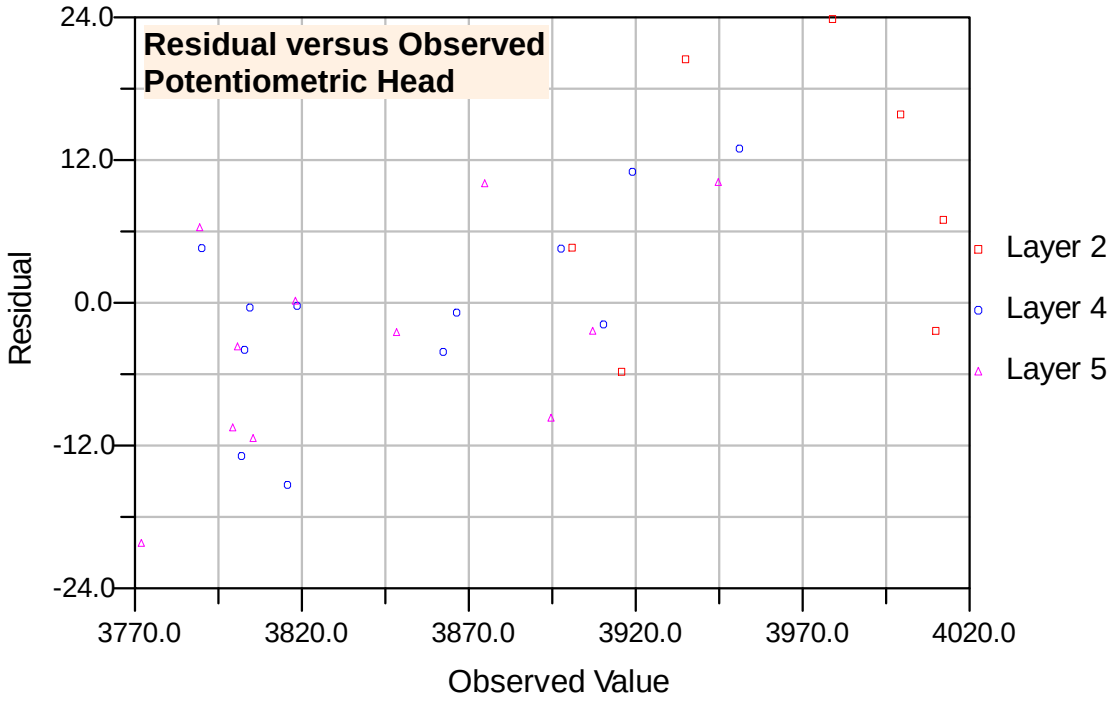




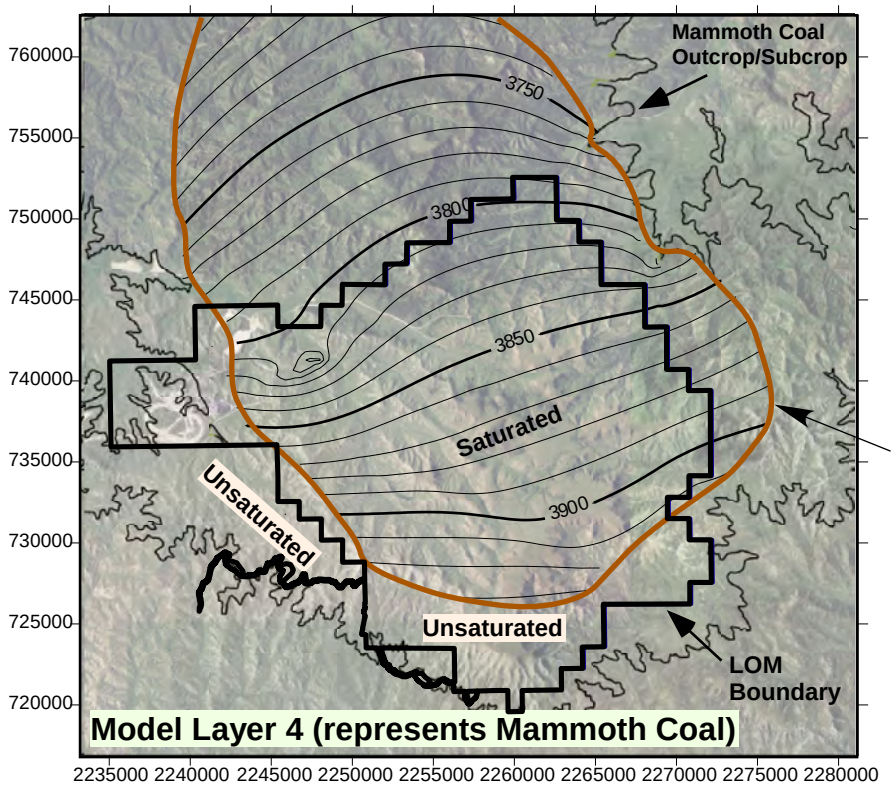
Cross-section not to scale

Date: 08/30/12 d:\SP-PHC\Fig_04M.cvx For Signal Peak Energy	NICKLIN EARTH & WATER, INC.	**Model Layering** **Bull Mountain Mine No. 1 Model**	**Figure 3M**

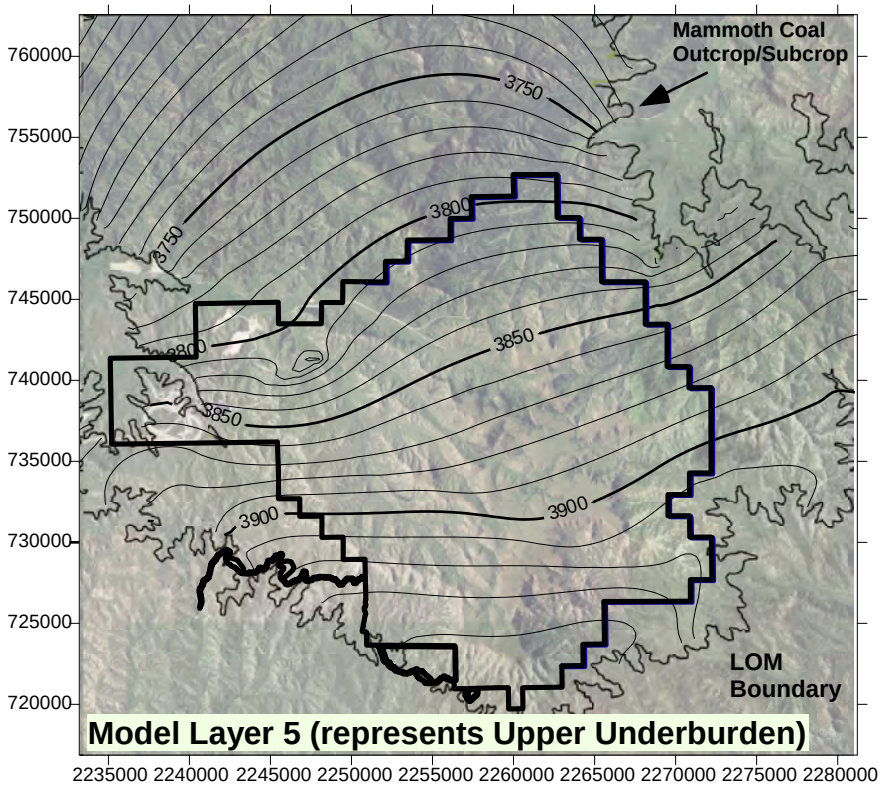




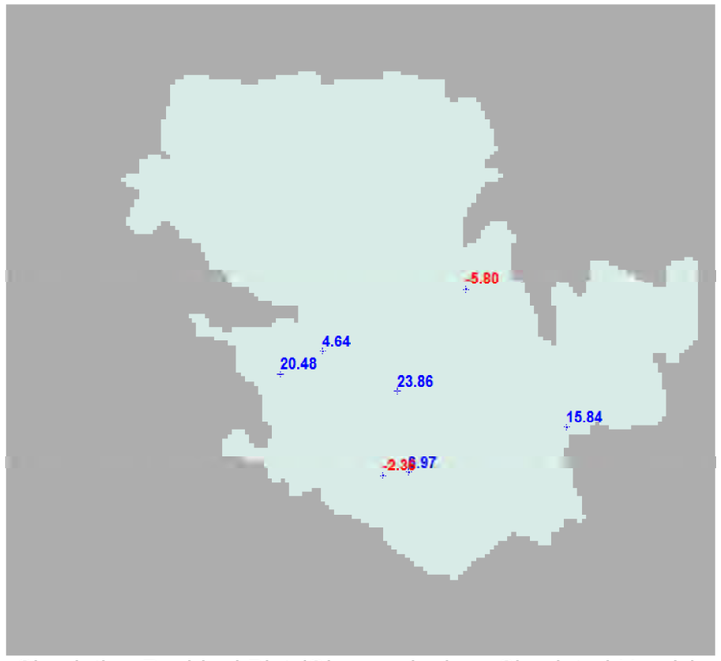
Date: 08/30/12 d:\SP-PHC\Fig_04M.cvx For Signal Peak Energy	NICKLIN EARTH & WATER, INC.	**Simulated Potentiometric Head Compared to Observed Values Bull Mountain Mine No. 1 Model**	**Figure 4M**



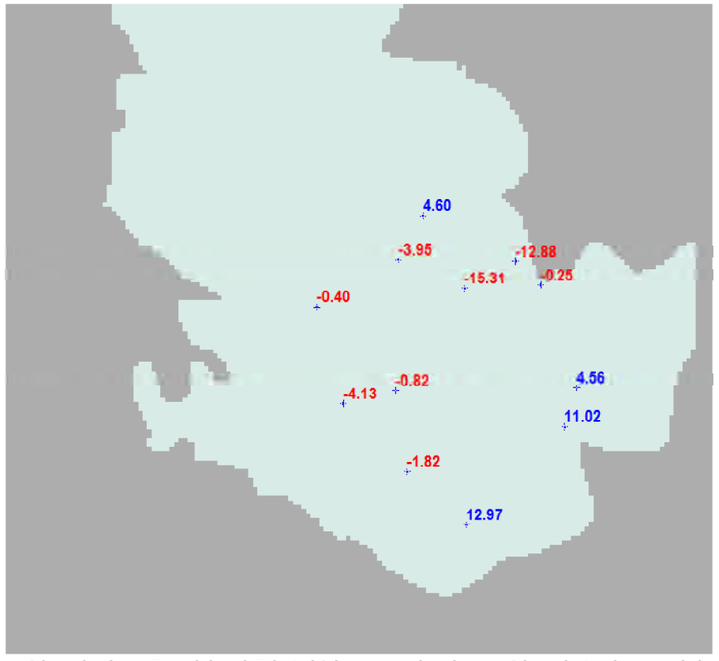
Simulated Boundary
Saturated/Unsaturated
Mammoth Coal



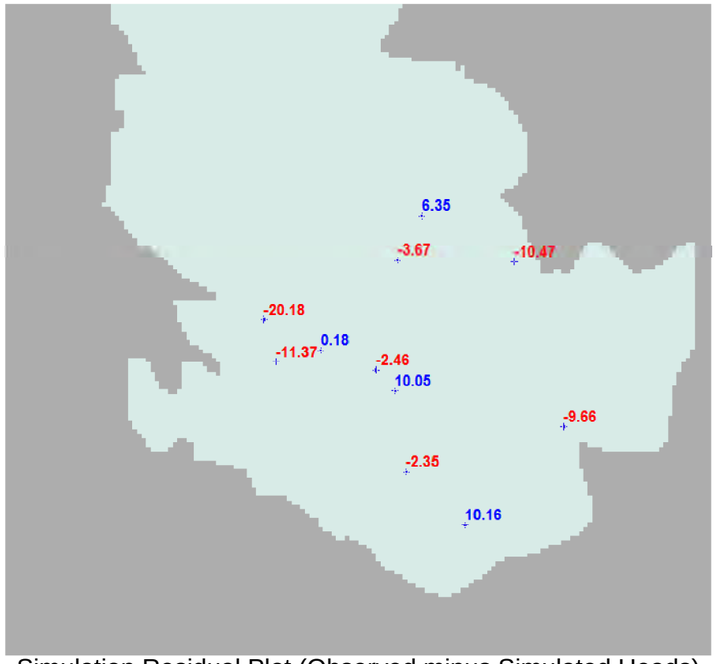
Date: 08/30/12 d:\SP-PHC\Fig_05M.cvx For Signal Peak Energy	NICKLIN EARTH & WATER, INC.	**Simulated Potentiometric Head Model Layers 4 and 5 Bull Mountain Mine No. 1 Model**	**Figure 5M**



Simulation Residual Plot (Observed minus Simulated Heads)
Layer 2 - represent OB-5



Simulation Residual Plot (Observed minus Simulated Heads)
Layer 4 - represent Mammoth Coal



Simulation Residual Plot (Observed minus Simulated Heads)
Layer 5 - represent Upper Underburden

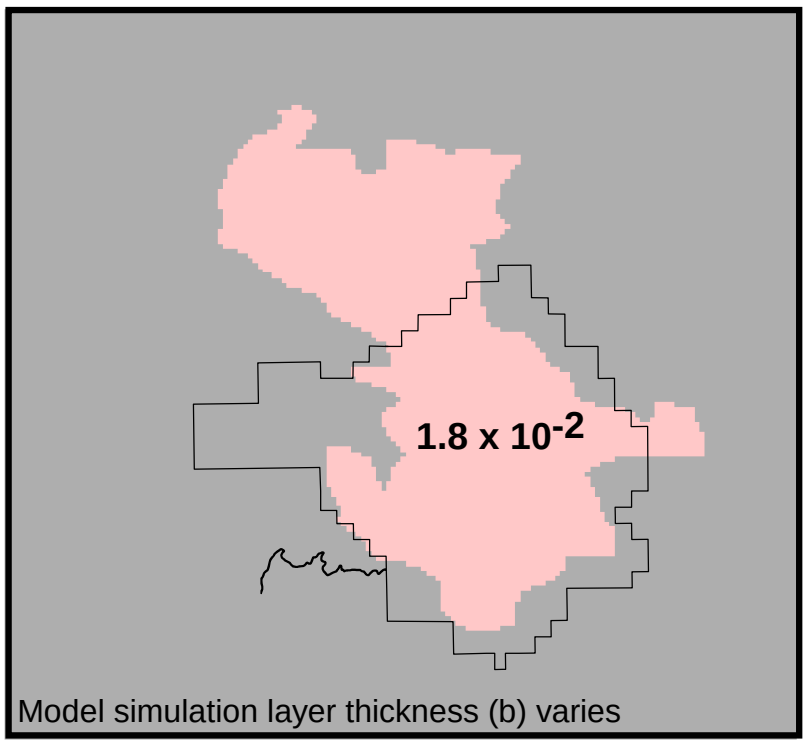


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d:\SP-PHC\Fig_06M.cvx
For Signal Peak Energy

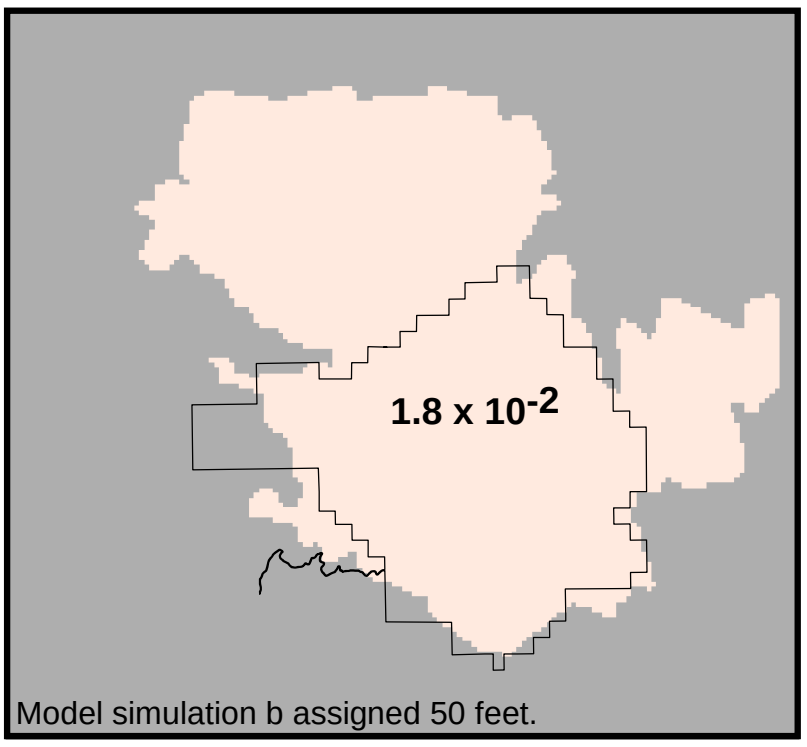
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Simulation Residual Plots
Bull Mountain Mine No. 1 Model

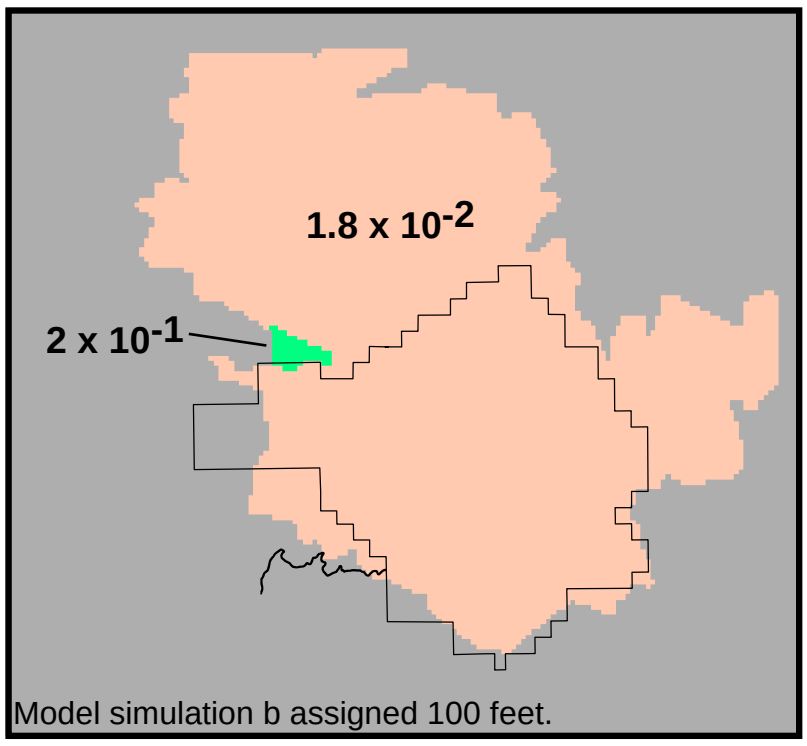
Figure 6M



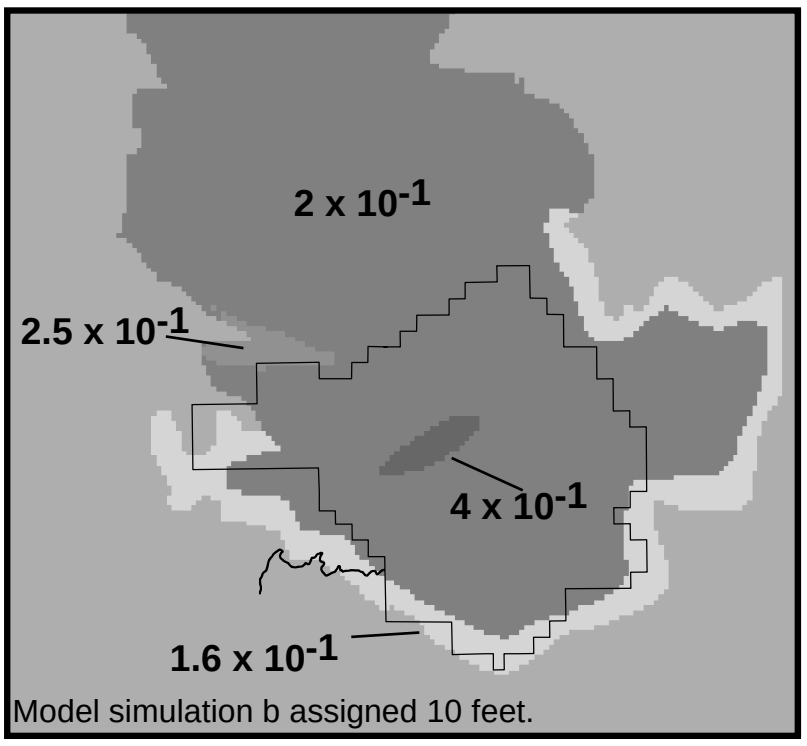
Model simulation layer thickness (b) varies



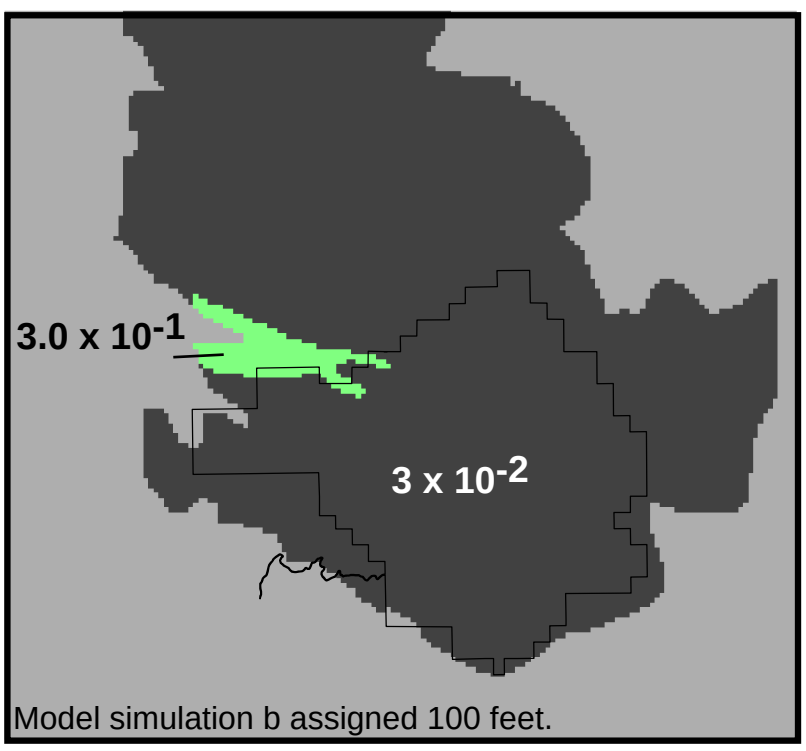
Model simulation b assigned 50 feet.



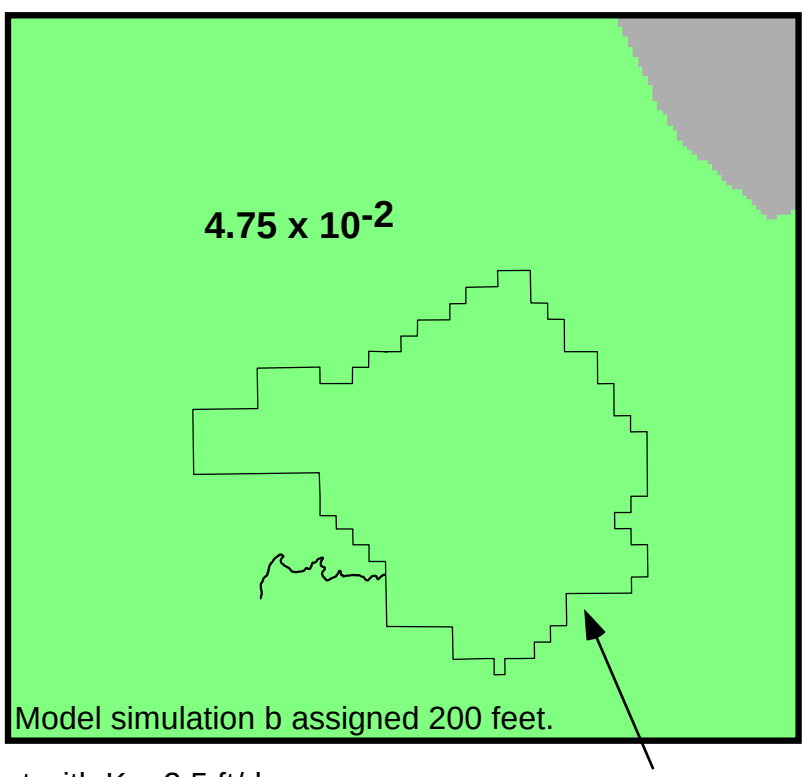
Model simulation b assigned 100 feet.



Model simulation b assigned 10 feet.



Model simulation b assigned 100 feet.



Model simulation b assigned 200 feet.

For model layer 7 - model simulation b assigned as 50 feet with K = 2.5 ft/day

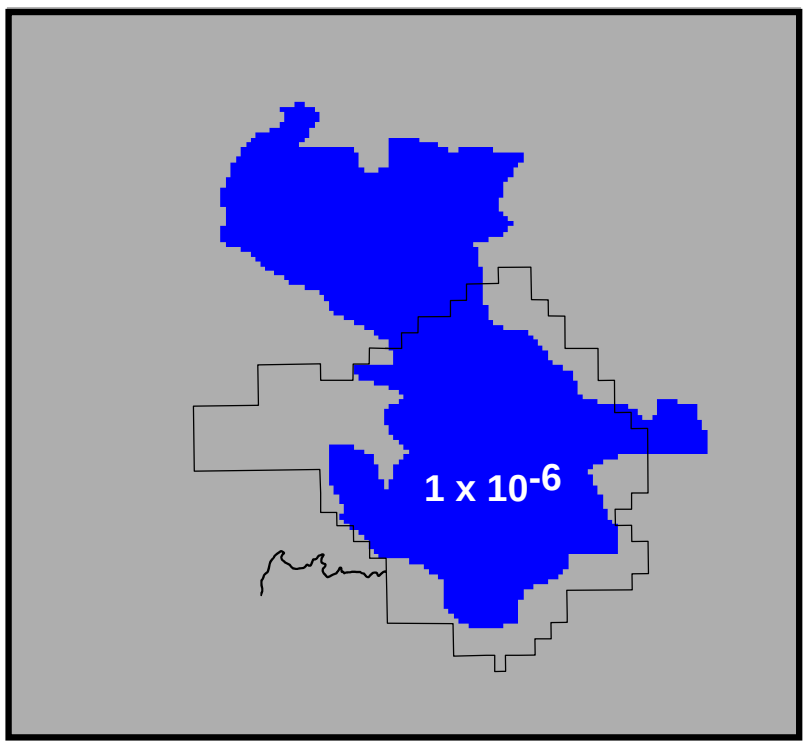
Amendment 3
or Life of Mine Boundary

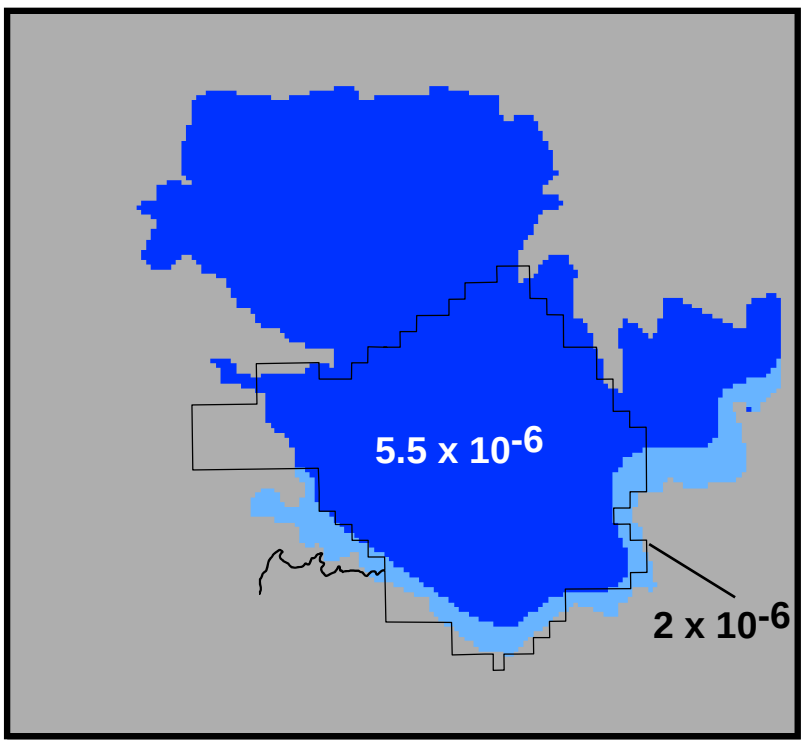
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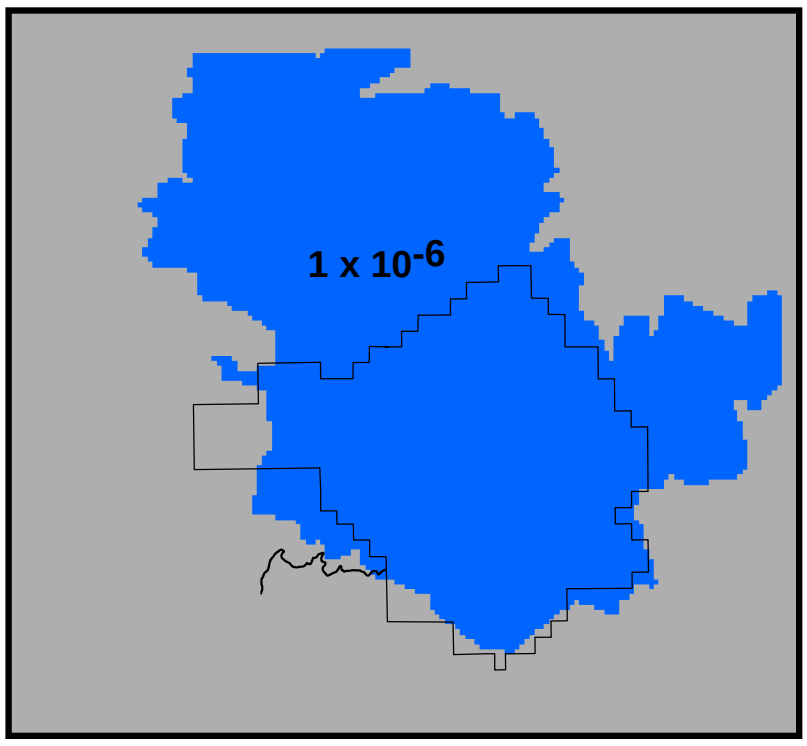
2 miles

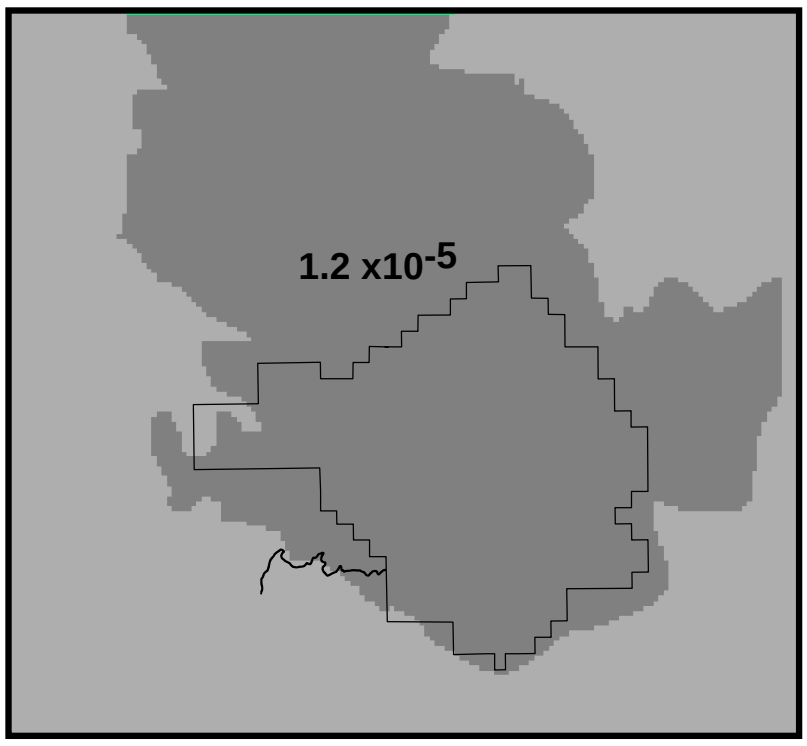
Note: b - assigned model layer thickness, ft. Note that values shown are hydraulic conductivities (ft/d). For layers 2 through 7 transmissivity is defined by K x b. For layer 1 transmissivity varies and is computed by MODFOW.

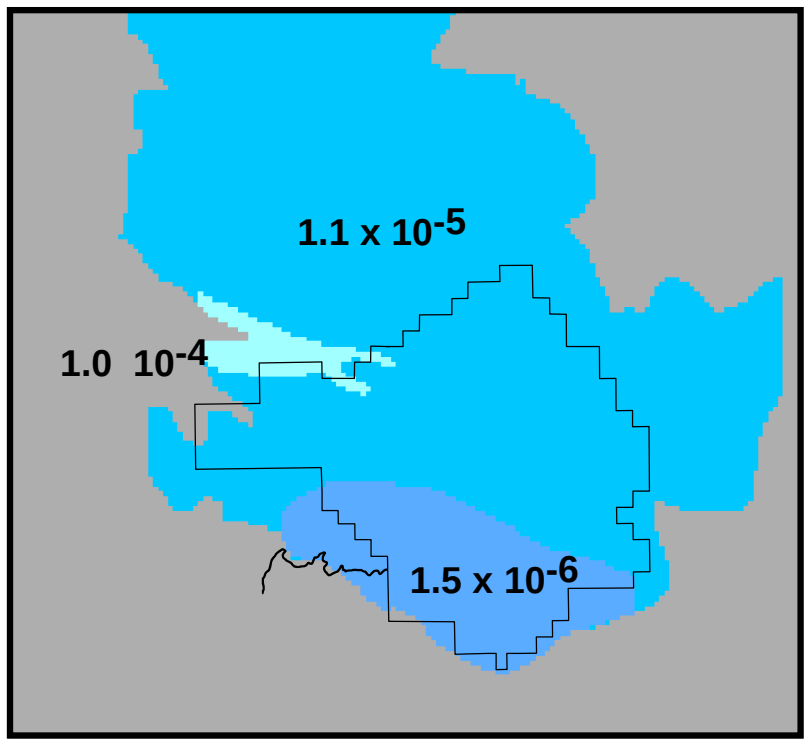
Date: 08/30/12 d:\SP-PHC\Fig_07M.cvx For Signal Peak Energy	NICKLIN EARTH & WATER, INC.	**Hydraulic Conductivity/Transmissivity Zonation Bull Mountain Mine No. 1 Model**	**Figure 7M**

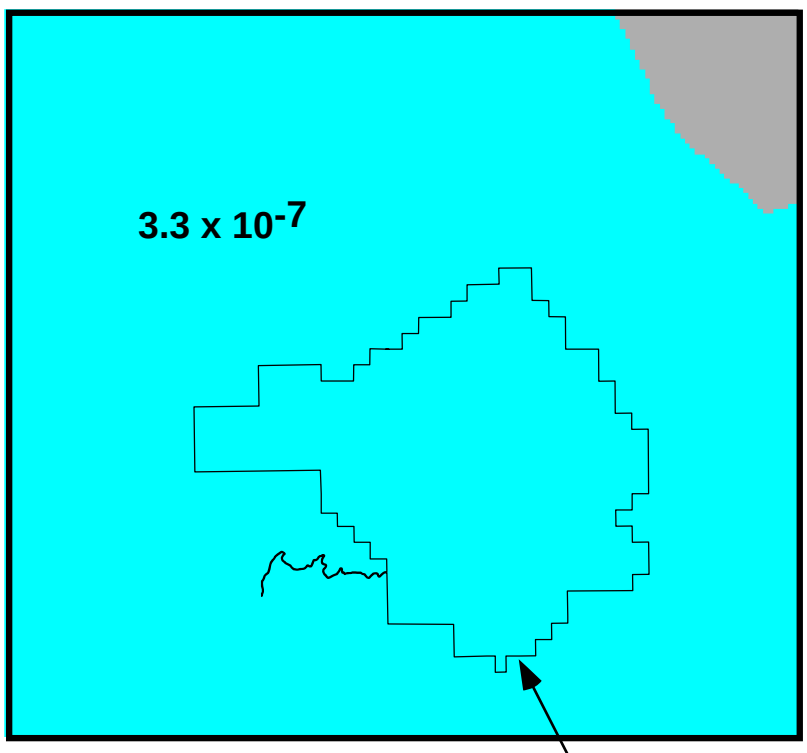








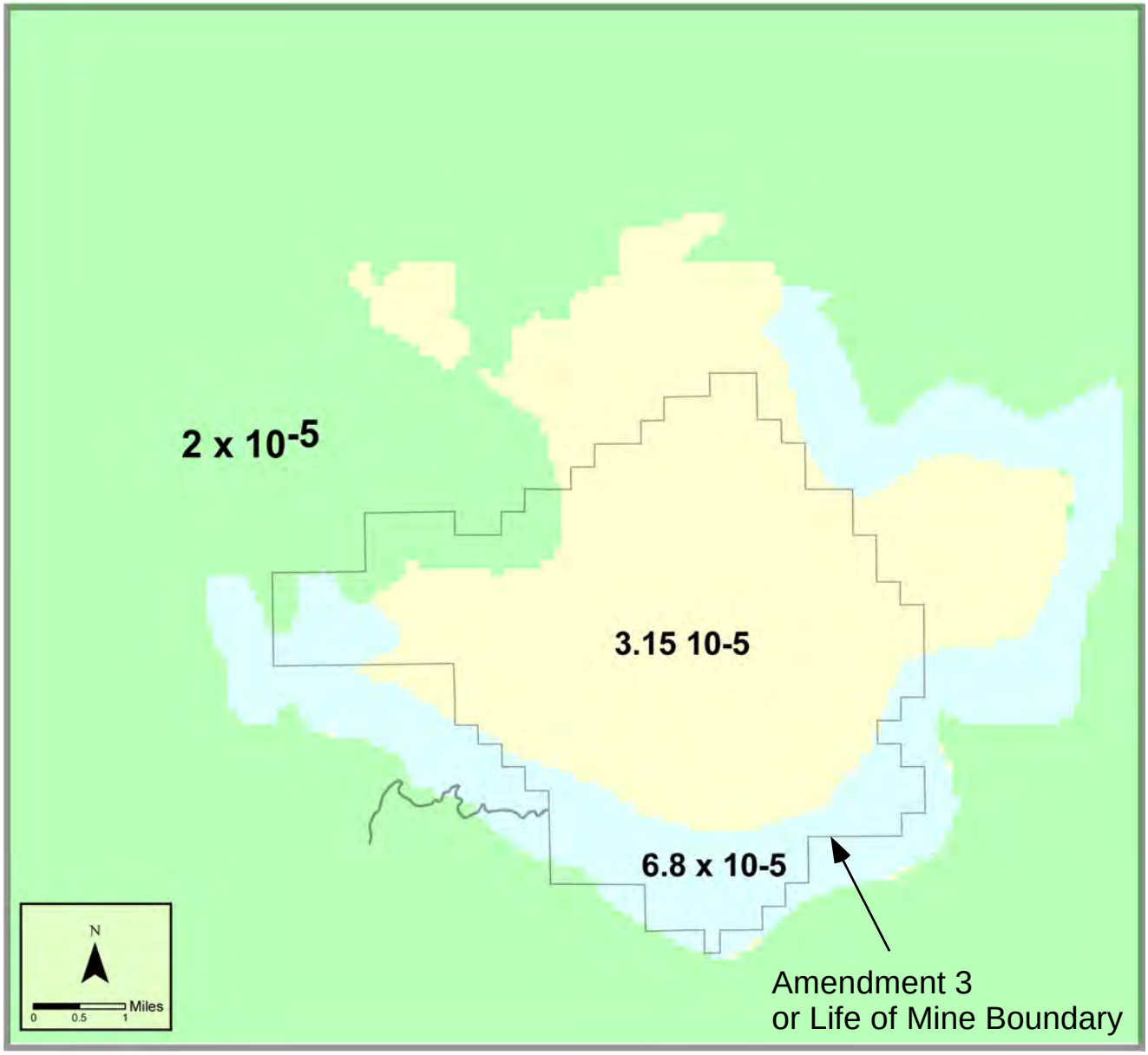




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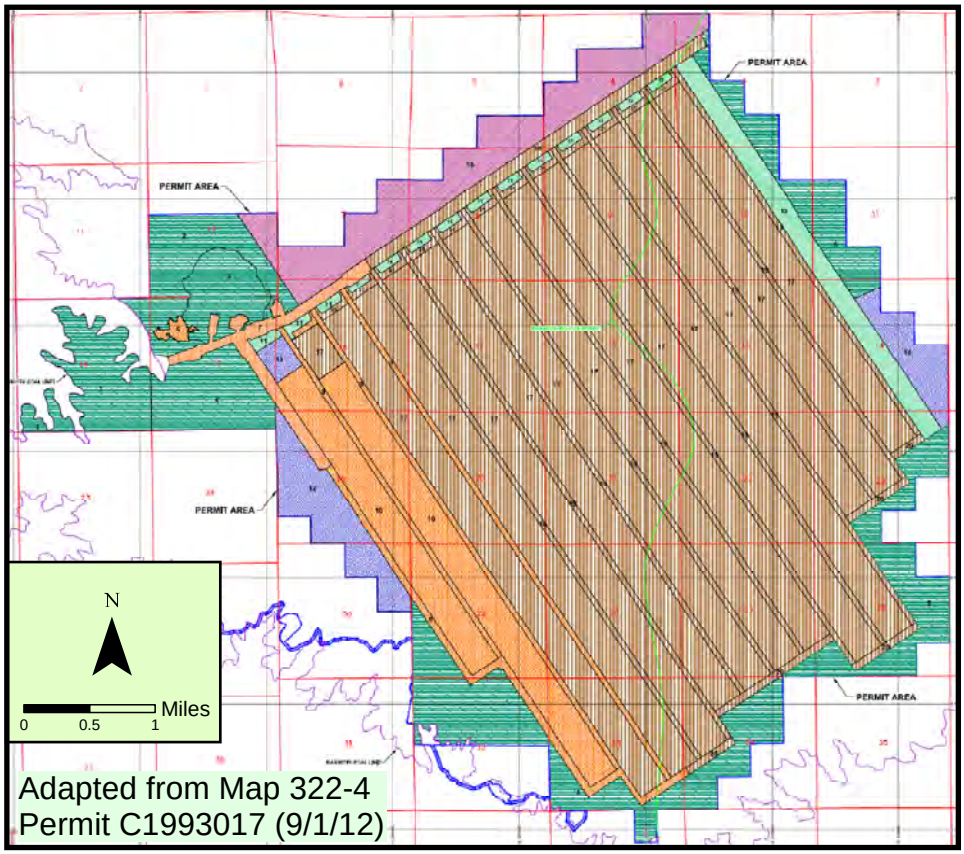
2 miles

Date: 08/30/12 d:\SP-PHC\Fig_08M.cvx For Signal Peak Energy	NICKLIN EARTH & WATER, INC.	**Leakance Zonation** **Bull Mountain Mine No. 1 Model**	**Figure 8M**

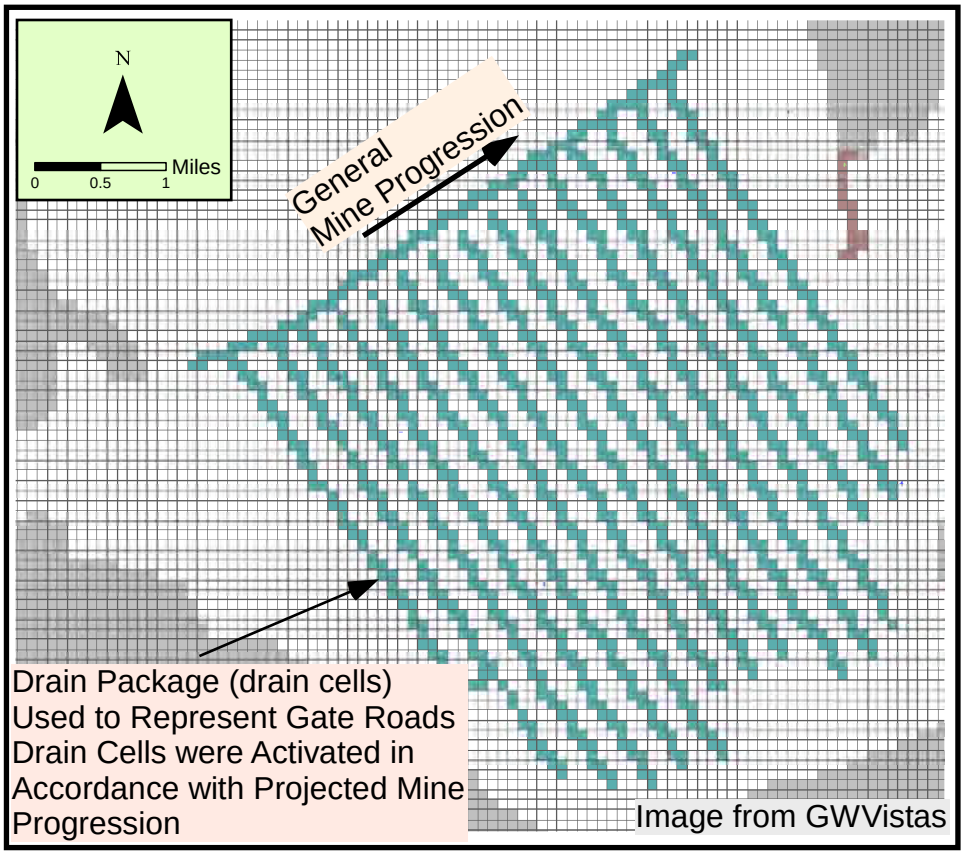


Units are in feet per day

Date: 08/30/12 d:\SP-PHC\Fig_9M.cvx For Signal Peak Energy	NICKLIN EARTH & WATER, INC.	**Recharge Zonation** **Bull Mountain Mine No. 1 Model**	**Figure 9M**



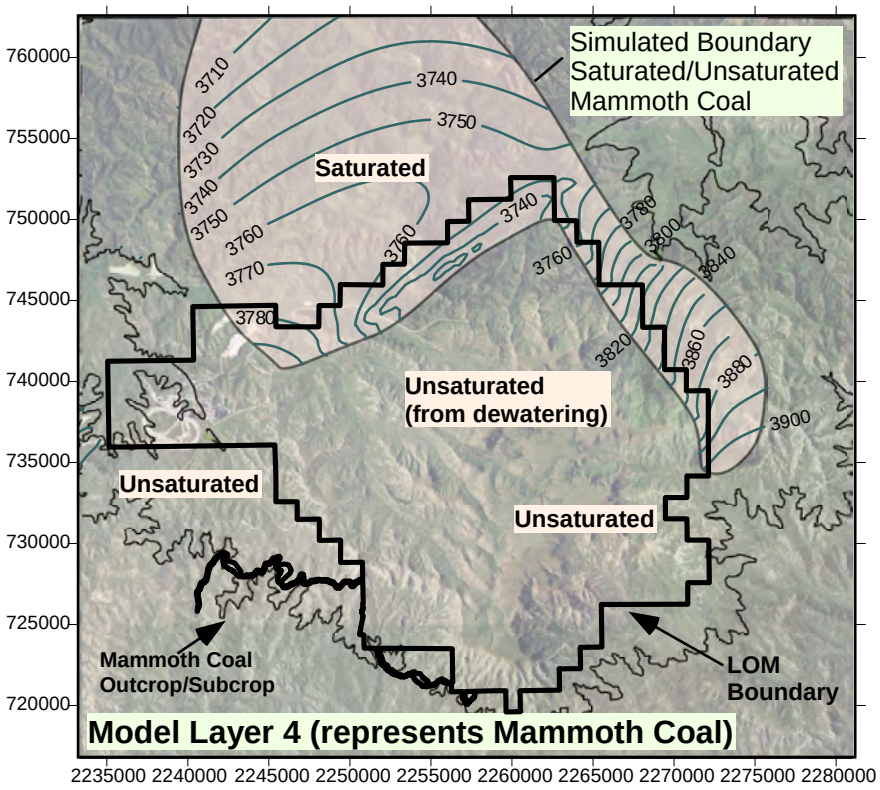
Adapted from Map 322-4
Permit C1993017 (9/1/12)

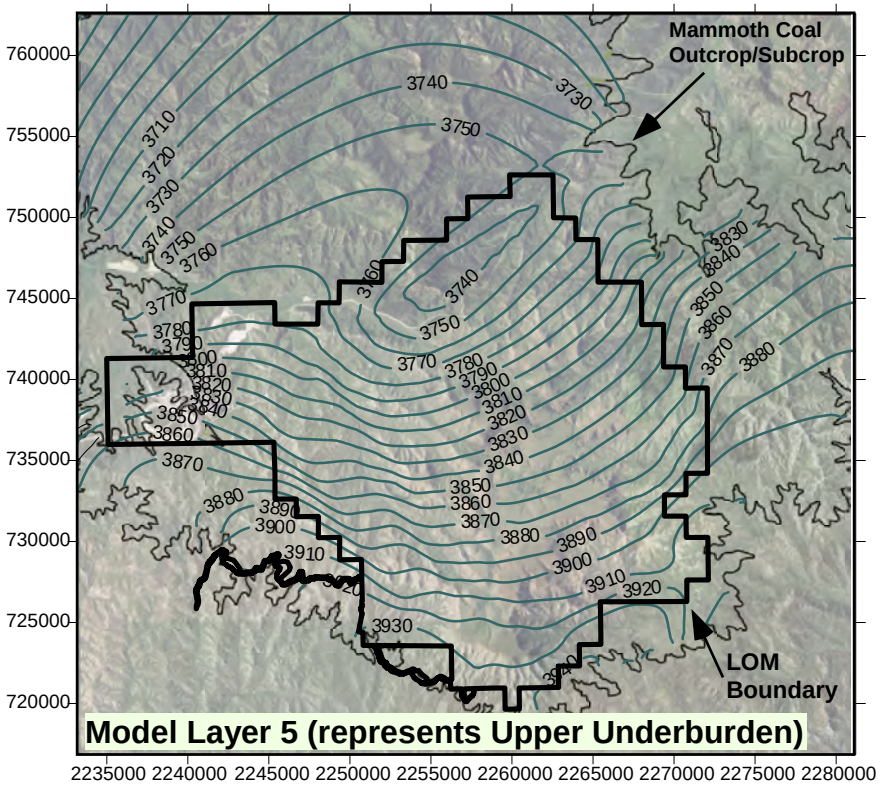


Drain Package (drain cells)
Used to Represent Gate Roads
Drain Cells were Activated in
Accordance with Projected Mine
Progression

Image from GWVistas

Date: 08/30/12 d:\SP-PHC\Fig_11M.cvx For Signal Peak Energy	NICKLIN EARTH & WATER, INC.	**Mine Plans and Drain Representation Bull Mountain Mine No. 1 Model**	**Figure 10M**

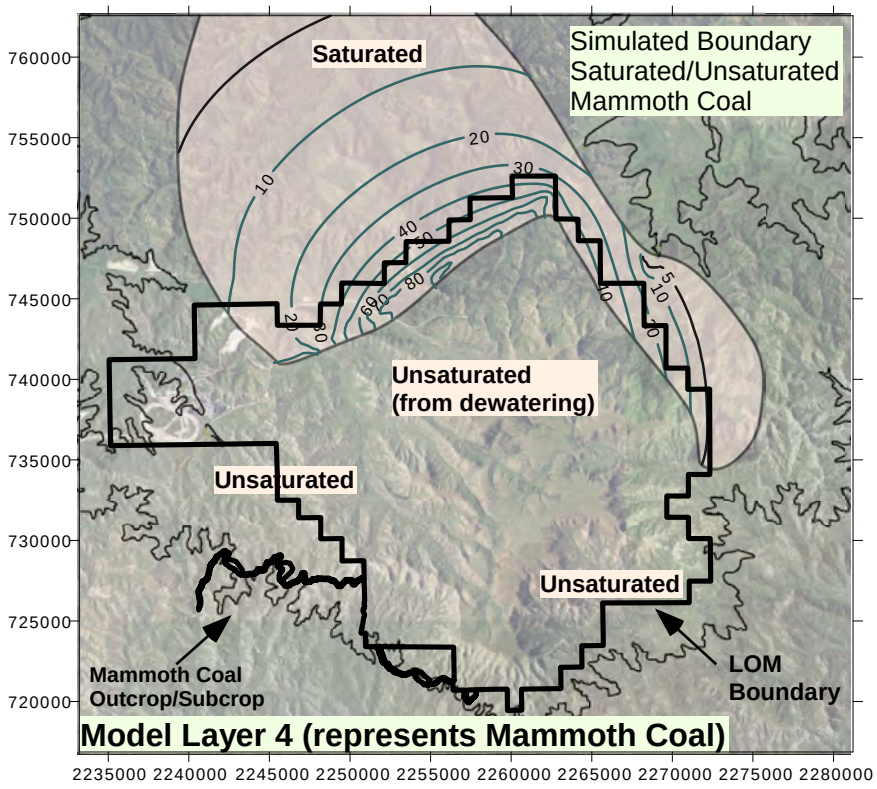


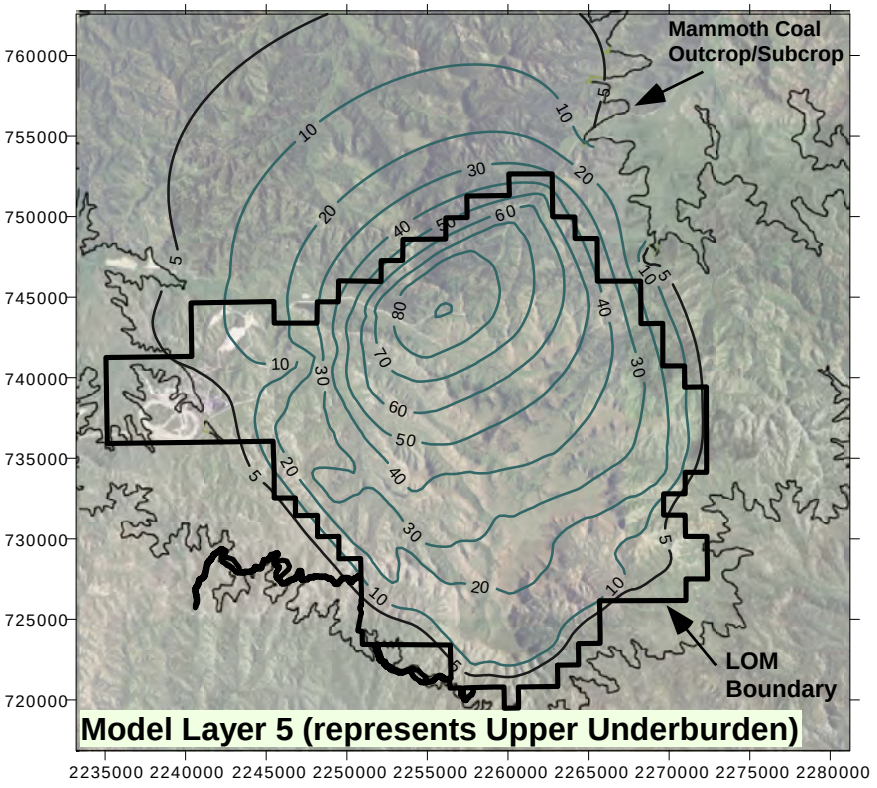


N

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

Date: 08/30/12 d:\SP-PHC\Fig_11M.cvx For Signal Peak Energy	NICKLIN EARTH & WATER, INC.	**Simulated Water Levels, Layers 4 and 5 End of Mine (LOM) Bull Mountain Mine No. 1 Model**	**Figure 11M Page 1**



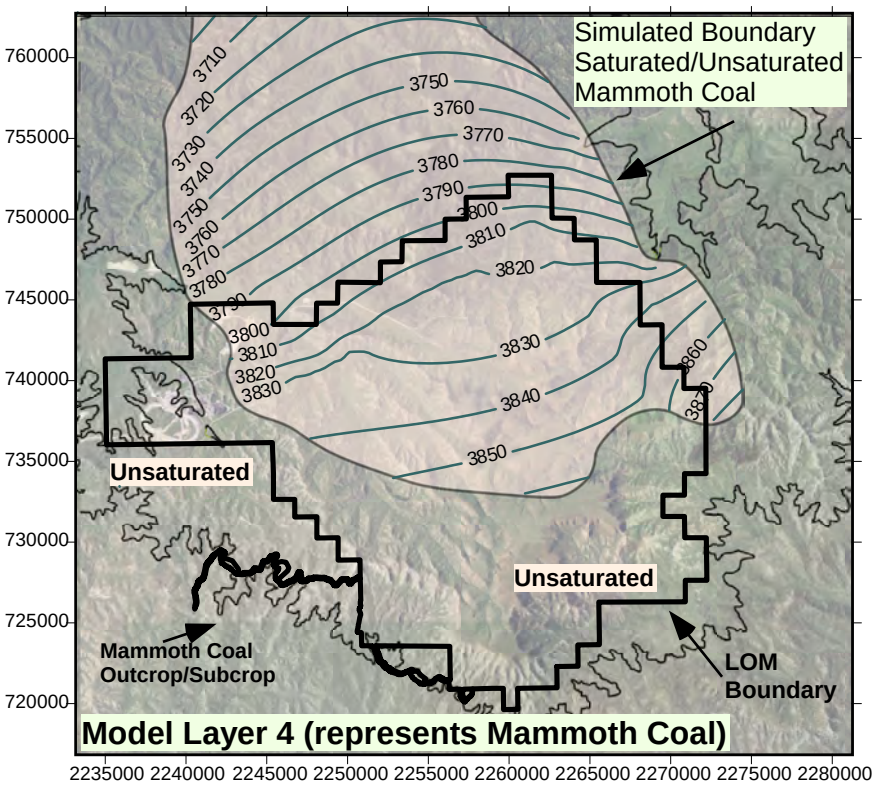


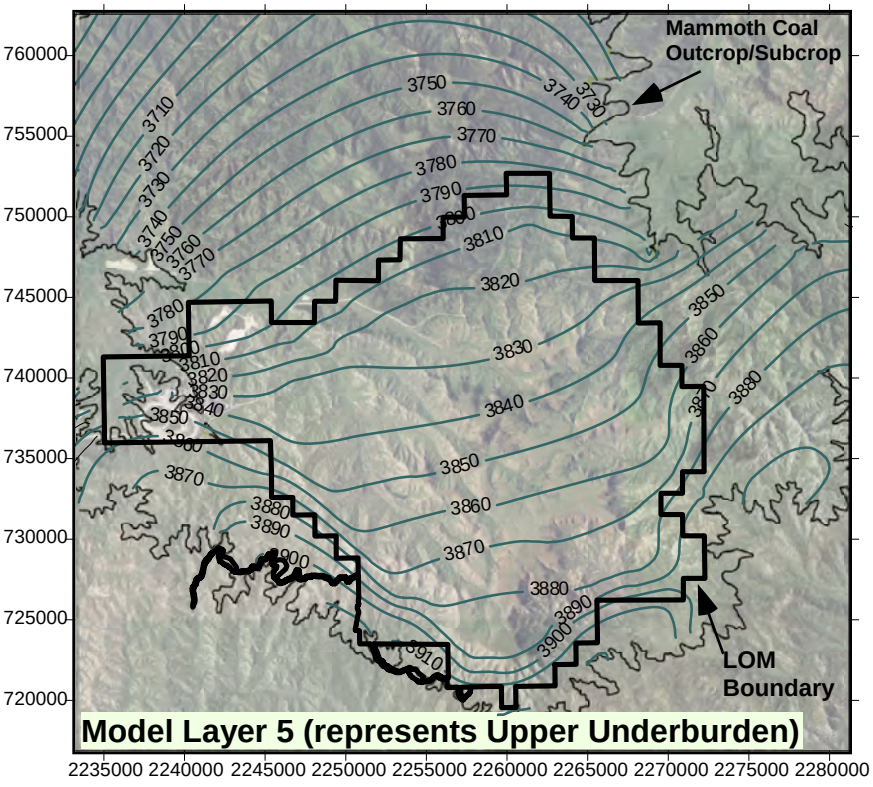
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Units indicated are in Montana NAD 83, State-Plane, Feet

Date: 08/30/12 d:\SP-PHC\Fig_11M.cvx For Signal Peak Energy	NICKLIN EARTH & WATER, INC.	**Simulated Drawdown, Layers 4 and 5 End of Mine (LOM) Bull Mountain Mine No. 1 Model**	**Figure 11M Page 2**

This scenario assumes gate roads are crushed following mining.



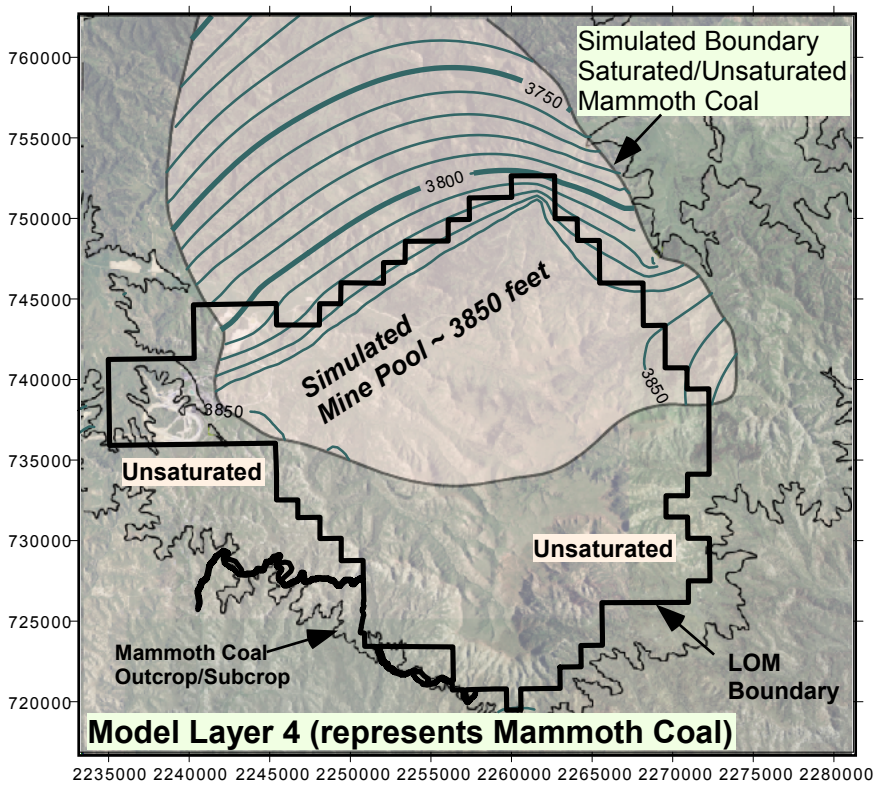


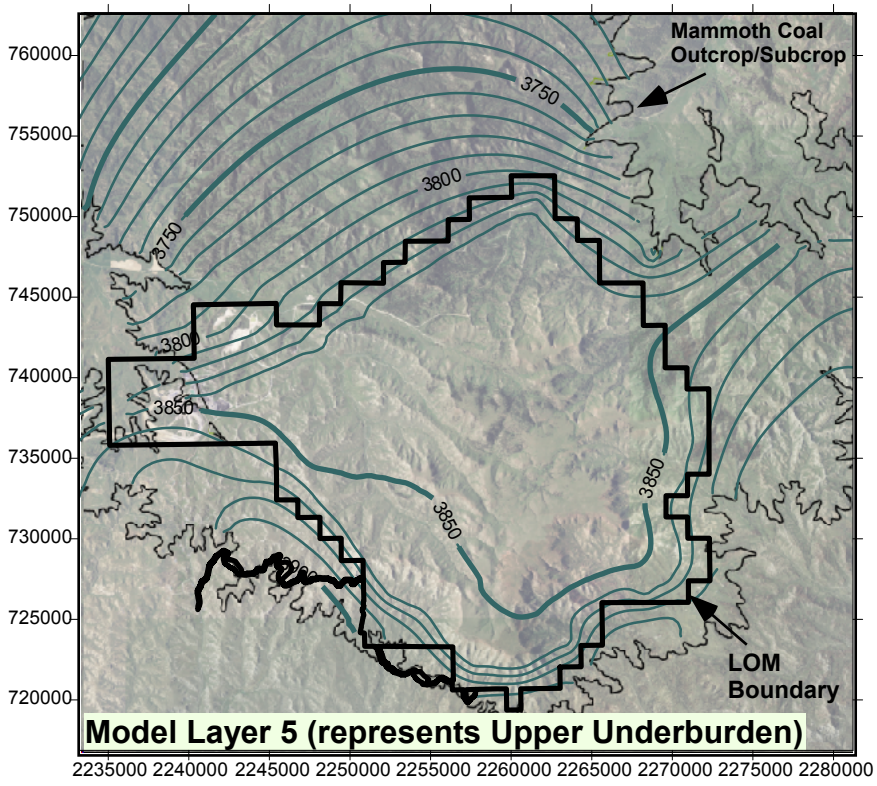
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Units indicated are in Montana NAD 83, State-Plane, Feet

Date: 08/30/12 d:\SP-PHC\Fig_12M.cvx For Signal Peak Energy	NICKLIN EARTH & WATER, INC.	**Simulated Water Levels, Layers 4 and 5 Scenario 1 - 50 Years after End of Mining Bull Mountain Mine No. 1 Model**	**Figure 12M Page 1**

This scenario assumes gate roads remain intact following mining.



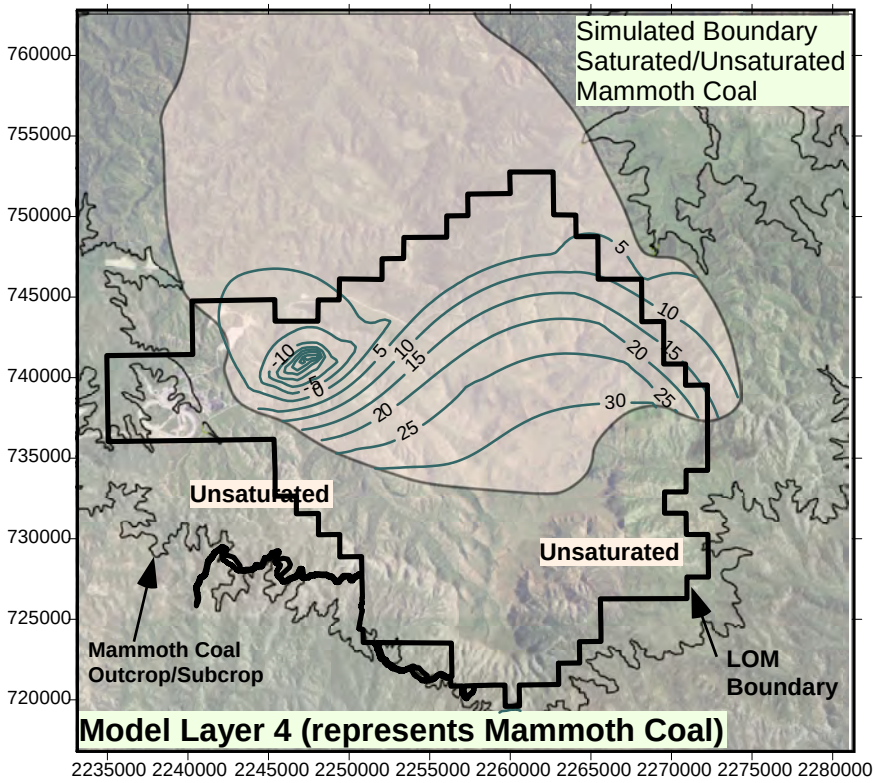


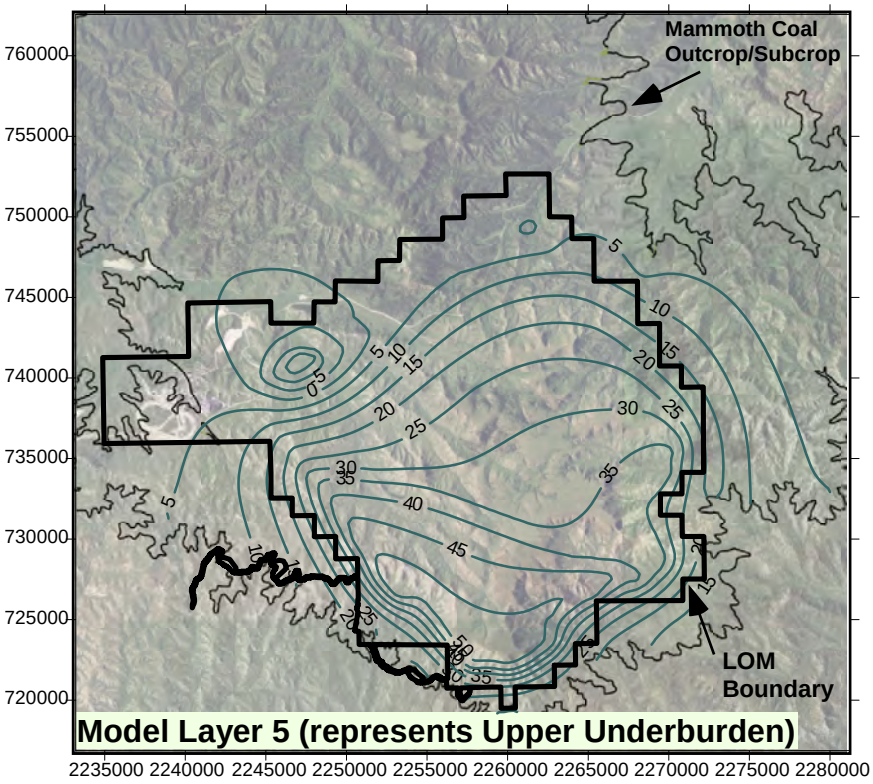
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Units indicated are in Montana NAD 83, State-Plane, Feet

Date: 03/04/13 d:\SP-PHC\Fig_12M.cvx For Signal Peak Energy	NICKLIN EARTH & WATER, INC.	**Simulated Water Levels, Layers 4 and 5 Scenario 2 - 50 Years after End of Mining Bull Mountain Mine No. 1 Model**	**Figure 12M Page 2**

This scenario assumes gate roads are crushed following mining.



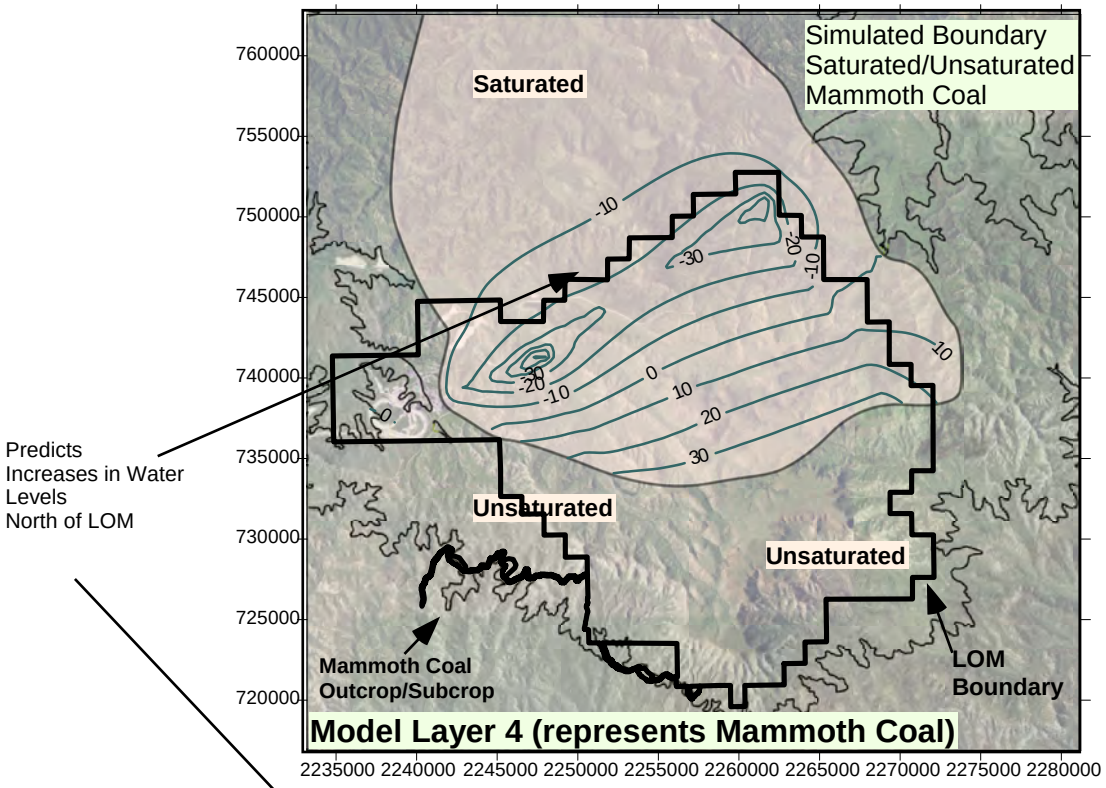


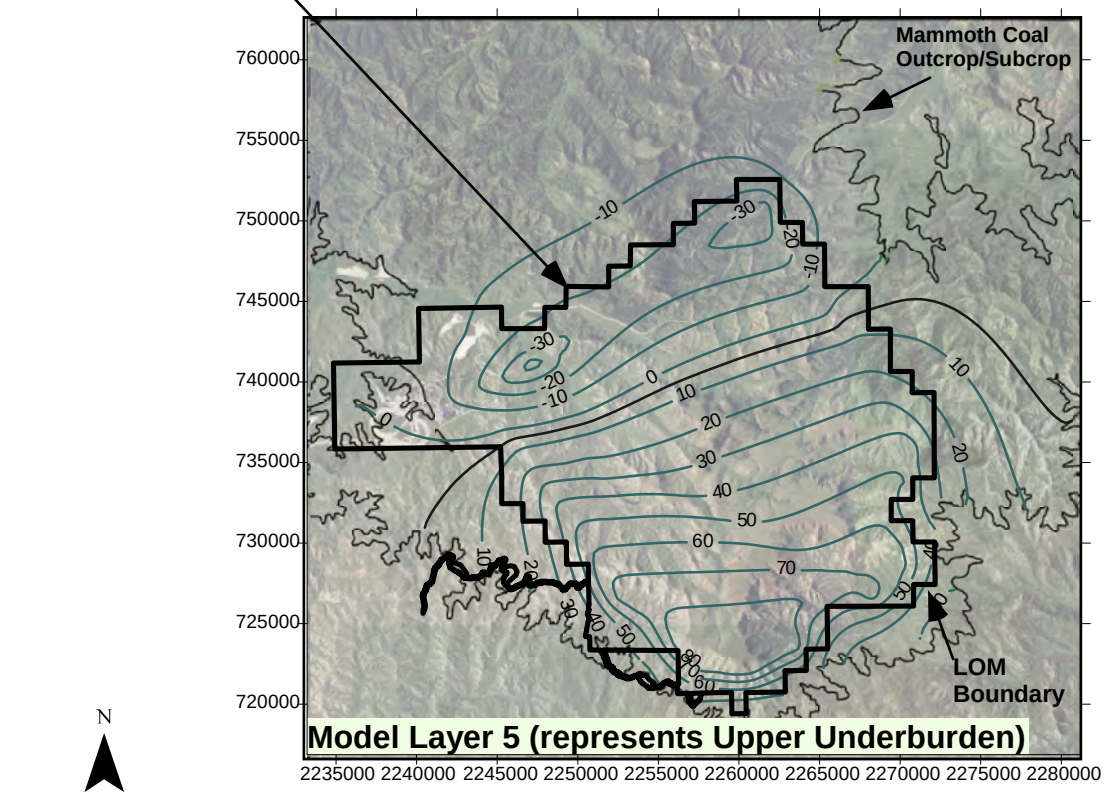
N

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

Date: 08/30/12 d:\SP-PHC\Fig_13M.cvx For Signal Peak Energy	NICKLIN EARTH & WATER, INC.	**Simulated Drawdown, Layers 4 and 5 Scenario 1 - 50 Years after End of Mining Bull Mountain Mine No. 1 Model**	**Figure 13M Page 1**

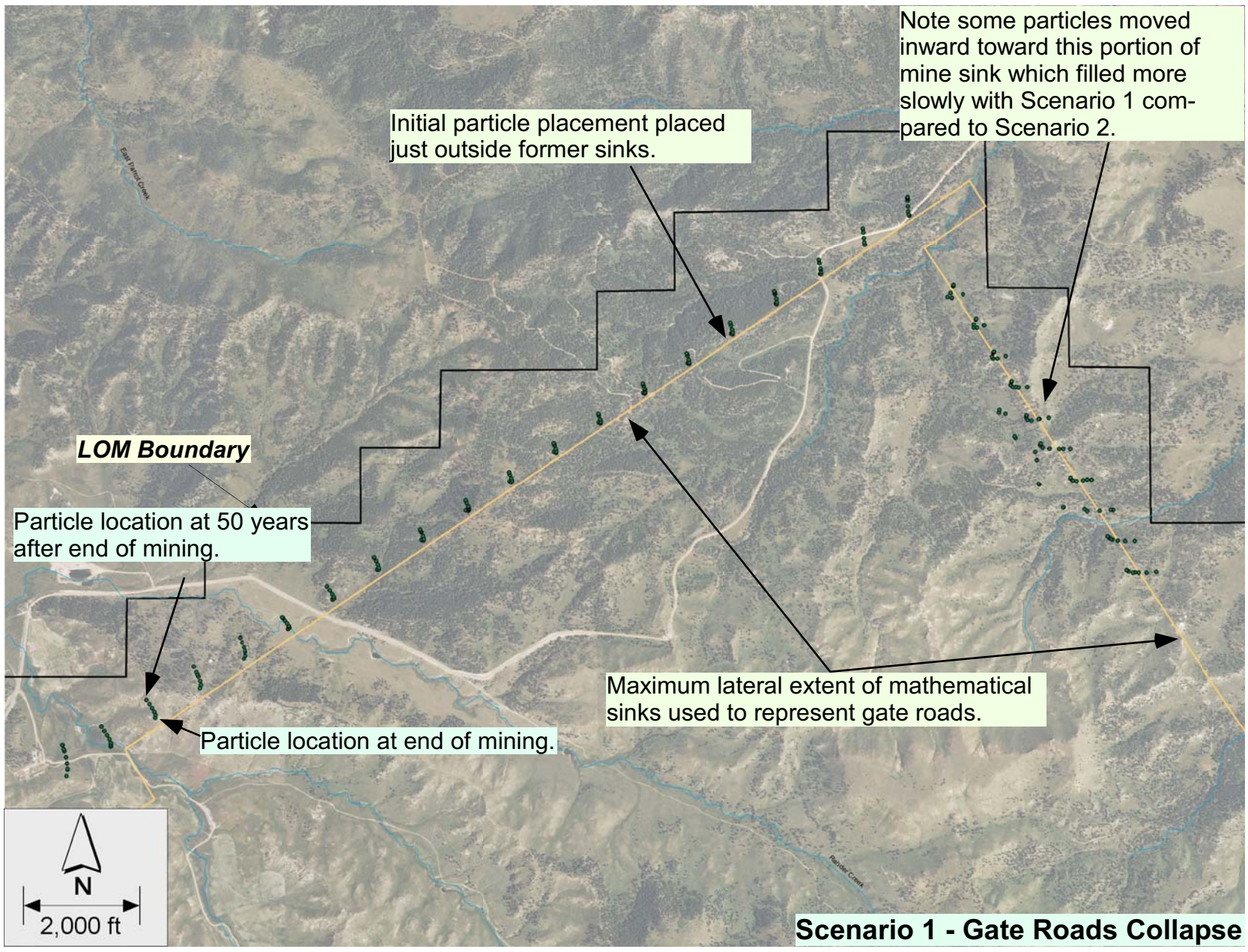
This scenario assumes gate roads remain intact following mining.

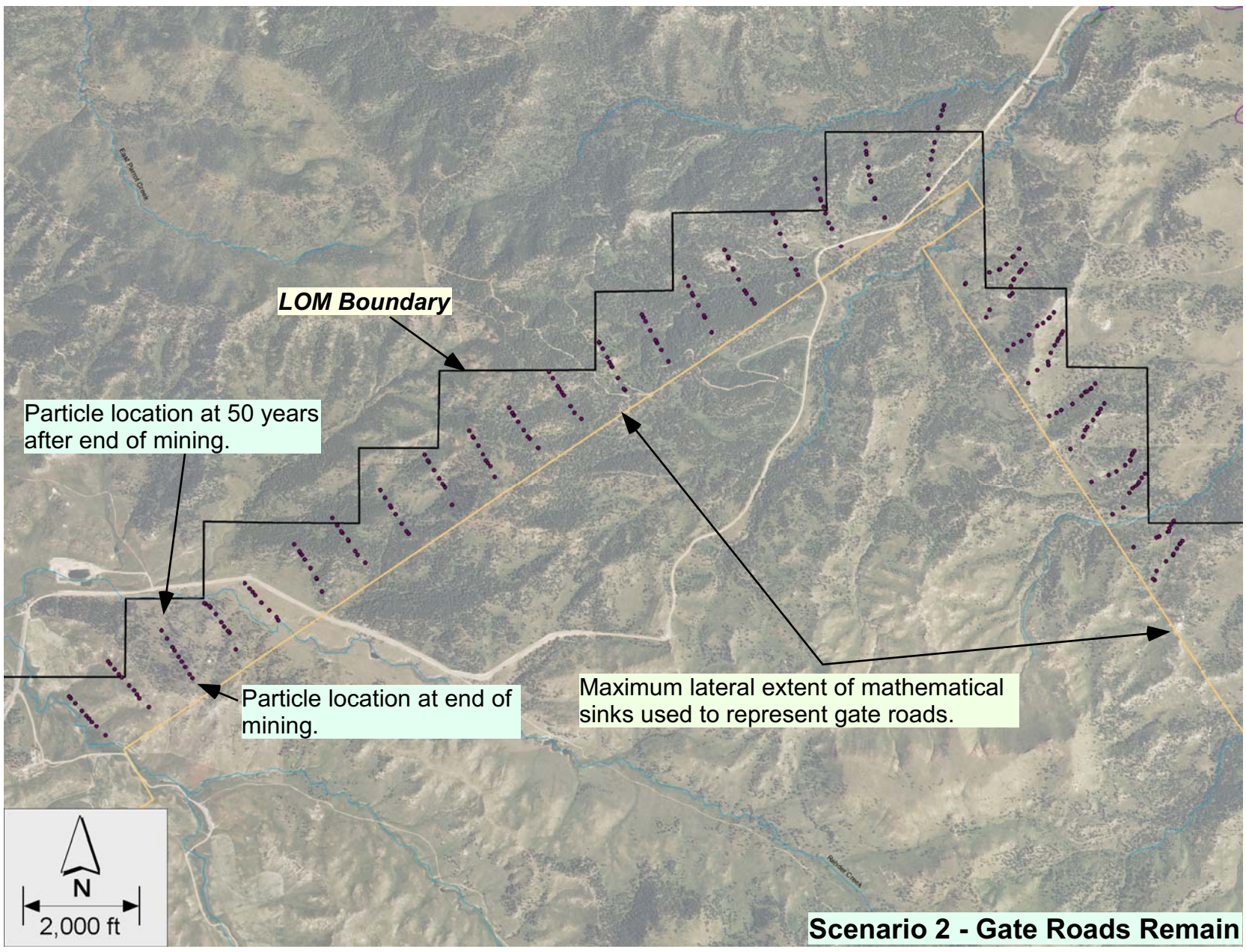




Units indicated are in Montana NAD 83, State-Plane, Feet. Drawdown in Feet.

Date: 08/30/12 d:\SP-PHC\Fig_13M.cvx For Signal Peak Energy	NICKLIN EARTH & WATER, INC.	**Simulated Drawdown, Layers 4 and 5 Scenario 2 - 50 Years after End of Mining Bull Mountain Mine No. 1 Model**	**Figure 13M Page 2**





Note that in the case of Scenario 2, initial particle placement was moved further away from the sink boundary to avoid mathematical singularities (associated with mine pool) for particle tracking simulations.

Date: 03/13/13 d:\SP-PHC\Fig_14M.cvx For Signal Peak	NICKLIN EARTH & WATER, INC.	**Particle Tracking Simulation Results Bull Mountain Mine No. 1 Model**	**Figure 14M**

ATTACHMENT 1M

Steady-State Model Sensitivity Analysis

Hydraulic Conductivity (K) - Sensitivity Analysis Results

Groundwater Vistas Sensitivity Analysis - Hydraulic Conductivity

Zone 1

Run	Multiplier	Sum of Squares	Residual Mean	Residual Std.
1	0.5	3.10E+03	7.972887	10.130133
2	0.75	3.11E+03	7.977746	10.153746
3	0.9	3.12E+03	7.982165	10.167982
4	1	3.13E+03	7.984289	10.177277
5	1	3.13E+03	7.984289	10.177277
6	1.5	3.15E+03	8.003983	10.221709
7	2	3.18E+03	7.99355	10.261288

Zone 10

Run	Multiplier	Sum of Squares	Residual Mean	Residual Std.
1	0.5	3.13E+03	7.984866	10.177483
2	0.75	3.13E+03	7.98463	10.17744
3	0.9	3.13E+03	7.984639	10.177462
4	1	3.13E+03	7.984289	10.177277
5	1	3.13E+03	7.984289	10.177277
6	1.5	3.13E+03	7.982987	10.177055
7	2	3.13E+03	7.982987	10.177038

Zone 2

Run	Multiplier	Sum of Squares	Residual Mean	Residual Std.
1	0.5	3.04E+03	8.041743	10.043648
2	0.75	3.08E+03	8.016654	10.116562
3	0.9	3.11E+03	8.000906	10.155194
4	1	3.13E+03	7.984289	10.177277
5	1	3.13E+03	7.984289	10.177277
6	1.5	3.20E+03	7.908719	10.272
7	2	3.26E+03	7.82847	10.351783

Zone 3

Run	Multiplier	Sum of Squares	Residual Mean	Residual Std.
1	0.5	3.03E+03	7.97139	10.045666
2	0.75	3.07E+03	7.987381	10.107495
3	0.9	3.10E+03	7.979031	10.147297
4	1	3.13E+03	7.984289	10.177277
5	1	3.13E+03	7.984289	10.177277
6	1.5	3.26E+03	8.00015	10.343196
7	2	3.43E+03	8.041931	10.531138

Zone 31

Run	Multiplier	Sum of Squares	Residual Mean	Residual Std.
1	0.5	3.13E+03	8.000836	10.185126
2	0.75	3.13E+03	7.989497	10.180717
3	0.9	3.13E+03	7.984346	10.178224
4	1	3.13E+03	7.984289	10.177277
5	1	3.13E+03	7.984289	10.177277
6	1.5	3.13E+03	7.975915	10.173179
7	2	3.13E+03	7.976588	10.170659

Groundwater Vistas Sensitivity Analysis - Hydraulic Conductivity

Zone 4

Run	Multiplier	Sum of Squares	Residual Mean	Residual Std.
1	0.5	2.99E+03	8.087189	9.98371
2	0.75	3.05E+03	8.018366	10.078382
3	0.9	3.09E+03	8.003441	10.138653
4	1	3.13E+03	7.984289	10.177277
5	1	3.13E+03	7.984289	10.177277
6	1.5	3.32E+03	8.049822	10.37735
7	2	3.57E+03	8.288809	10.578954

Zone 40

Run	Multiplier	Sum of Squares	Residual Mean	Residual Std.
1	0.5	3.13E+03	7.988252	10.18464
2	0.75	3.13E+03	7.987259	10.180929
3	0.9	3.13E+03	7.985485	10.178677
4	1	3.13E+03	7.984289	10.177277
5	1	3.13E+03	7.984289	10.177277
6	1.5	3.12E+03	7.97847	10.170637
7	2	3.12E+03	7.971837	10.163828

Zone 41

Run	Multiplier	Sum of Squares	Residual Mean	Residual Std.
1	0.5	3.11E+03	7.950085	10.147847
2	0.75	3.12E+03	7.969038	10.16407
3	0.9	3.12E+03	7.980879	10.173113
4	1	3.13E+03	7.984289	10.177277
5	1	3.13E+03	7.984289	10.177277
6	1.5	3.14E+03	8.001582	10.196755
7	2	3.15E+03	8.012869	10.21033

Zone 43

Run	Multiplier	Sum of Squares	Residual Mean	Residual Std.
1	0.5	3.15E+03	8.037414	10.230615
2	0.75	3.14E+03	8.00688	10.201923
3	0.9	3.13E+03	7.996024	10.187763
4	1	3.13E+03	7.984289	10.177277
5	1	3.13E+03	7.984289	10.177277
6	1.5	3.10E+03	7.940498	10.134685
7	2	3.09E+03	7.901321	10.099469

Zone 5

Run	Multiplier	Sum of Squares	Residual Mean	Residual Std.
1	0.5	2.98E+03	8.003804	9.948253
2	0.75	3.03E+03	7.998986	10.055622
3	0.9	3.09E+03	7.984516	10.126164
4	1	3.13E+03	7.984289	10.177277
5	1	3.13E+03	7.984289	10.177277
6	1.5	3.39E+03	8.01311	10.459041
7	2	3.74E+03	8.473139	10.776624

Groundwater Vistas Sensitivity Analysis - Hydraulic Conductivity

Zone 51

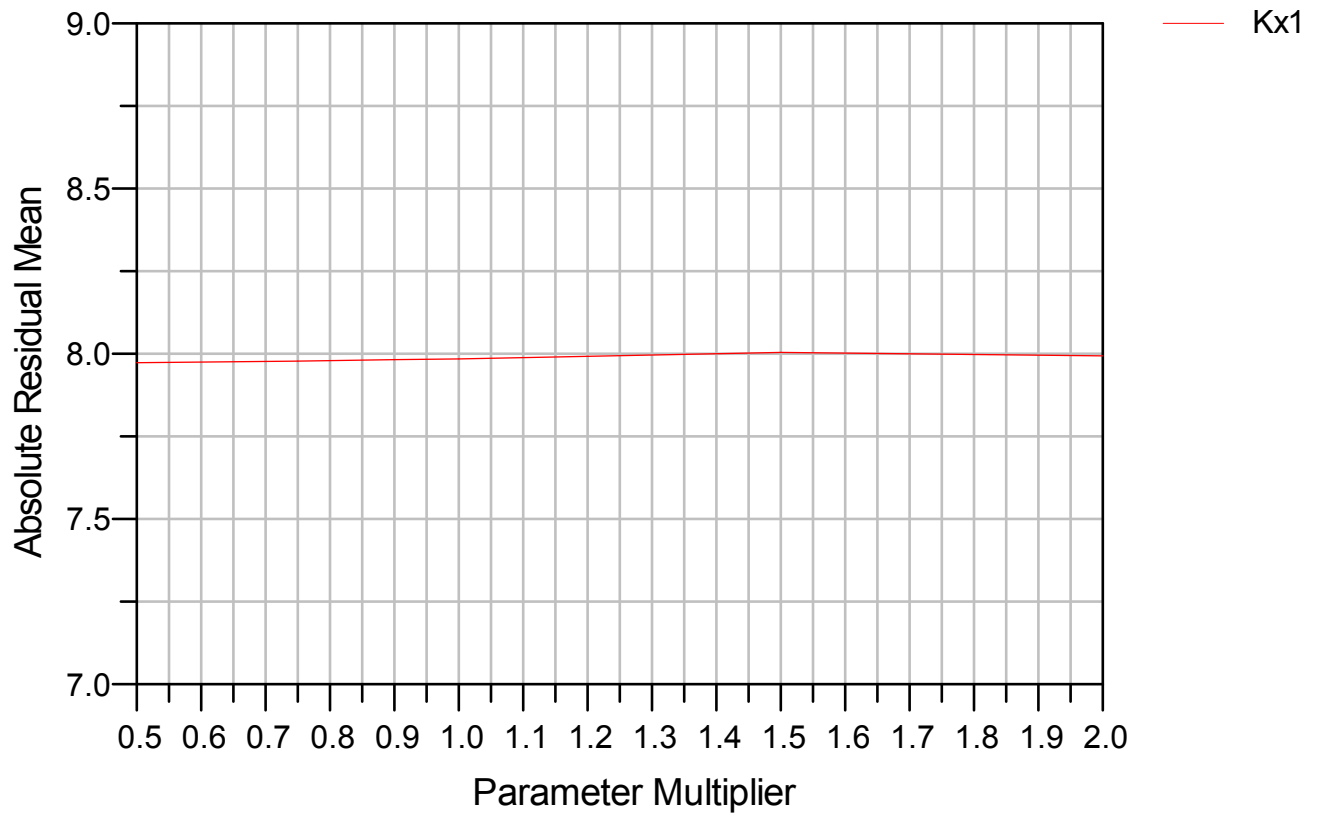
Run	Multiplier	Sum of Squares	Residual Mean	Residual Std.
1	0.5	3.19E+03	8.171295	10.306824
2	0.75	3.15E+03	8.066657	10.232779
3	0.9	3.14E+03	8.011074	10.198332
4	1	3.13E+03	7.984289	10.177277
5	1	3.13E+03	7.984289	10.177277
6	1.5	3.10E+03	7.98663	10.104045
7	2	3.11E+03	7.996786	10.06099

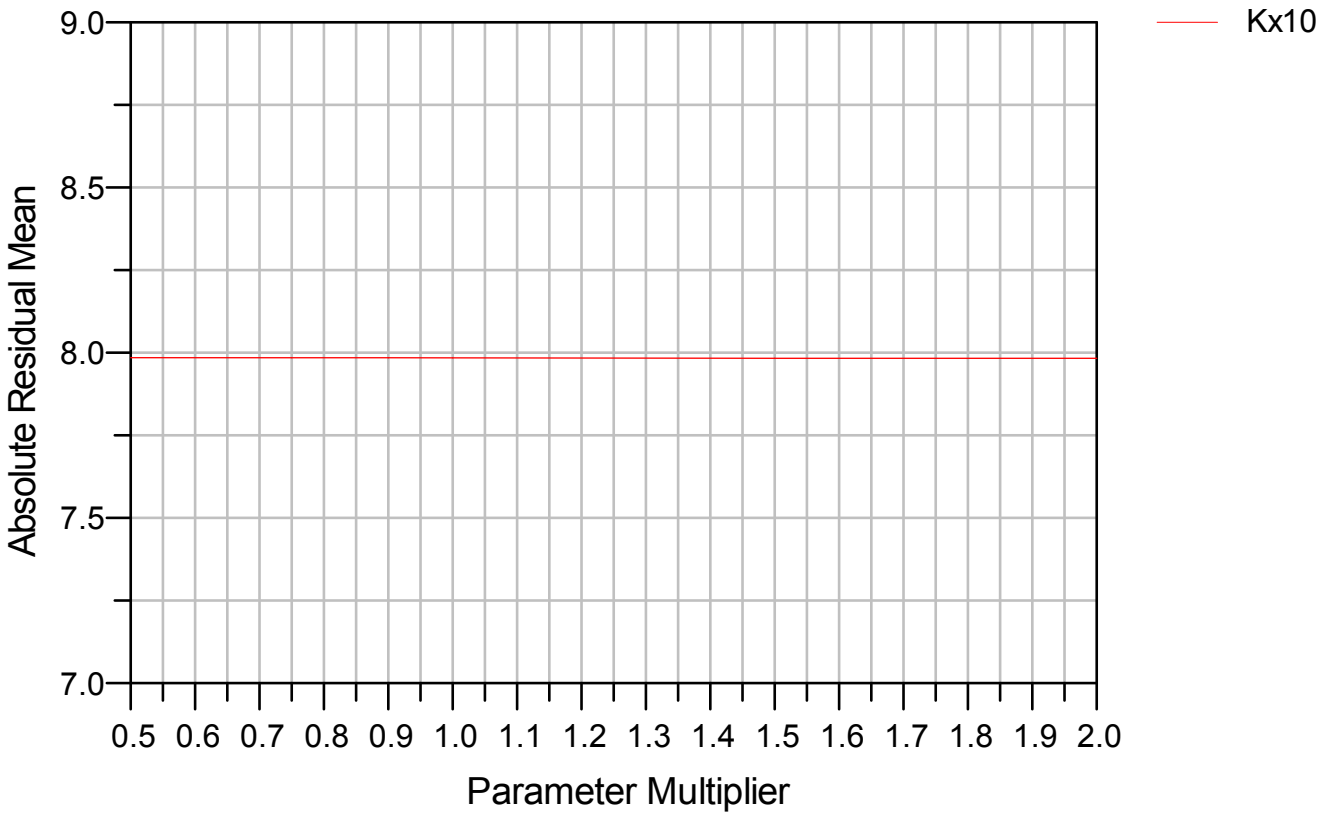
Zone 6

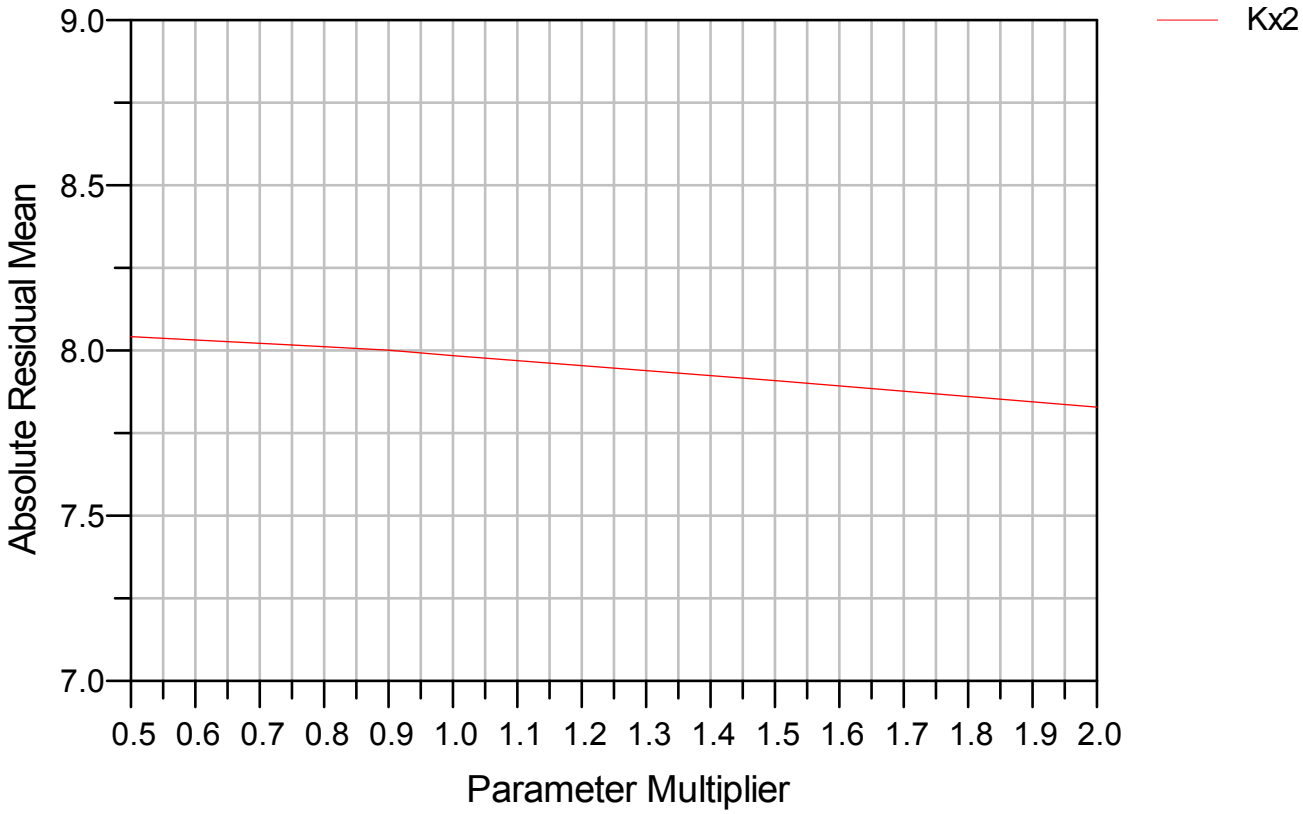
Run	Multiplier	Sum of Squares	Residual Mean	Residual Std.
1	0.5	5.39E+03	10.797901	10.110283
2	0.75	3.34E+03	8.461131	9.923364
3	0.9	3.05E+03	8.133836	10.047636
4	1	3.13E+03	7.984289	10.177277
5	1	3.13E+03	7.984289	10.177277
6	1.5	5.73E+03	10.920298	11.147927
7	2	1.08E+04	15.791375	12.177878

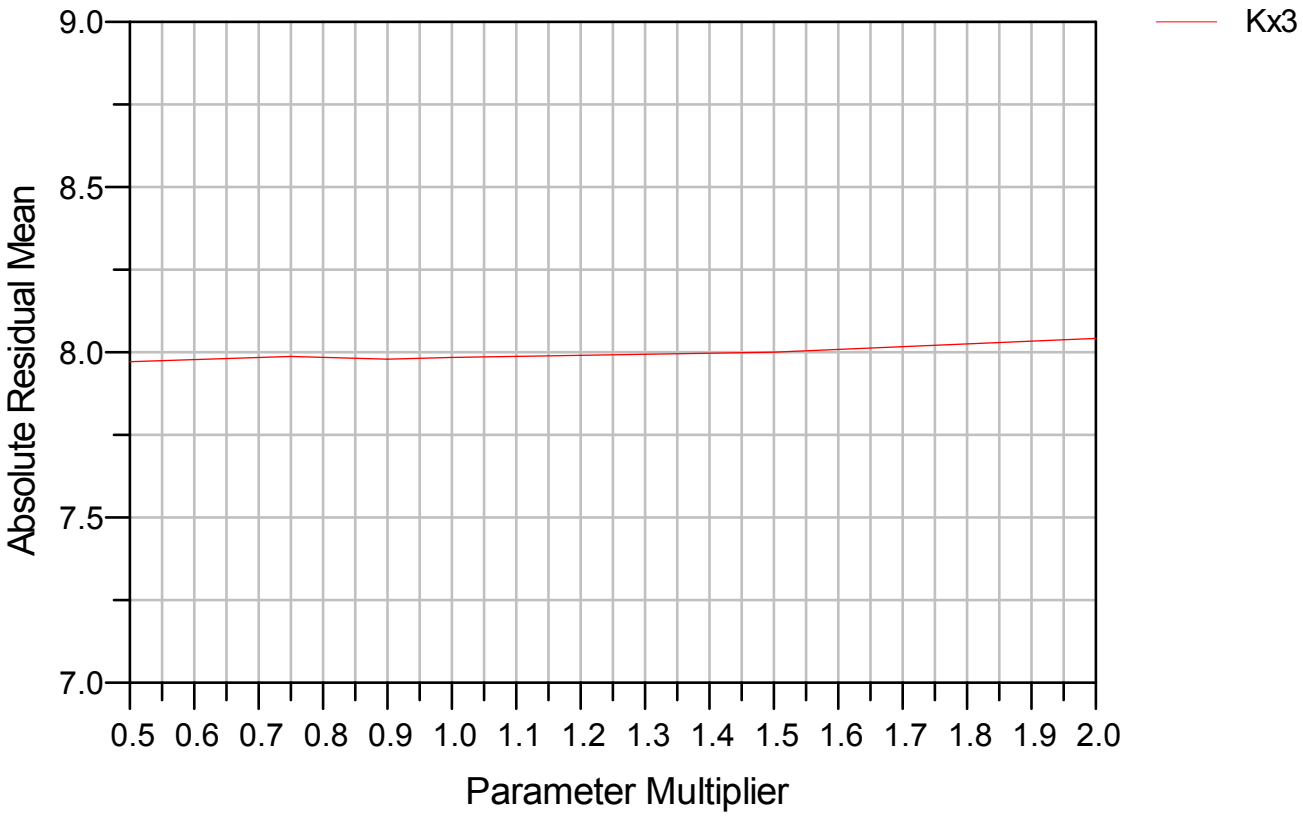
Zone 7

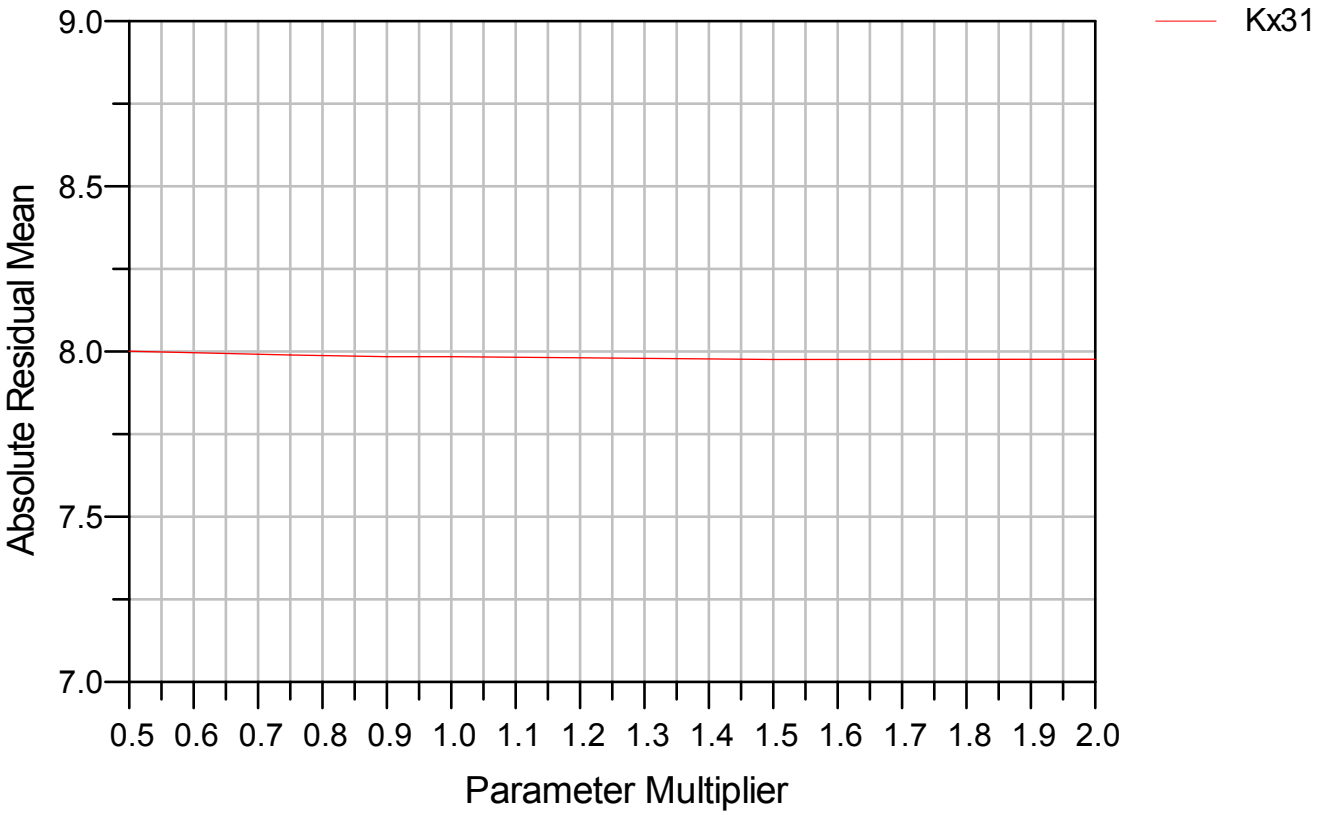
Run	Multiplier	Sum of Squares	Residual Mean	Residual Std.
1	0.5	5.18E+04	38.954781	14.406404
2	0.75	9.41E+03	15.710602	9.665701
3	0.9	3.49E+03	8.81574	9.667713
4	1	3.13E+03	7.984289	10.177277
5	1	3.13E+03	7.984289	10.177277
6	1.5	1.82E+04	21.202571	13.207365
7	2	4.04E+04	33.506637	14.959537

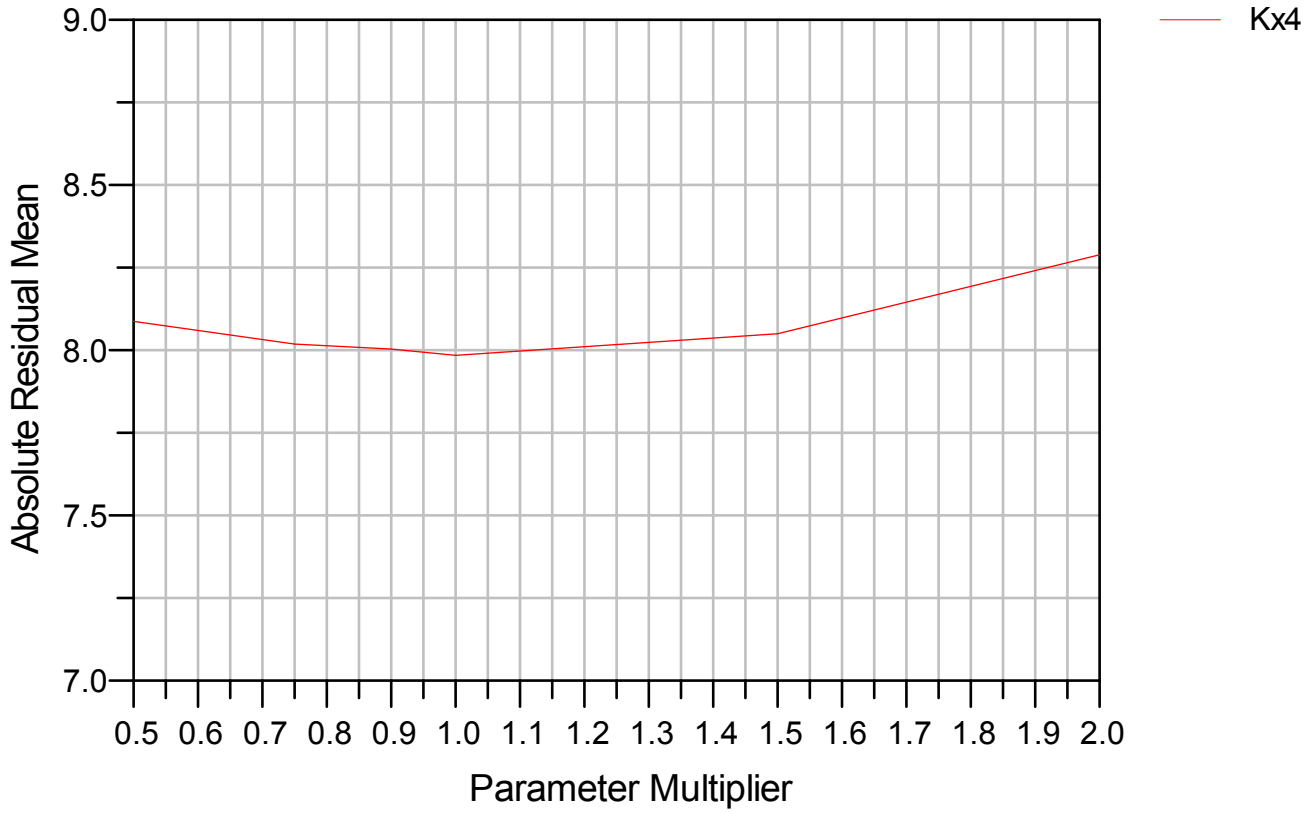

Kx1
9.0
8.5
8.0
7.5
7.0
Absolute Residual Mean
0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0
Parameter Multiplier

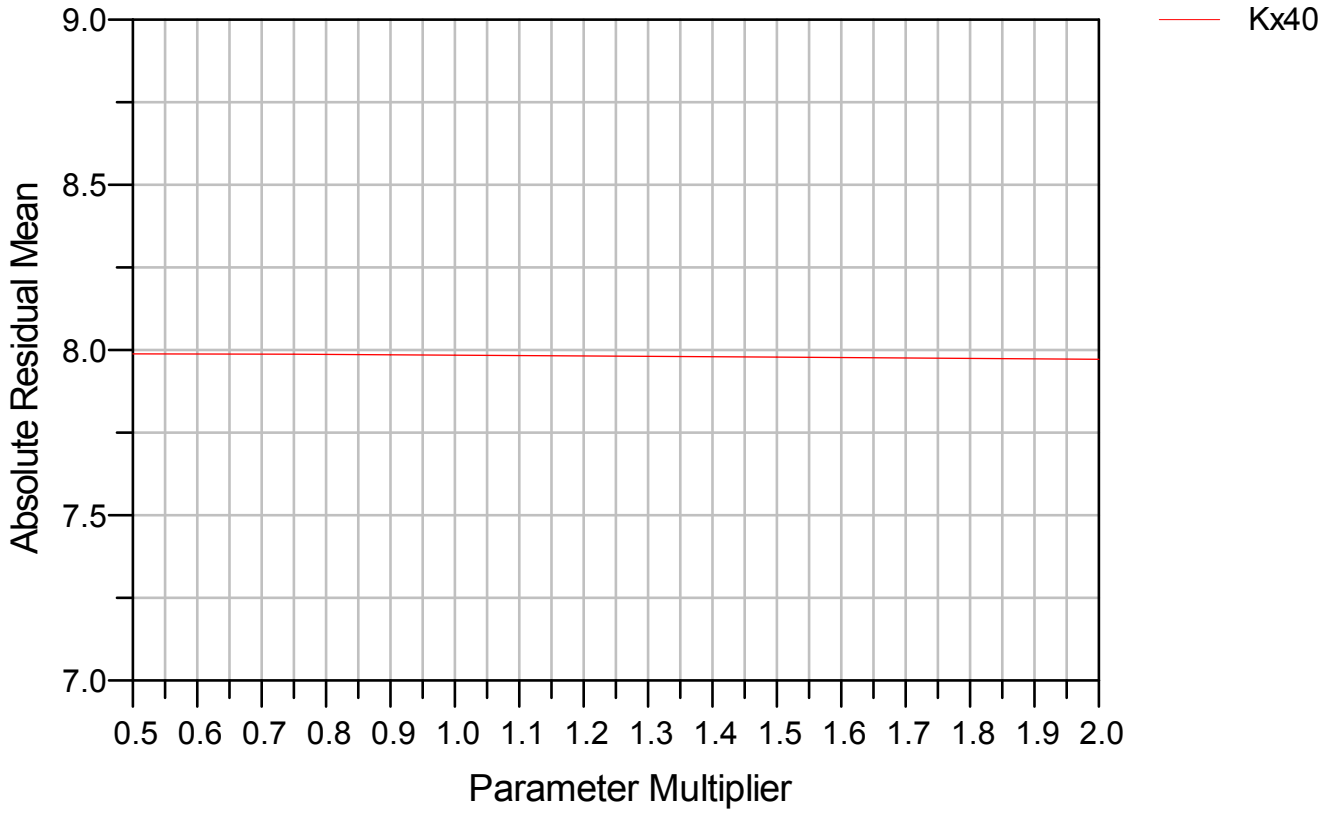

Kx10
9.0
8.5
8.0
7.5
7.0
Absolute Residual Mean
0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0
Parameter Multiplier

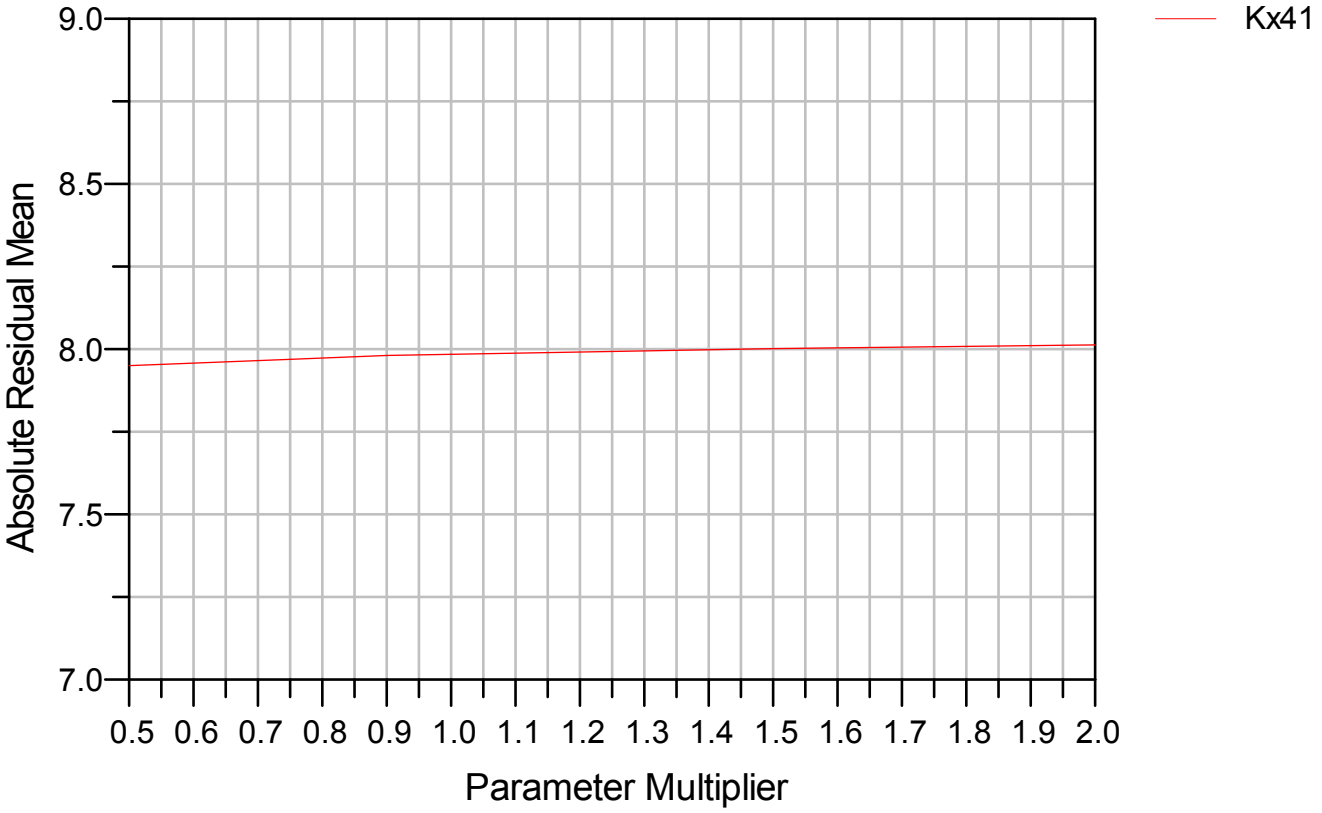

Kx2
9.0
8.5
8.0
7.5
7.0
Absolute Residual Mean
0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0
Parameter Multiplier

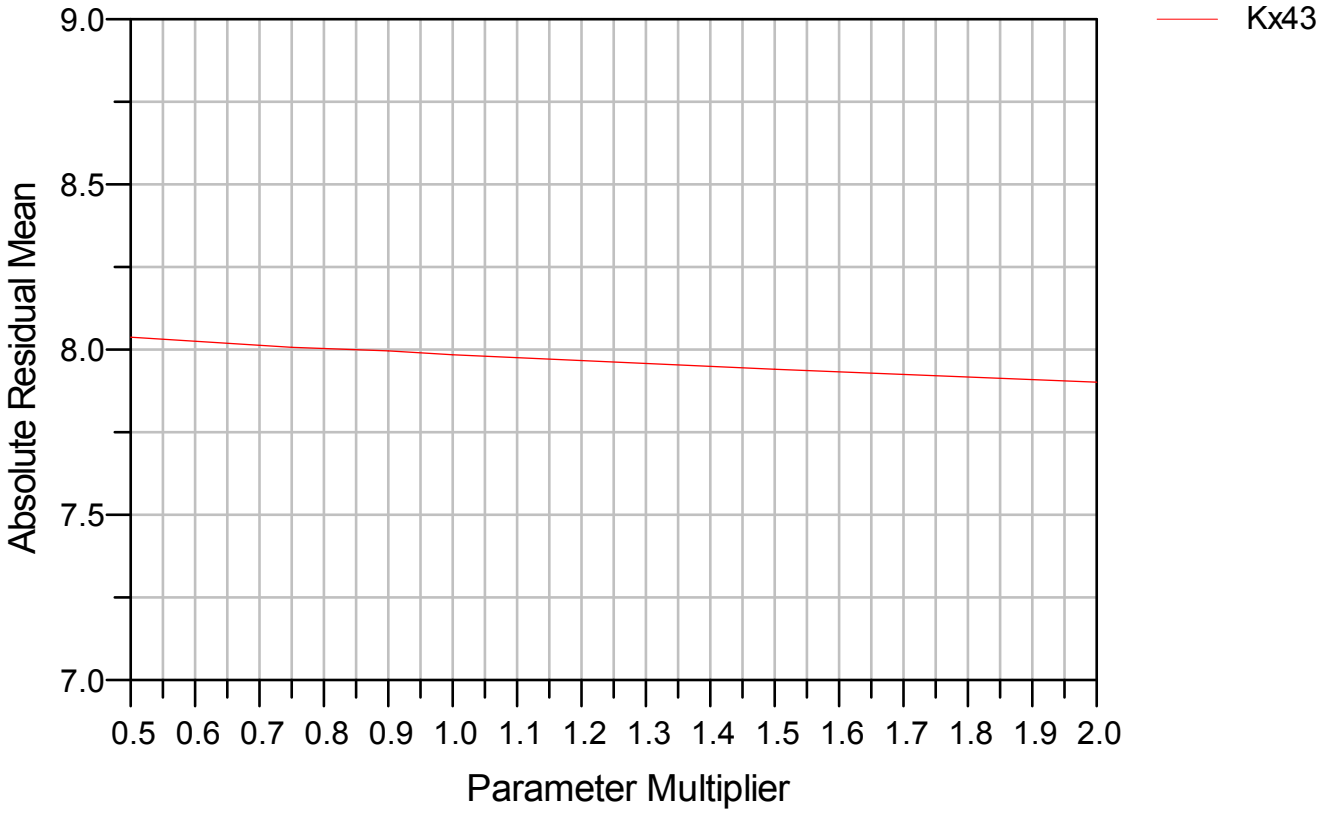

Kx3
9.0
8.5
8.0
7.5
7.0
Absolute Residual Mean
0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0
Parameter Multiplier

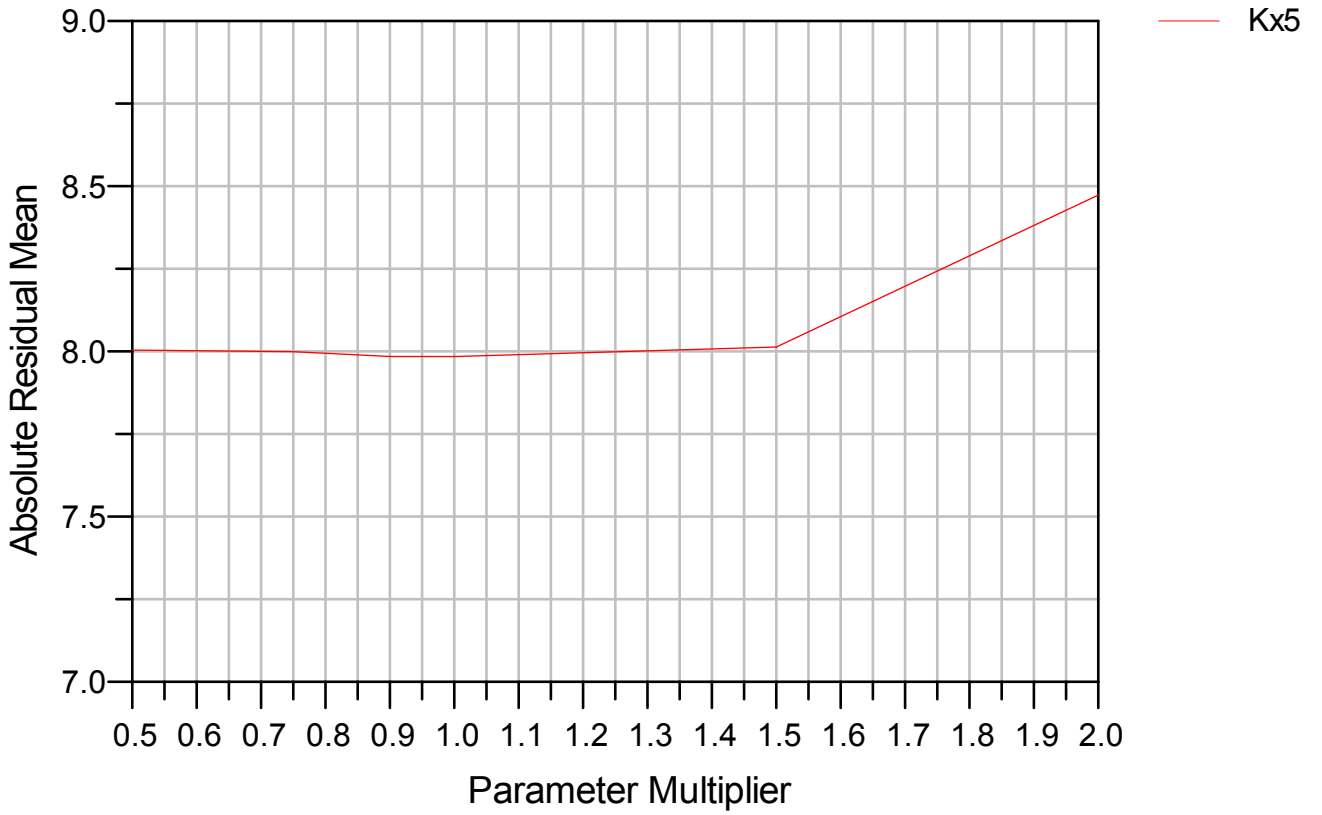

Kx31
9.0
8.5
8.0
7.5
7.0
Absolute Residual Mean
0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0
Parameter Multiplier

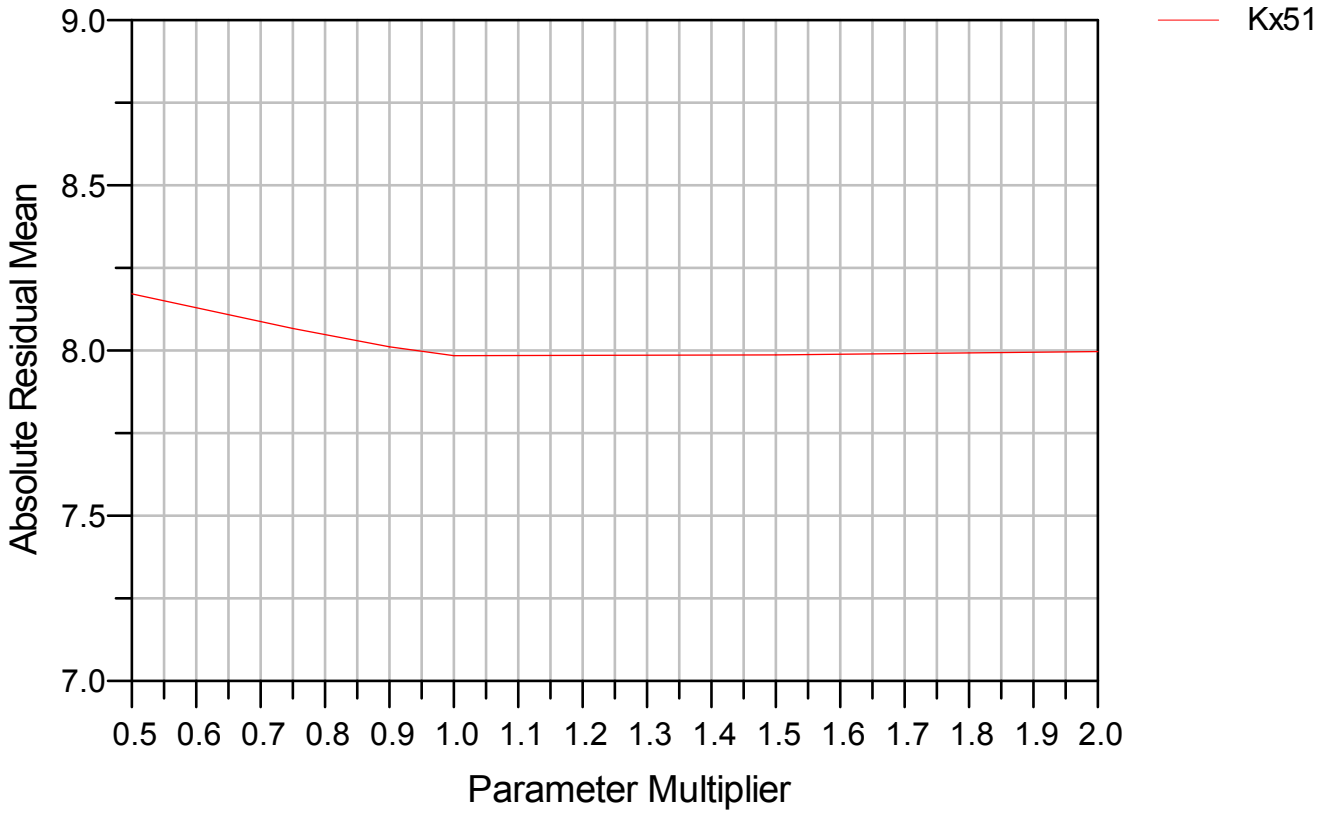

Kx4
9.0
8.5
8.0
7.5
7.0
Absolute Residual Mean
0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0
Parameter Multiplier

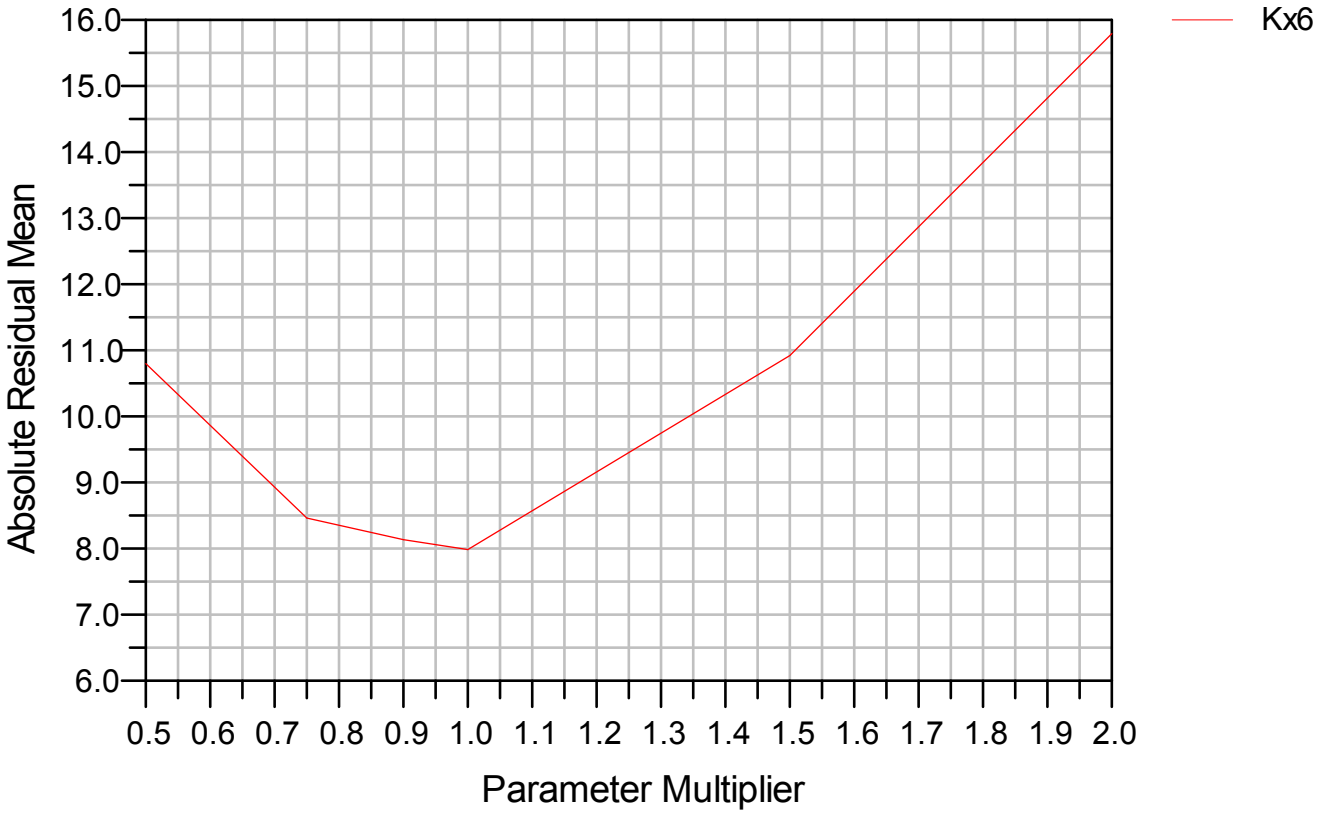

Kx40
9.0
8.5
8.0
7.5
7.0
Absolute Residual Mean
0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0
Parameter Multiplier

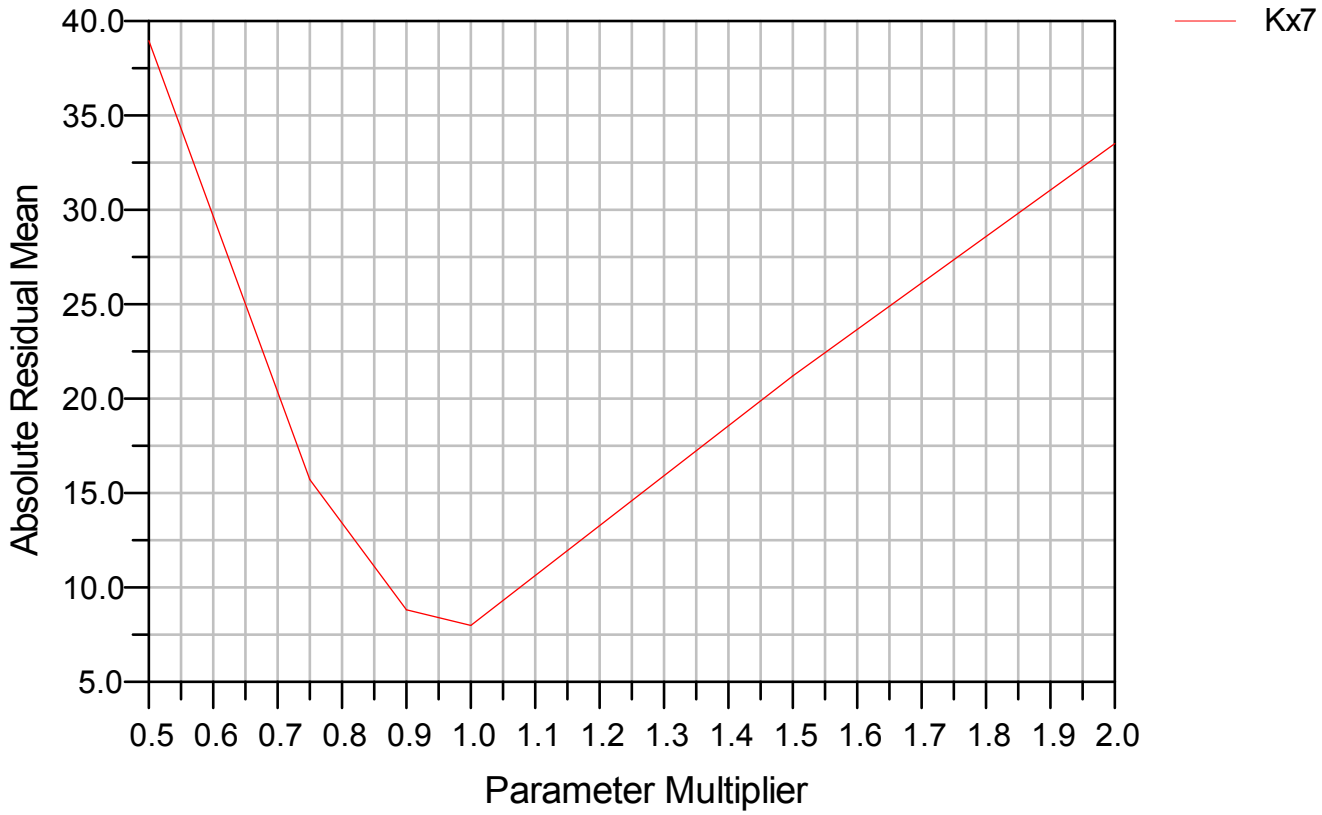

Kx41
9.0
8.5
8.0
7.5
7.0
Absolute Residual Mean
0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0
Parameter Multiplier


Kx43
9.0
8.5
8.0
7.5
7.0
Absolute Residual Mean
0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0
Parameter Multiplier


Kx5
9.0
8.5
8.0
7.5
7.0
Absolute Residual Mean
0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0
Parameter Multiplier


Kx51
Absolute Residual Mean
9.0
8.5
8.0
7.5
7.0
0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0
Parameter Multiplier


Kx6
Absolute Residual Mean
16.0
15.0
14.0
13.0
12.0
11.0
10.0
9.0
8.0
7.0
6.0
0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0
Parameter Multiplier


Kx7
Absolute Residual Mean
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0
Parameter Multiplier

Recharge - Sensitivity Analysis Results

Groundwater Vistas Sensitivity Analysis - Recharge

Zone 1

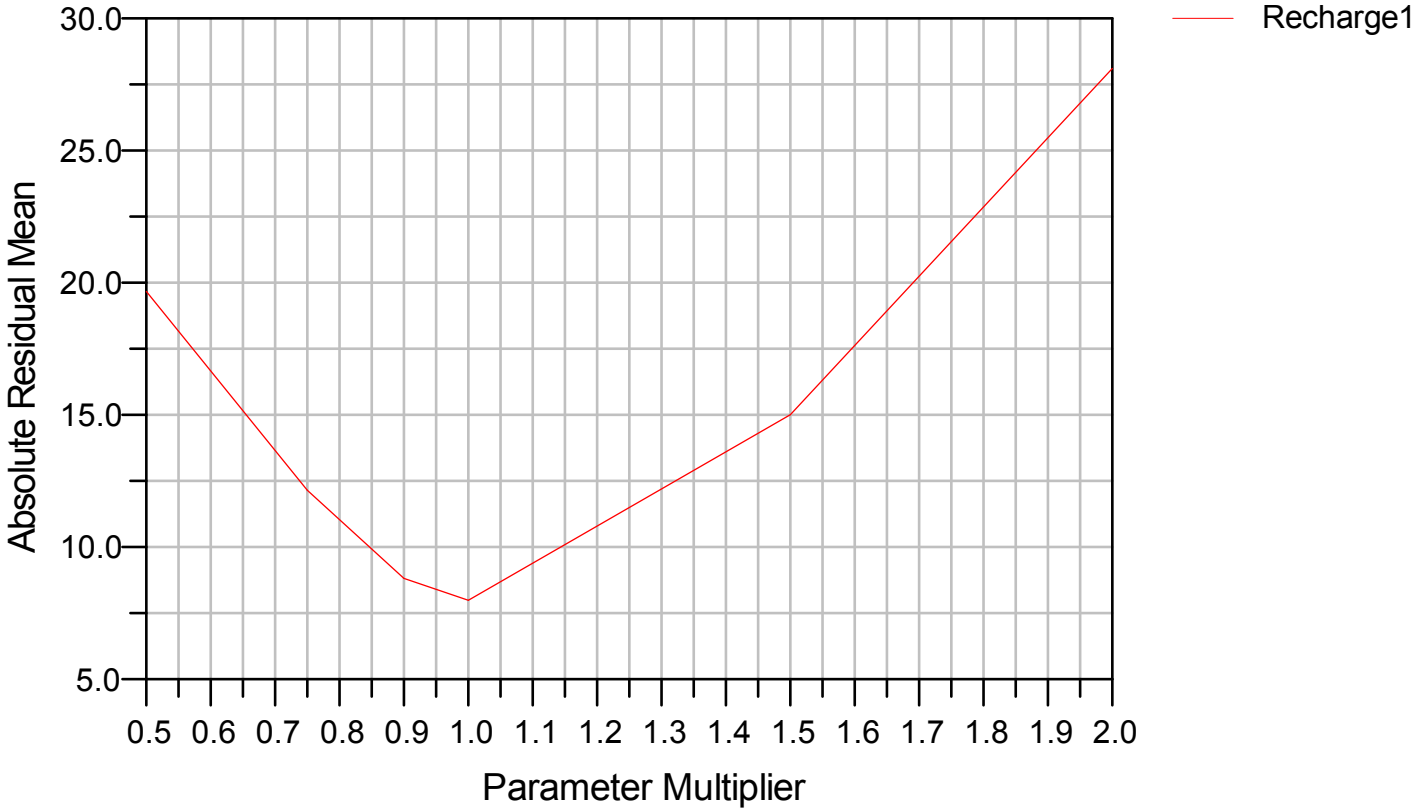
Run	Multiplier	Sum of Squares	Residual Mean	Residual Std.
1	0.5	1.61E+04	19.668302	13.333103
2	0.75	6.59E+03	12.145769	11.543083
3	0.9	3.91E+03	8.812346	10.672034
4	1	3.13E+03	7.984289	10.177277
5	1	3.13E+03	7.984289	10.177277
6	1.5	8.70E+03	15.004458	9.13778
7	2	2.67E+04	28.102958	10.071322

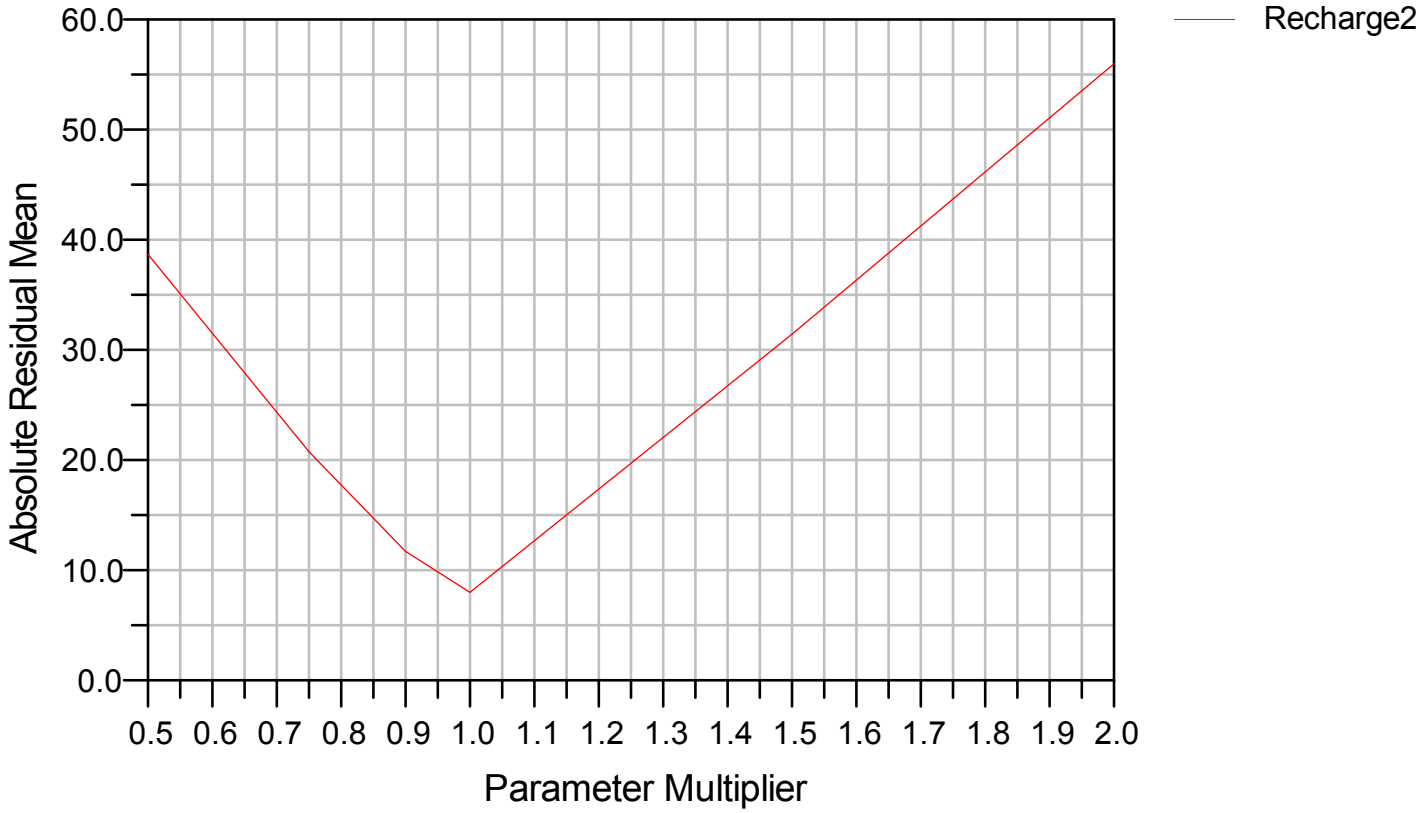
Zone 2

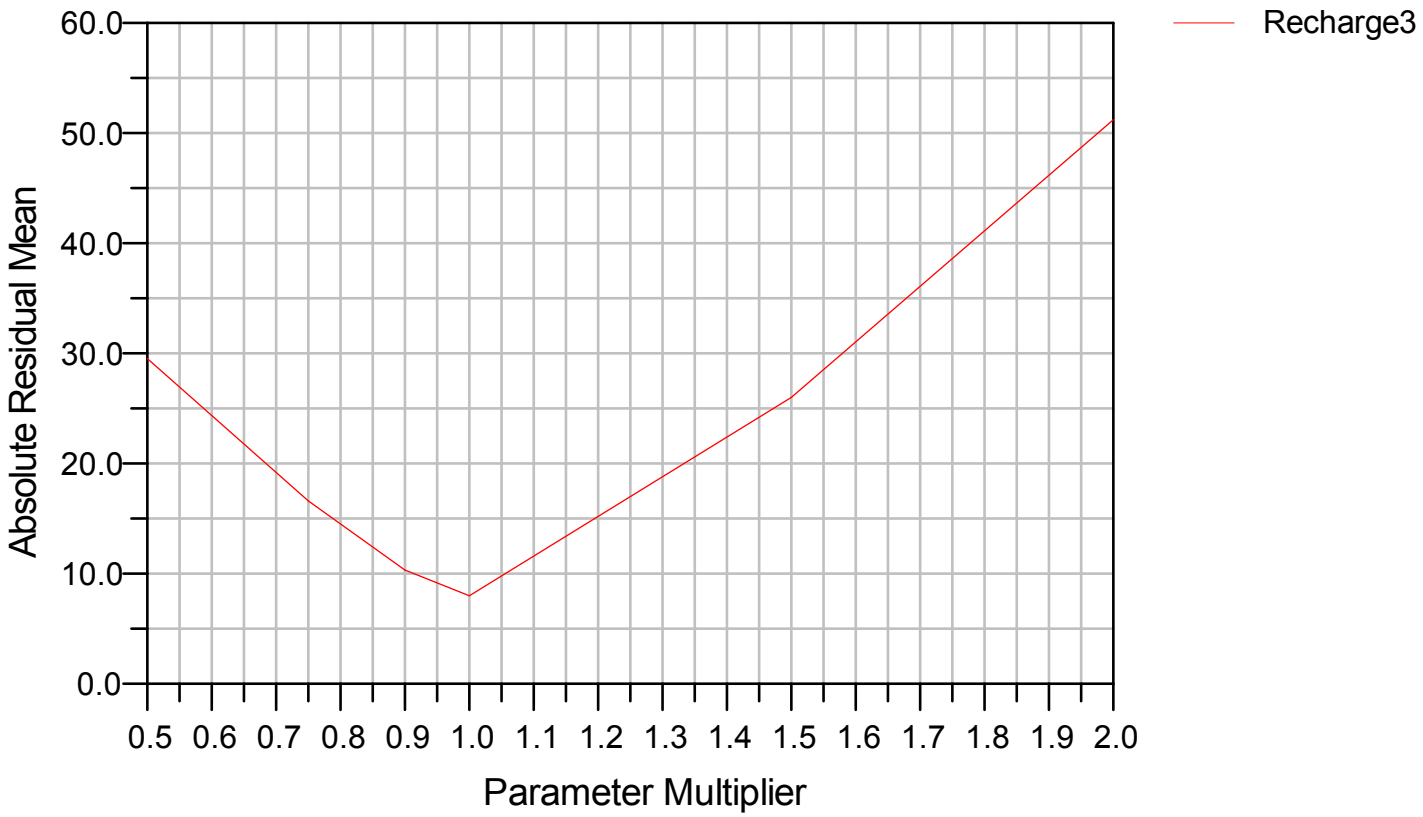
Run	Multiplier	Sum of Squares	Residual Mean	Residual Std.
1	0.5	6.32E+04	38.665452	25.419148
2	0.75	1.92E+04	20.748281	16.949131
3	0.9	6.48E+03	11.698805	12.431103
4	1	3.13E+03	7.984289	10.177277
5	1	3.13E+03	7.984289	10.177277
6	1.5	3.75E+04	31.423442	16.172907
7	2	1.20E+05	55.976624	29.414779

Zone 3

Run	Multiplier	Sum of Squares	Residual Mean	Residual Std.
1	0.5	4.13E+04	29.520571	23.27492
2	0.75	1.38E+04	16.597096	15.93385
3	0.9	5.48E+03	10.320601	12.034009
4	1	3.13E+03	7.984289	10.177277
5	1	3.13E+03	7.984289	10.177277
6	1.5	2.93E+04	25.9973	17.727924
7	2	1.14E+05	51.210331	34.34719


Recharge1
30.0
25.0
20.0
15.0
10.0
5.0
Absolute Residual Mean
0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0
Parameter Multiplier


Recharge2
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Absolute Residual Mean
0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0
Parameter Multiplier


Recharge3
Absolute Residual Mean
60.0
50.0
40.0
30.0
20.0
10.0
0.0
0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0
Parameter Multiplier

Leakance - Sensitivity Analysis Results

Groundwater Vistas Sensitivity Analysis - Leakance

Zone 1

Run	Multiplier	Sum of Squares	Residual Mean	Residual Std.
1	0.1	9.89E+03	14.762558	14.356827
2	0.2	3.71E+03	8.356196	10.921172
3	0.5	3.16E+03	8.038089	10.241272
4	1	3.13E+03	7.984289	10.177277
5	2	3.10E+03	7.971138	10.141191
6	5	3.08E+03	7.956807	10.09867
7	10	3.07E+03	7.95487	10.093315

Zone 2

Run	Multiplier	Sum of Squares	Residual Mean	Residual Std.
1	0.1	2.36E+05	52.744055	86.436813
2	0.2	1.03E+05	33.832408	56.006026
3	0.5	1.35E+04	13.97276	19.501889
4	1	3.13E+03	7.984289	10.177277
5	2	1.03E+04	13.103584	17.467526
6	5	1.92E+04	16.557107	23.422492
7	10	2.29E+04	17.710346	25.504795

Zone 21

Run	Multiplier	Sum of Squares	Residual Mean	Residual Std.
1	0.1	1.65E+04	12.082099	22.844968
2	0.2	6.57E+03	9.732824	14.525621
3	0.5	2.89E+03	7.764551	9.814794
4	1	3.13E+03	7.984289	10.177277
5	2	3.73E+03	8.360827	11.054516
6	5	4.28E+03	8.697757	11.803721
7	10	4.50E+03	8.818876	12.093208

Zone 3

Run	Multiplier	Sum of Squares	Residual Mean	Residual Std.
1	0.1	2.74E+05	58.364238	92.125105
2	0.2	7.97E+04	30.450081	48.405489
3	0.5	6.86E+03	10.851928	13.902043
4	1	3.13E+03	7.984289	10.177277
5	2	7.42E+03	11.505073	15.087559
6	5	1.22E+04	13.954495	18.85428
7	10	1.42E+04	14.801913	20.196529

Zone 4

Run	Multiplier	Sum of Squares	Residual Mean	Residual Std.
1	0.1	1.16E+04	15.919335	14.367632
2	0.2	4.28E+03	9.698383	10.366917
3	0.5	2.98E+03	8.040062	9.915484
4	1	3.13E+03	7.984289	10.177277
5	2	3.34E+03	8.106269	10.373868
6	5	3.54E+03	8.372857	10.518292
7	10	3.64E+03	8.495457	10.577806

Groundwater Vistas Sensitivity Analysis - Leakance

Zone 45

Run	Multiplier	Sum of Squares	Residual Mean	Residual Std.
1	0.1	3.13E+03	7.984386	10.177372
2	0.2	3.13E+03	7.984272	10.177281
3	0.5	3.13E+03	7.984313	10.177209
4	1	3.13E+03	7.984289	10.177277
5	2	3.13E+03	7.983898	10.17751
6	5	3.13E+03	7.984305	10.177209
7	10	3.13E+03	7.984297	10.177307

Zone 5

Run	Multiplier	Sum of Squares	Residual Mean	Residual Std.
1	0.1	1.21E+04	16.356478	14.059592
2	0.2	5.06E+03	10.173635	11.2054
3	0.5	3.21E+03	8.269993	10.263176
4	1	3.13E+03	7.984289	10.177277
5	2	3.22E+03	7.901581	10.19131
6	5	3.34E+03	7.895828	10.222441
7	10	3.40E+03	7.882937	10.235245

Zone 51

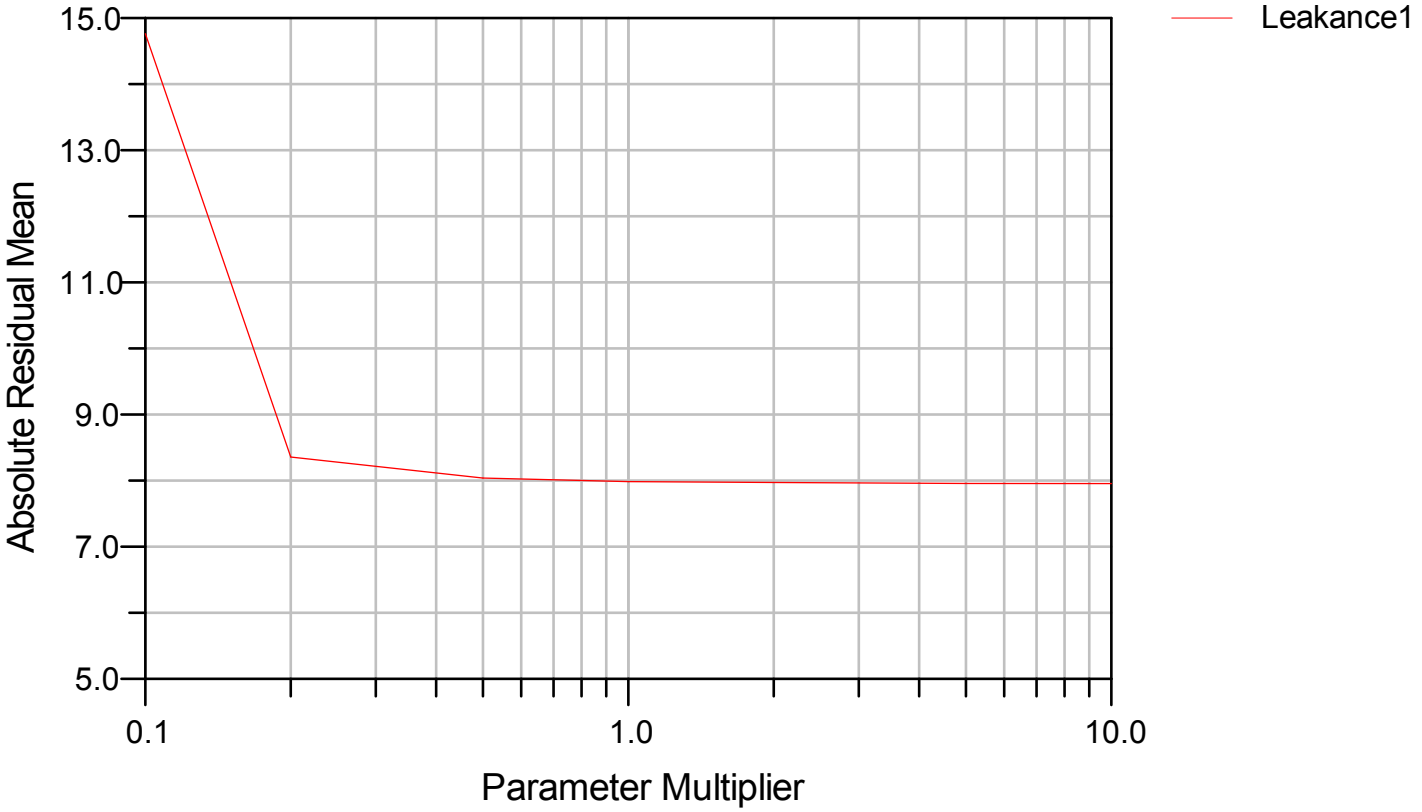
Run	Multiplier	Sum of Squares	Residual Mean	Residual Std.
1	0.1	3.16E+03	8.061836	10.251256
2	0.2	3.14E+03	8.030846	10.214967
3	0.5	3.13E+03	7.9984	10.187739
4	1	3.13E+03	7.984289	10.177277
5	2	3.12E+03	7.975239	10.171865
6	5	3.12E+03	7.968867	10.168181
7	10	3.12E+03	7.977445	10.16656

Zone 52

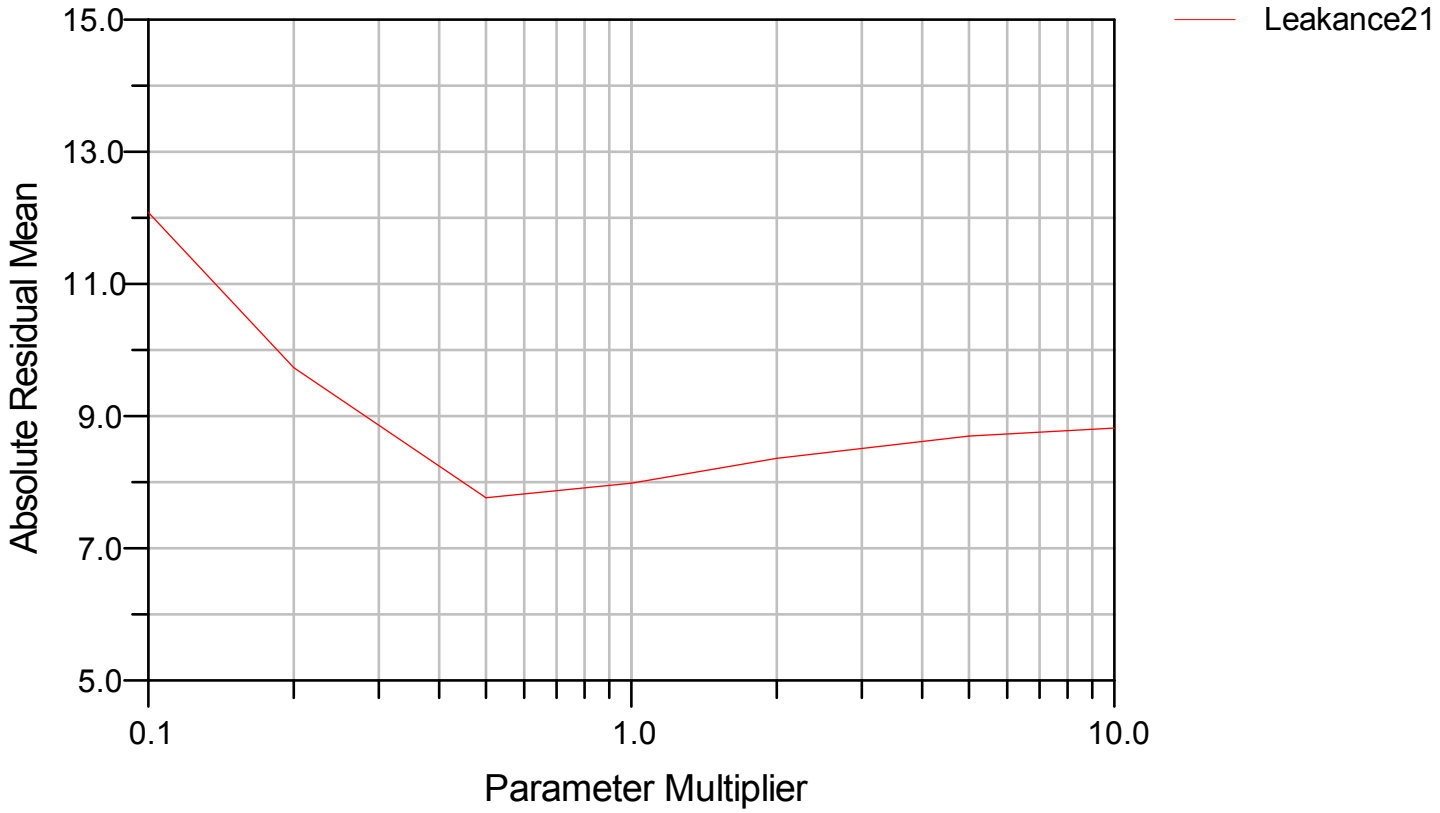
Run	Multiplier	Sum of Squares	Residual Mean	Residual Std.
1	0.1	5.32E+04	25.114356	35.615077
2	0.2	1.98E+04	17.434982	22.035178
3	0.5	4.00E+03	9.668999	10.935102
4	1	3.13E+03	7.984289	10.177277
5	2	4.52E+03	9.666831	11.824358
6	5	6.15E+03	11.08745	13.426203
7	10	6.85E+03	11.586913	14.049346

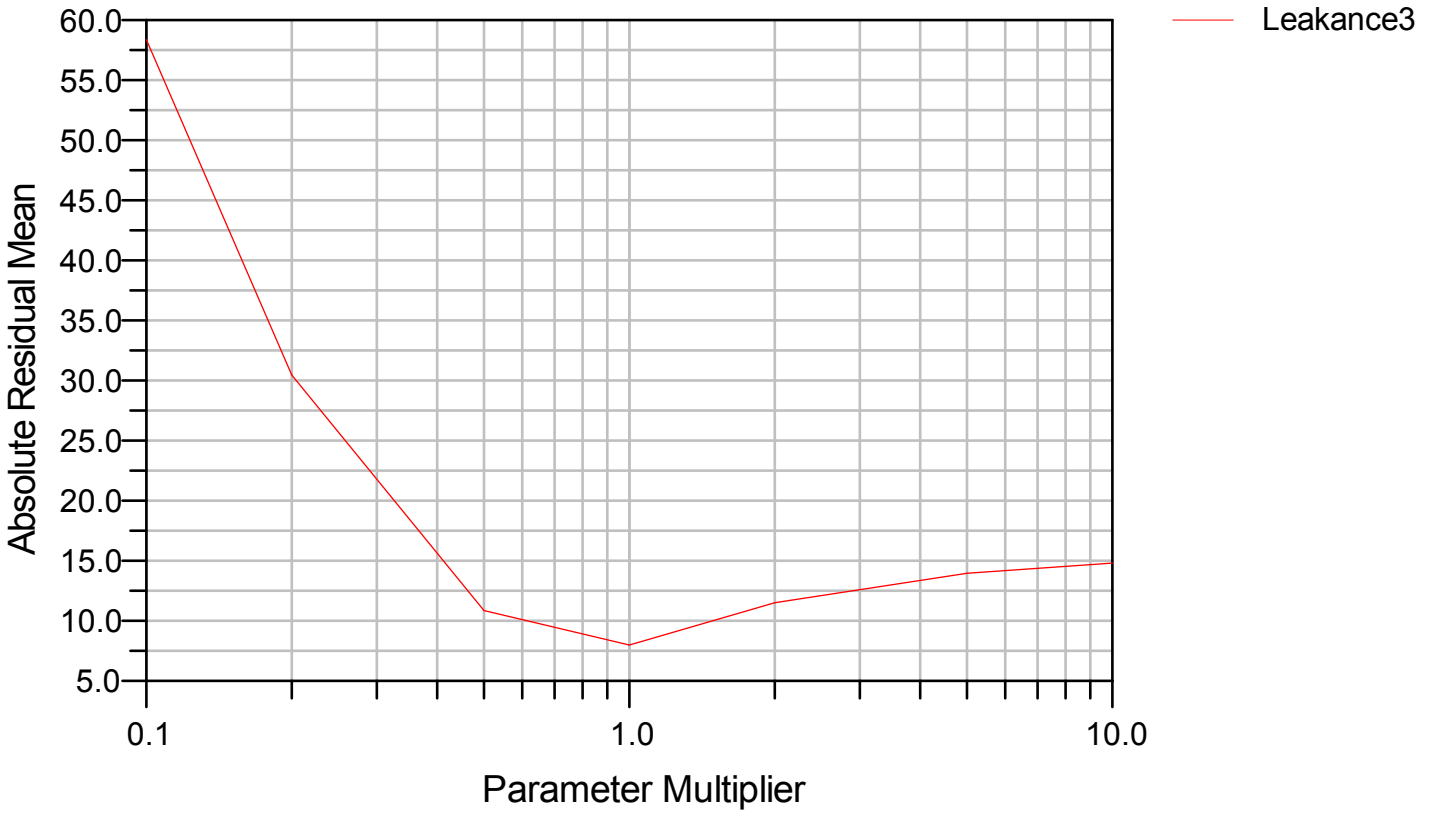
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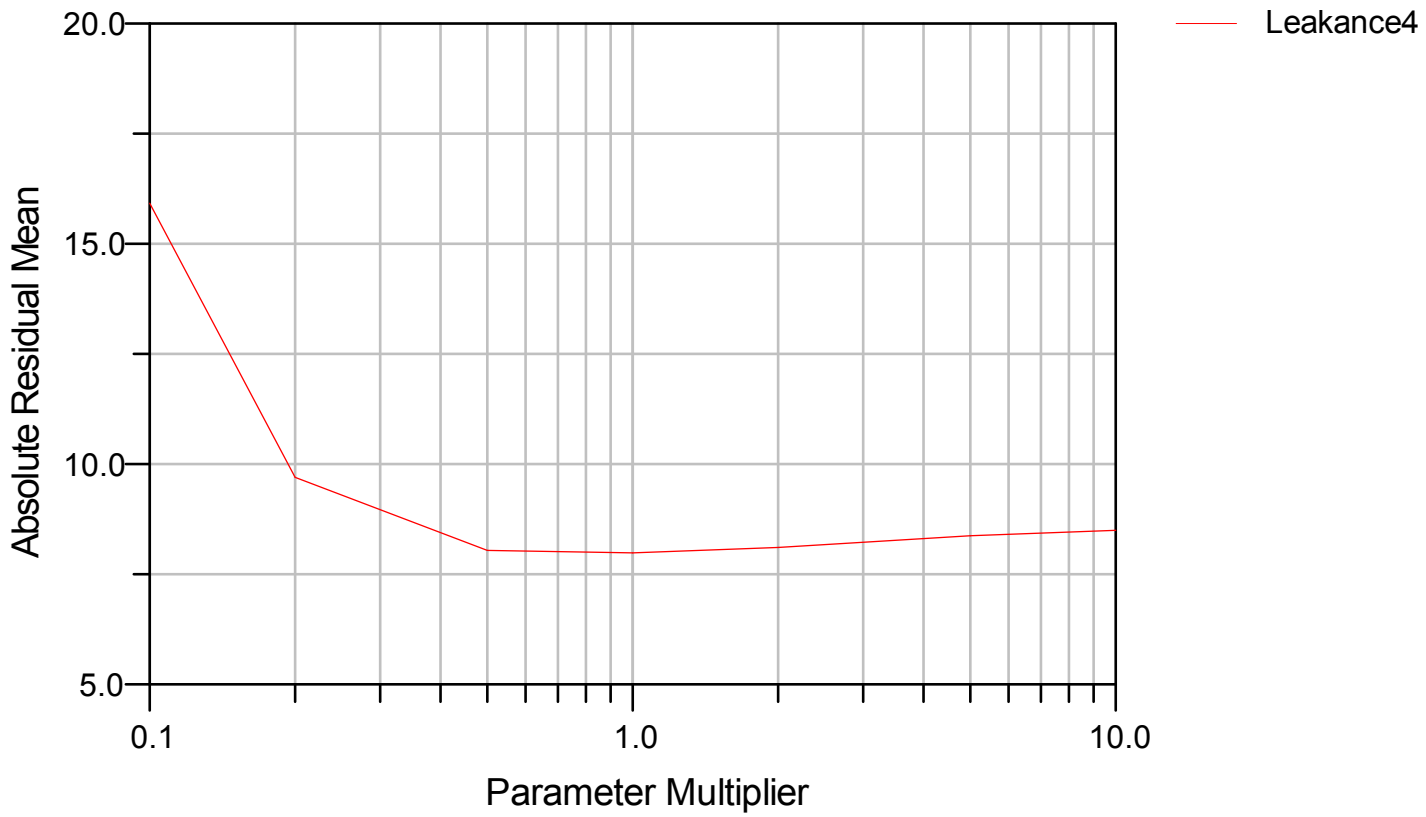
Run	Multiplier	Sum of Squares	Residual Mean	Residual Std.
1	0.1	1.27E+06	176.351575	106.170273
2	0.2	5.29E+05	116.513139	63.723864
3	0.5	6.60E+04	42.62227	19.58828
4	1	3.13E+03	7.984289	10.177277
5	2	3.80E+04	30.976698	17.832181
6	5	1.07E+05	55.387309	22.234575
7	10	1.48E+05	66.356384	23.066687

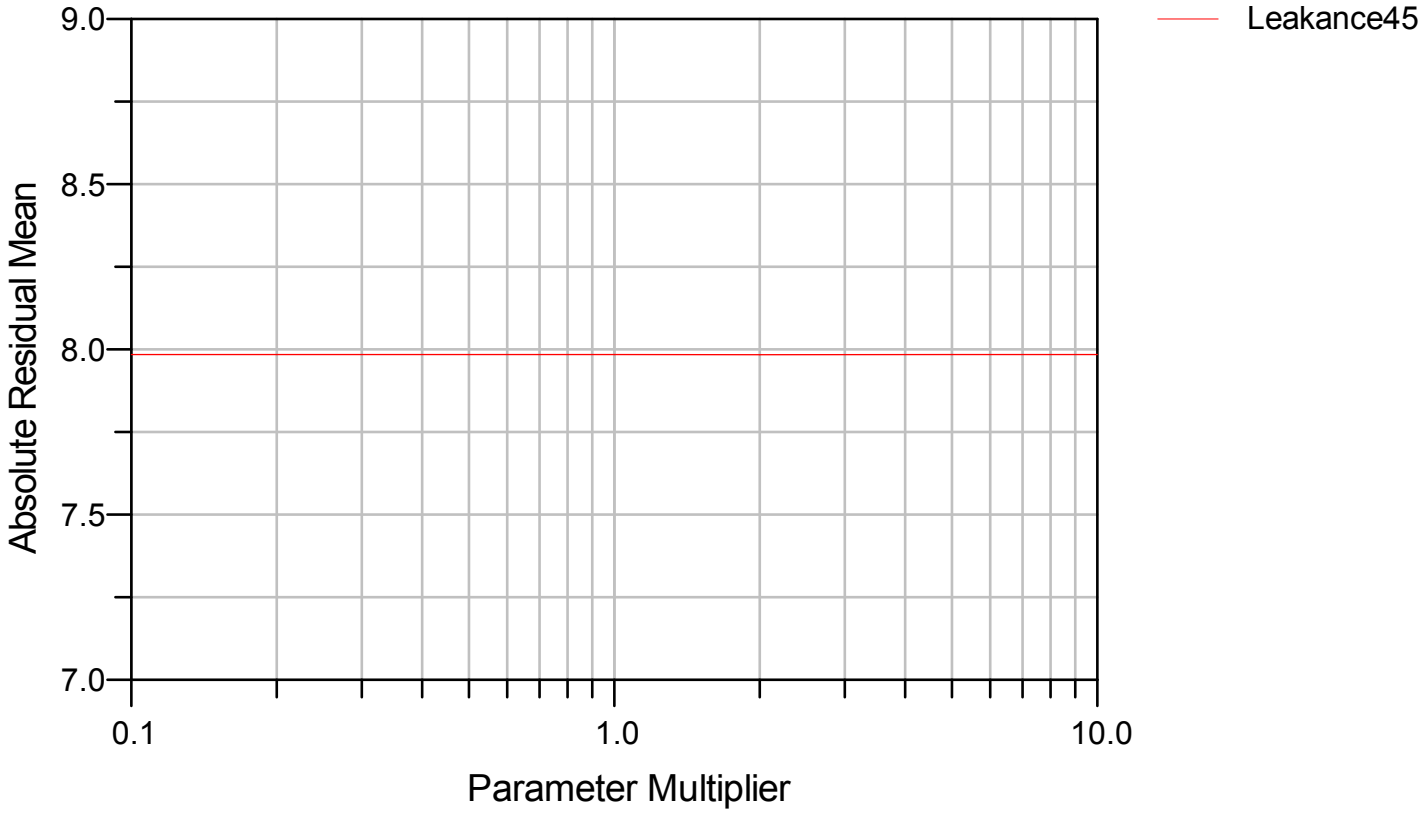

Leakance1
15.0
13.0
11.0
9.0
7.0
5.0
Absolute Residual Mean
0.1
1.0
10.0
Parameter Multiplier

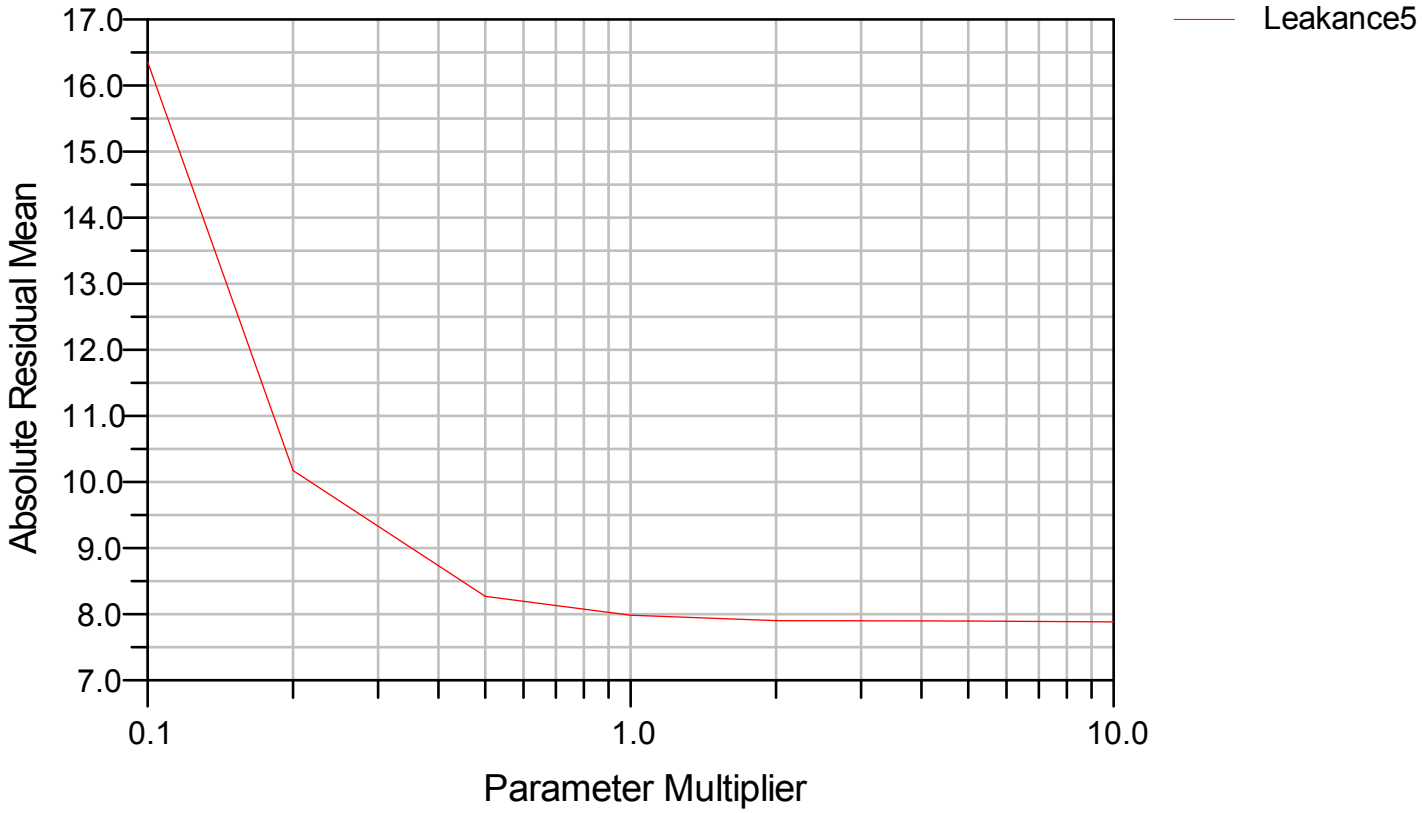

Leakance2
55.0
45.0
35.0
25.0
15.0
5.0
Absolute Residual Mean
0.1
1.0
10.0
Parameter Multiplier

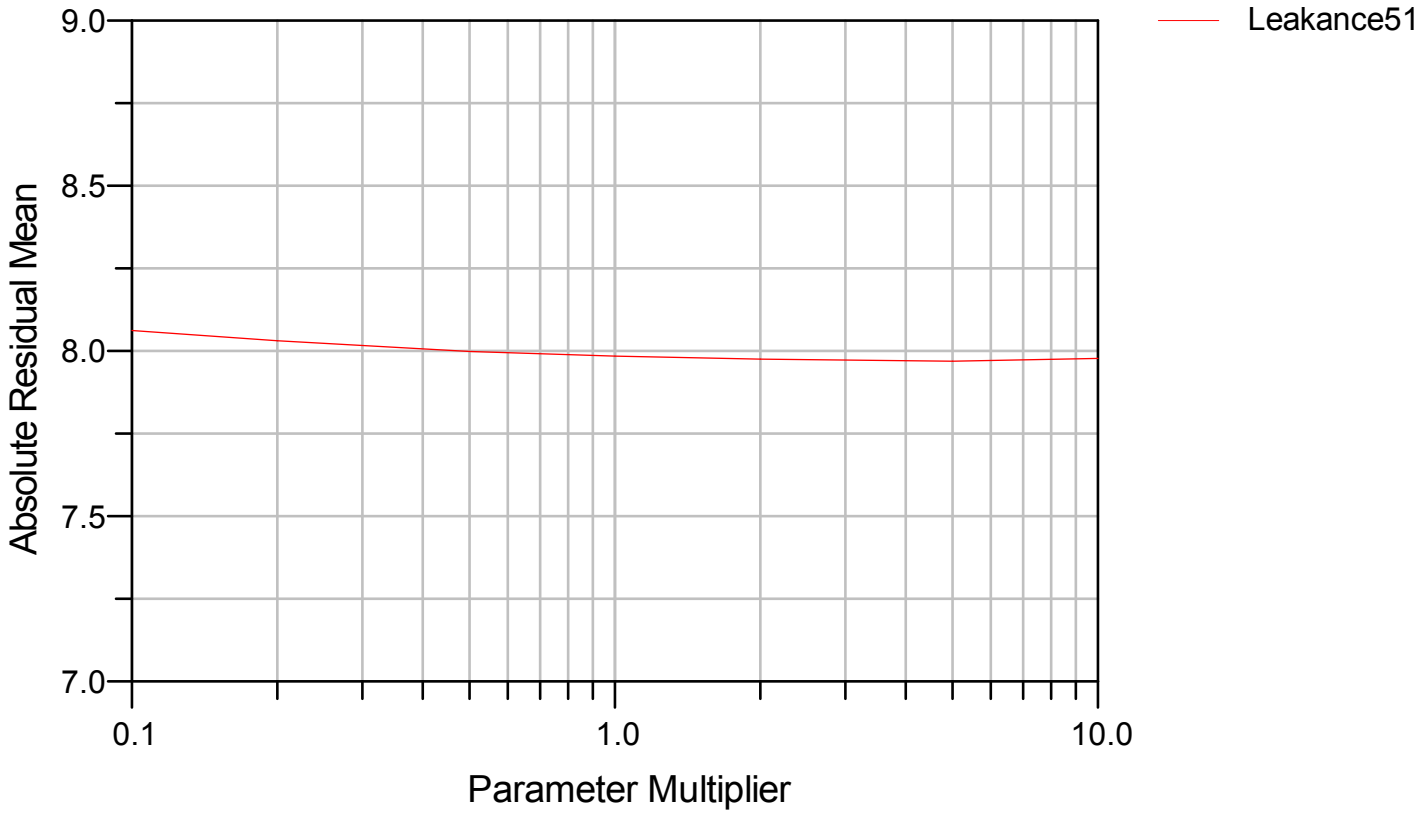

Leakance21
15.0
13.0
11.0
9.0
7.0
5.0
Absolute Residual Mean
0.1
1.0
10.0
Parameter Multiplier

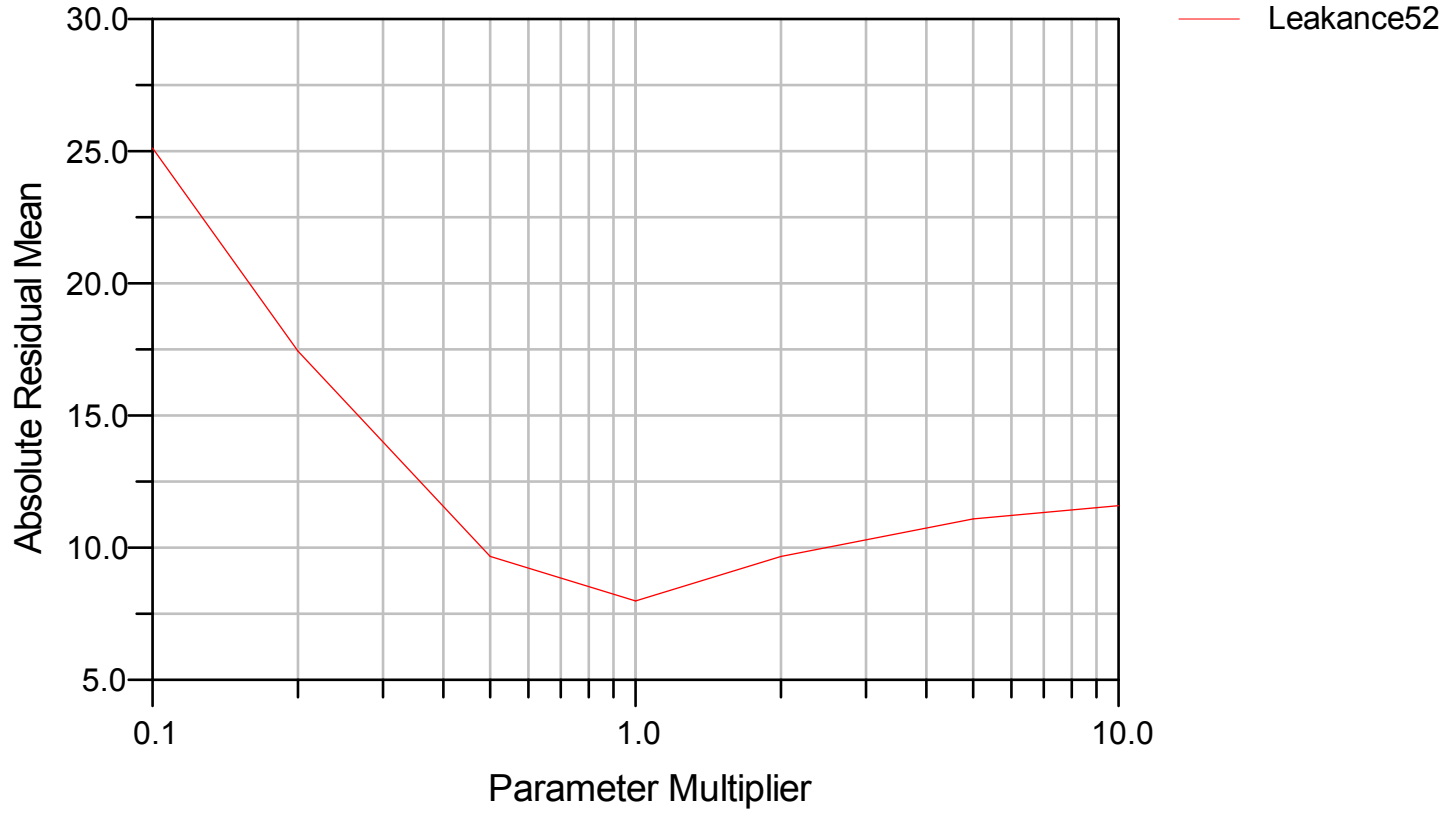

Leakance3
60.0
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
Absolute Residual Mean
0.1
1.0
10.0
Parameter Multiplier

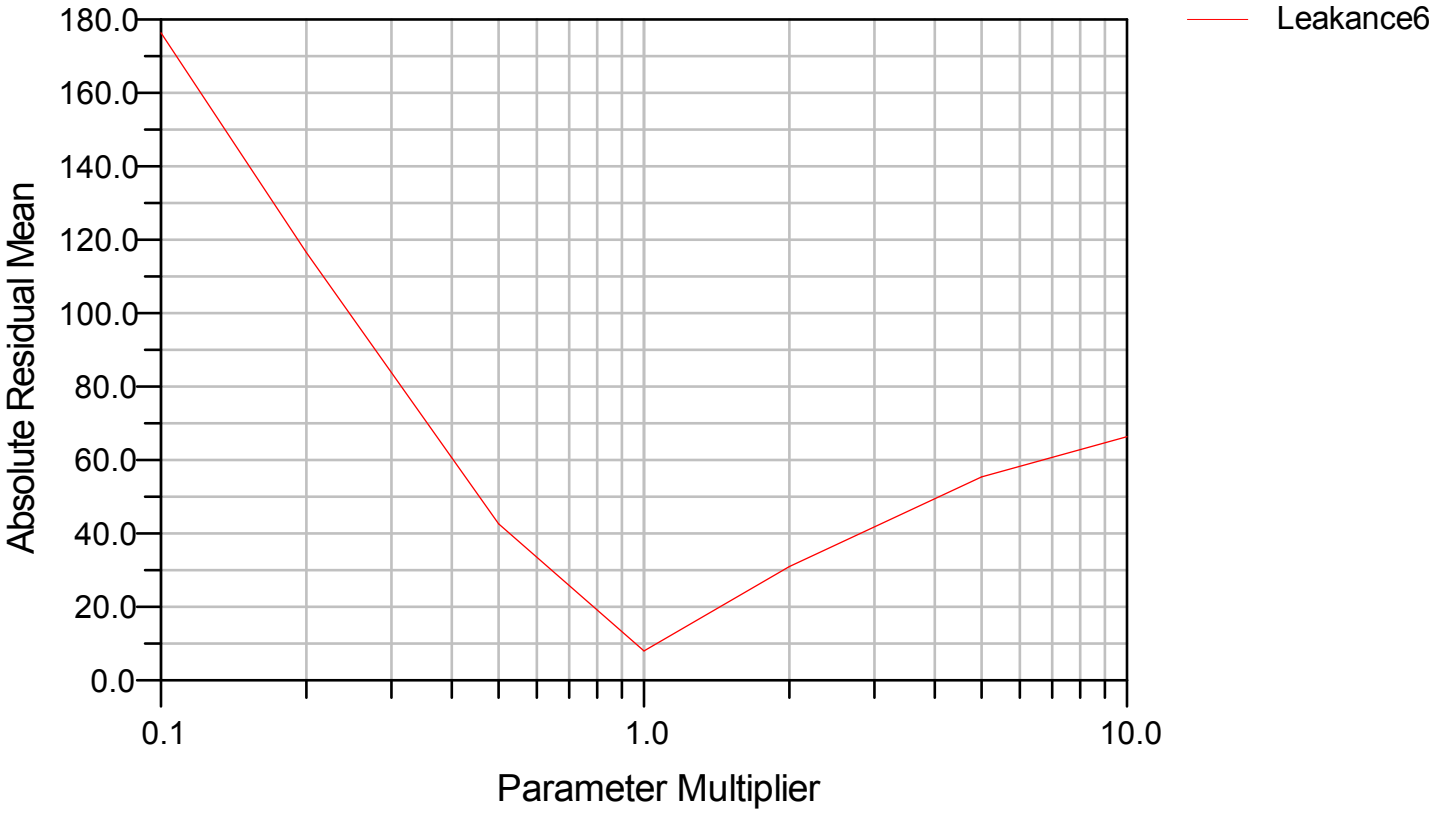

Leakance4
20.0
15.0
10.0
5.0
Absolute Residual Mean
0.1
1.0
10.0
Parameter Multiplier


Leakance45
9.0
8.5
8.0
7.5
7.0
Absolute Residual Mean
0.1
1.0
10.0
Parameter Multiplier


Leakance5
17.0
16.0
15.0
14.0
13.0
12.0
11.0
10.0
9.0
8.0
7.0
Absolute Residual Mean
0.1
1.0
10.0
Parameter Multiplier


Leakance51
9.0
8.5
8.0
7.5
7.0
Absolute Residual Mean
0.1
1.0
10.0
Parameter Multiplier


Leakance52
30.0
25.0
20.0
15.0
10.0
5.0
Absolute Residual Mean
0.1
1.0
10.0
Parameter Multiplier


Leakance6
180.0
160.0
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
Absolute Residual Mean
0.1
1.0
10.0
Parameter Multiplier

ATTACHMENT 2M

Water Balance Data - Bull Mountains Mine No 1

FROM POND				GOING TO PLANT				Diff/AVG	VAULT ENTERING MINE				Diff/AVG	EM XC67 EXITING MINE				Diff/AVG
DATE	TIME	G/M	TOTAL G	DATE	TIME	G/M	TOTAL G		DATE	TIME	GM	TOTAL G		DATE	TIME	G/M	TOTAL G	
5/3/2012	11:02 AM	264		5/3/2012	10:58 AM	63.595			5/3/2012	11:44 AM	191.25			5/3/2012	10:45:00 AM	663.7		
	11:03AM	282			10:59 AM	45.296				11:45 AM	236.27				10:45:30 AM	665.1		
					11:00 AM	47.994				11:46 AM	196.27	86877552			10:46 AM	659.7	(NA)	
					11:01 AM	61.948	78225440											
								4540536					3312904					
								450.5 G/M					330.3 G/M					
5/10/2012	11:00 AM	519		5/10/2012	11:00 AM	320	82765976		5/10/2012	10:55 AM	190	90190456		5/10/2012	10:45 AM	1052.4	67065400	
								3191476					3428316					3197500
								278.6 G/M					299.3 G/M					280.1 G/M
5/18/2012	9:55 AM	1359		5/18/2012	9:54 AM	813.06	85957452		5/18/2012	9:48 AM	459.12	93618772		5/18/2012	9:02 AM	0	70262900	
								4730292					2924324					2930500
								464.8 G/M					287 G/M					287.8 G/M
5/25/2012	11:30 AM	1368		5/25/2012	11:30 AM	988.5	90687744		5/25/2012	11:36 AM	200	96543096		5/25/2012	10:43 AM	768.4	73193400	
								5925320					2747392					
								593.1 G/M					273.6 G/M					
6/1/2012	10:00AM	300		6/1/2012	10:00	950	96613064		6/1/2012	10:56 AM	200	99290488		6/1/2012				
								5471769					2174232					5971000
								538 G/M					215.1					296.1 G/M
6/8/2012	11:30 AM	400		6/8/2012	11:30	567	2084833		6/8/2012	11:25 AM	218	1464720		6/8/2012	10:55 AM	0	79164400	
								5906733					2522615					2758300
								588.2 GM					250.9 GM					276.8 G/M
6/15/2012	10:52 AM	370		6/15/2012	10:52 AM	870	7991566		6/15/2012	10:58 AM	377	3987335		6/15/2012	9:00 AM	0	81922700	
								4411777					2096703					2768300
								446 G/M					212.2 G/M					279.6 G/M
6/22/2012	7:45 AM	328		6/22/2012	7:45 AM	948	12403343		6/22/2012	7:40 AM	337	6084038		6/22/2012	6:00 AM	0	84691000	
								6516457					4346213					4874200
								341.1 GM					227.5 GM					257.8 GM
7/5/2012	14:09 PM	0		7/5/2012	14:09 PM	945.86	18919800		7/5/2012	14:04 PM	120.32	10430251		7/5/2012	9:05 AM	0	89565200	
								3810606					3000489					2835200
								333.4 GM					262.5 GM					283.8 GM
7/13/2012	12:39 PM	277		7/13/2012	12:39 PM	123.9	22730406		7/13/2012	12:35 PM	0	13430748		7/12/2012	7:35	59	92400400	

Water Balance Data - Bull Mountains Mine No.1

Date	Flow In (gpm)	Flow Out (gpm)	Flow Out - Flow In (gpm)
5/18/2012	299.3	280.1	-19.2
5/25/2012	287	287.8	0.8
6/8/2012	215.1	296.1	81
6/15/2012	250.9	276.8	25.9
6/22/2012	212.2	279.6	67.4
7/5/2012	227.5	257.8	30.3
7/13/2012	262.5	283.8	21.3
		Average Difference	30

ATTACHMENT 3M

PROPOSED SUPPLEMENTAL GROUNDWATER INVESTIGATIONS

Additional groundwater data collection activities are proposed to provide supplemental data to enhance the characterization of the following hydrogeologic features:

- Deep Underburden Aquifer
- Alluvium of Fattig Creek

Each of the proposed investigations and scheduled activities are discussed below.

Deep Underburden Aquifer

The deep Underburden aquifer serves as a prominent source of groundwater supply for domestic, stock, and also as a mine public water supply source. This aquifer has been proposed as well as a potential mitigation water source for portions of the mine vicinity that may be adversely affected by the mining activity. It is anticipated that this source should provide an ample supply of water for replacement uses, such as stock water and domestic (household) and lawn irrigation purposes. One of the potentially more significant uses that has been proposed is to use this same source as a mitigation source for flowing springs, and or stream reaches in the Bull Mountain area. Some of the springs flow at very significant rates. For instance, spring 52455 (near northeastern corner of LOM) flows at rates commonly exceeding 10 gallons per minute. Such a flow rate exceeds the typical demands at the mine public water supply well (projected at 6 gpm). Given that there are a large overall number of springs, ponds, and identified stream reaches, seasonal flow rates could substantially exceed 100 gpm.

Using the deep Underburden aquifer may have other issues as well, including differences in water quality between native spring/stream sources compared to the water quality of the deeper Underburden. There are likely to be issues related to the Beneficial Use application process of the Montana Department of Natural Resources and Conservation. Demonstration of a beneficial use is required before a permit will be issued by the DNRC. Such applications routinely receive objections so that in the event a permit is issued, the process can be rather lengthy. In the event the aforementioned hurdles could be overcome, it would still be necessary to convince the DNRC that the aquifer system has the capacity to meet all the existing uses plus intended uses before a permit could be obtained.

Hence, the objectives of the deep Underburden aquifer study are two-fold:

1) Provide better definition of the extent and overall water-bearing capacity of the deep Underburden aquifer; and
2) Assist in simulating and predicting the overall impacts of mining to the deeper Underburden aquifer, including quantifying the potential implications of the implementing mitigation measures that have been proposed for the mine.

The following are the main components of the deep Underburden aquifer investigation:

1) Define locations and develop specifications for well construction and testing. Input from DEQ will be sought when siting the wells. It is assumed that two deep underburden wells would sufficiently complement information provided by studies involving the Office Supply well and BMP121 for evaluation purposes.
2) Construct the wells and conduct aquifer pumping tests on each well.
3) Quantification of the aquifer properties based upon the pumping test results. This will include updating the conceptual model as necessary.
4) Conduct a model simulation effort to quantify the overall aquifer capacity to meet existing and proposed demands, including proposed mitigation efforts, if they become required. This simulation effort will also consider the significance of mine dewatering making predictions.

The following is the projected schedule for completing this effort.

1) It is assumed that six weeks will be required to site the well locations and to subcontract a well driller for mobilization to the planned well locations.
2) The well drilling, well construction, well development, and aquifer pumping tests in total will require about one month of time.
3) The aquifer system evaluation and conceptual model update will require about one month.
4) The updated simulation effort, including completing a report describing all aspects of the well construction, testing, and model simulation efforts will require from one to two months of time.

In summary, the total estimated time required to conduct the focused Underburden aquifer evaluation will require about 6 months of time as follows:

- Coordination with DEQ to confirm the well testing program, including location and testing protocol (1 month).
- Scheduling drilling, testing and reporting on the aquifer test results (2 months).
- Conducting the focused model simulation effort which includes meeting and coordination with DEQ (2 months).

Permittee is committed to completing underburden evaluation no later than 6 months after approval of Amendment #3.

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Alluvium of Fattig Creek

Fattig Creek and its tributaries begin nearer the eastern edge of the planned Life of Mine Boundary. It is anticipated that upper reaches of this creek will have similar characteristics to that defined in the Rehder Creek drainage. In effect, many of the upper reaches of this drainage were dry. However, there are relatively few alluvial monitoring wells in Upper Reaches of Fattig Creek to confirm this. Hence, it is recommend that three alluvial monitoring wells be placed in three drainages that contribute to Fattig Creek and that these wells be placed near the LOM boundary to provide information about the nature of the Fattig Creek alluvium in this area.

Input from DEQ will be sought when siting these wells. The plan is to construct these wells this season, possibly in coordination with the deep Underburden well investigations.

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RE: COMMENTS ON ENVIRONMENTAL ASSESSMENT FOR SIGNAL PEAK PERMIT AMENDMENT NO. 3

Dear Mr. Yde,

> *I am talking here about the common experience, the common fate, of rural communities for a long time. . . . The message is plain enough, and we have ignored it for too long: the great centralized economic entities of our time do not come into rural places in order to improve them by 'creating jobs.' They come to take as much value as they can, as cheaply and quickly as they can take it.*[1]

On behalf of the Montana Environmental Information Center (MEIC), the Sierra Club, and the National Wildlife Federation (collectively, "Citizens"), I submit the following comments and objections regarding the Department of Environmental Quality's (DEQ) draft environmental

[1] Wendell Berry, Another Turn of the Crank: Essays 11 (1995).

assessment (EA) for Signal Peak Energy, LLC's (SPE) Permit Amendment No. 3 for the Bull Mountain Mine.

Montana Environmental Information Center is a 501(c)(3) nonprofit organization founded in 1973 with approximately 4,000 members throughout the United States and the State of Montana. MEIC is dedicated, in part, to the preservation and enhancement of the natural resources and natural environment of Montana and to the gathering and dissemination of information concerning the protection and preservation of the human environment through education of its members and the general public on their rights and obligations under local, state and federal environmental protection laws and regulations. MEIC is also dedicated, in part, to assuring that state and federal officials comply with and fully uphold the laws of Montana and United States that are designed to protect and enhance the environment from pollution. MEIC and its members have intensive, long-standing recreational, aesthetic, scientific, professional, and spiritual interests in the responsible production and use of energy, the reduction of greenhouse (GHG) pollution as a means to ameliorate our climate crisis, and the land, air, water, and community impacted by climate change, including impacts associated with the Bull Mountain Mine. MEIC submits these comments on its own behalf and on behalf of its adversely affected members.

Sierra Club is America's oldest and largest grassroots environmental organization. Sierra Club has approximately 600,000 members, including more than 2,100 who live in Montana. Founded in 1892, the Sierra Club has been working for well more than a century to protect communities, wild places, and the planet itself. Sierra Club is dedicated to exploring, enjoying, and protecting the wild places of the Earth; to practicing and promoting the responsible use of the Earth's resources and ecosystems; to educating and enlisting humanity to protect and restore the quality of the natural and human environment; and to using all lawful means to carry out these objectives. Sierra Club's concerns encompass the exploration, enjoyment and protection of the lands and waters of Montana. Sierra Club submits these comments on its own behalf and on behalf of its adversely affected members.

The National Wildlife Federation (NWF) was founded in 1936 as the national voice of state and local conservation groups, and has since emerged as the nation's foremost grassroots conservation organization, leading an integrated network of members and supporters and 47 affiliated organizations throughout the United States and its territories. NWF has been involved in environmental issues—including coal development—in the Rocky Mountain West for decades. NWF has a strong presence in Montana, with a regional office in Missoula, staff presence throughout the state, and an active state affiliate in the Montana Wildlife Federation. NWF submits these comments on its own behalf and on behalf of its adversely affected members.

1. Proposed Action

SPE's proposed permit amendment indicates that the company seeks to add 7,161.4 acres to the area of the Bull Mountain Mine. This expansion would bring the total mine area to 14,896.4 acres. The expansion would add 175.9 million tons of in-place coal reserves, of which 110.1 million tons would be mineable, and 91.4 million tons recoverable. DEQ has prepared a 14 page

draft checklist EA, concluding that the mine expansion will have no significant impacts that were not already addressed in a previous (albeit unidentified) environmental impact statement (EIS).

As an initial matter, it is unacceptable for DEQ to simply state that the environmental effects of the proposed mining activity were addressed in a previous EIS, without clearly identifying the EIS and either making the EIS available to the public or directing the public to where they can obtain a copy. *Cf.* 40 C.F.R. § 1502.21 ("Agencies shall incorporate material into an environmental impact statement by reference when the effect will be to cut down on bulk *without impeding agency and public review of the action*. The incorporated material shall be cited in the statement and *its content briefly described*. *No material may be incorporated by reference unless it is reasonably available for inspection by potentially interested persons within the time allowed for comment.*"). Because DEQ has not made the unidentified EIS reasonably available to the public, it has not fulfilled its statutory duty under MEPA to inform the public of the impacts of its actions. Mont. Code Ann. § 75-1-102(1)(b).

2. The Right to a Clean and Healthful Environment and Montana Environmental Policy Act

Montana's Constitution assures Montanans the inalienable right to a "clean and healthful environment." Mont. Const. art. II, § 3. The constitution further provides that "[t]he State and each person shall maintain and improve a clean and healthful environment in Montana for present and future generations." *Id.* art. IX, § 1(1). Further, in clear anticipation of legislative capture by powerful extractive industries, the constitution requires the legislature to uphold laws that allow Montanans recourse to courts to defend their constitutional right to a clean and healthful environment: "The legislature shall provide adequate remedies for the protection of the environmental life support system from degradation and provide adequate remedies to prevent unreasonable depletion and degradation of natural resources." *Id.* art. IX, § 1(3). The Montana Supreme Court has concluded that the right to a healthful environment is fundamental and actions that implicate the right must pass strict scrutiny. *Mont. Envtl. Info. Ctr. v. Mont. Dep't of Envtl. Quality*, 296 Mont. 207, 225 (1999).

The Montana Environmental Policy Act (MEPA) purports to fulfill the State of Montana's obligation to protect Montanans' fundamental constitutional right to a clean and healthful environment. Mont. Code Ann. § 75-1-102(1); Mont. Const. art. II, § 3. The purpose of MEPA is to assure that decision makers and the public are fully informed of the potential environmental impacts of a proposed action before the actions occurs. Mont. Code Ann. § 75-1-102(1). Because MEPA is modeled after the federal National Environmental Policy Act (NEPA), case law interpreting NEPA is persuasive in Montana courts. *Ravalli Co. Fish & Game Ass'n, Inc. v. Mont. Dep't of State Lands*, 273 Mont. 371, 377 (1995).

3. The Presence of Federal Coal Requires NEPA Analysis of the Proposed Mine Expansion and Preparation of an EIS

Because the proposed mine expansion includes significant amounts of federal coal,[2] Montana's federal-state cooperative agreement applies. 30 C.F.R. § 926.30. Pursuant to this agreement, the U.S. Office of Surface Mining (OSM) is responsible for assuring that mine expansion is properly analyzed pursuant to the National Environmental Policy Act (NEPA), *id.* § 926.30 (Article IV.B.1.b(1), B.2.a(1)); *id.* § 740.4(c)(7)(i)-(viii), and the U.S. Secretary of the Interior is ultimately responsible for approving the expansion (which is a mine plan modification) *id.* § 746.18(a), (d)(3); *id.* § 926.30 (Article IV.B.3.c); *accord* Mont. Code Ann. § 82-4-231(8)(f). OSM may not delegate to DEQ its responsibility for determining whether an EIS should be prepared. 30 C.F.R. § 740.4(c)(7)(ii). Here, given the magnitude of the proposed mining, preparation of a federal EIS is warranted. In any event, analysis under MEPA is not an adequate substitute for NEPA analysis because it severely limits consideration of alternatives and impacts, and limits available remedies. *See* Mont. Code Ann. § 75-1-201(1)(b)(iv)(C)(I)-(II) (limiting alternatives), (2)(a) (limiting evaluation of impacts), (6)(c)-(d) (limiting remedies); Mont. Admin. R. 17.4.603(7), (18) (limiting evaluation of indirect and cumulative impacts). In accordance with the extreme limitations of MEPA, DEQ's EA fails entirely to consider any impacts that are regional, national, or global in nature (for example, the planned combustion of the coal) and it fails to conduct any actual consideration of alternatives.[3] *See generally* Draft EA 1-14. There is no analysis of indirect or cumulative impacts. *Cf.* 40 C.F.R. § 1508.25(c) (requiring analysis of indirect and cumulative impacts). Because MEPA review, especially as conducted here, is no substitute for federal NEPA review, OSM must conduct a full NEPA review of the proposed mine expansion, as OSM has undertaken with regard to the Area F expansion of the Rosebud strip mine. *See* 78 Fed. Reg. 52,967, 52,967 (Aug. 27, 2013).

4. Cumulative Hydrologic Impact Analysis and Analysis of Ground Water Impacts

It has long been recognized that coal mining harms water resources. As such, one of the driving purposes behind the national coal mining law, the Surface Mining Control and Reclamation Act (SMCRA), is to curb water pollution and destruction of fish and wildlife habitat from coal mining. 30 U.S.C. § 1201(c). In order to further this purpose, SMCRA establishes numerous obligations for operators and regulators that are intended to protect water resources. Each mining application must contain

> a determination of the probable hydrologic consequences of mining and reclamation operations, both on and off the mine site, with respect to the hydrologic regime, quantity and quality of water in surface and ground water systems including the dissolved and suspended solids under seasonal flow conditions and the collection of sufficient data for the mine site and surrounding areas so that an assessment can be made by the regulatory authority of the probable cumulative impacts of anticipated mining in the area upon the hydrology of the area and particularly upon water availability: *Provided, however,* That this

[2] Application, Map 303-1.

[3] *Cf.* 30 C.F.R. § 773.7 (granting OSM three options regarding permits: approval, approval with conditions, and disapproval); *see Dine Citizens Against Ruining Our Environment v. Kline*, 747 F. Supp. 2d 1234, 1255-56 (D. Colo. 2010) (vacating EA of mine expansion for failure to consider alternative of approval with conditions).

> determination shall not be required until such time as hydrologic information on the general area prior to mining is made available from an appropriate Federal or State agency: *Provided further,* That the permit shall not be approved until such information is available and is incorporated into the application.

Id. § 1257(b)(11); *accord* Mont. Code Ann. § 82-4-222(1)(m). Permit applications must also include a reclamation plan that contains specific provisions for hydrologic reclamation. 30 U.S.C. § 1257(d); *id.* § 1258(a)(13); *see also* 30 C.F.R. § 784.14(g) (hydrologic reclamation plan required for underground mines); *accord* Mont. Code Ann. § 82-4-222(4); Admin. R. Mont. 17.24.314. The hydrologic reclamation plan must contain

> a detailed description of the measures to be taken during the mining and reclamation process *to assure protection of*: (A) the quality of surface and ground water systems both on- and off-site, from adverse effects of the mining and reclamation process; (B) the rights of present users of such water; and (C) the quantity of surface and ground water systems, both on- and off-site, from adverse effects of the mining and reclamation process or to provide alternative sources of water where such protection of quantity cannot be assured . . . .

30 U.S.C. § 1258(a)(13); Admin. R. Mont. 17.24.314(1). SMCRA also establishes performance standards for coal mining operations to assure protection of the hydrologic balance. 30 U.S.C. § 1265(b)(10); Mont. Code Ann. § 82-4-231(10)(k). Further, SMCRA specifically forbids a regulatory authority from issuing a coal-mining permit unless and until

> the assessment of the probable cumulative impact of all anticipated mining in the area on the hydrologic balance specified in section 1257(b) of this title has been made by the regulatory authority and the proposed operation thereof has been designed to prevent material damage to [the] hydrologic balance outside [of the] permit area.

30 U.S.C. § 1260(b)(3); Mont. Code Ann. § 82-4-227(3)(a). Montana defines material damage to include "[a]ny violation of a water quality standard, whether or not existing water use is affected." Mont. Code Ann. § 82-4-203(31). In order for the cumulative hydrologic impact assessment (CHIA) to meet minimal requirements of rationality, the regulatory authority (here, DEQ) must establish criteria which guide its material damage determination. Such criteria must include violations of water quality standards. *Id.*

Here, SPE's application acknowledges that it will lead to violations of water quality standards within the permit area. Appx. 314-5 at 56 ("[T]here is potential that some of the groundwater will change from Class II to Class III designation of the State."). DEQ's Draft EA predicts such degradation as well. Draft EA at 6 (noting that the "results [of past ground water studies] indicate that the post mining groundwater quality of the mine pool within the Bull Mountain Mine No. 1 would likely degrade from baseline water quality"). Baseline ground water in the coal aquifer that SPE proposes to remove is classified as Class II groundwater appropriate for "public and private water supplies, culinary and food processing purposes, irrigation of some agricultural crops, drinking water for livestock and wildlife, and most commercial and industrial

purposes." Admin. R. Mont. 17.30.1006(2)(a); *id.* (Class II groundwater has a "natural specific conductance that is greater than 1,000 and less than 2,500 microSiemens/cm"); Draft EA at 6 (noting that baseline specific conductance of coal aquifer is 2272 uS/cm, i.e., Class II). Montana Bureau of Mines and Geology (MBMG) studies found that abandoned coal mines in the Roundup area generally have elevated specific conductance (SC), which degrades the ground water quality to Class III waters. Draft EA at 6 (noting abandoned mines have average SC of 3,038 uS/cm). SPE's application compares post-mining SC to that at the Rosebud Mine, which it considers roughly analogous to the Bull Mountain Mine, and concluded that SC levels could reach 2,700 uS/cm. Appx. 314-5 at 53-54. Using either estimate, it is clear that water quality in the mine will degrade, and water quality standards will be violated. *See* Admin. R. Mont. 17.30.1006(3). Beneficial use of Class III water is limited to "irrigation of some salt tolerant crops; some commercial and industrial purposes; drinking water for some livestock and wildlife; and drinking, culinary, and food processing purposes where the specific conductance is less than 7,000 uS/cm." *Id.*

It is clear that this polluted water from the extensive mining operation will likely migrate approximately ¼ to ½ mile beyond the mine boundaries within 50 years following mining. Appx. 314-5 at 58; Draft EA at 7. This conclusion is bolstered by SPE's and DEQ's own determinations that ground water within the permit boundary is connected to ground water outside the permit boundary. *See* Draft EA at 5-6 (concluding that mining will cause drawdown of the coal aquifer and aquifers above the coal "in the immediate vicinity of the mine and extending down gradient several miles beyond the permit boundary toward the north-northwest"); Appx. 314-5 at 22 (noting aquifer drawdown in areas nearly one mile from active mining); *id.* at 23 (projecting that "drawdown outside of mine areas would be limited to about one mile at the periphery of the Life of Mine (LOM)"). So, to recap, mining is going to degrade ground water quality within the mining area from Class II to Class III, and this polluted water is going to migrate outside of the mine boundary. As such, it seems likely that mining, if permitted, would lead to violations of water quality standards outside the mine permit area. DEQ is obligated to withhold approval of the mine permit because such violations constitute material damage under SMCRA.

DEQ's Draft EA, however, avoids this conclusion, reasoning that even though the mine would pollute ground water and the ground water would migrate beyond mine boundaries, there would be no degradation of water outside the mine boundaries (even though there is no approved mixing zone):

> Because the particle tracking model [which determined that polluted water would migrate] uses conservative assumptions which increase particle tracking rates, the actual distance of movement of lower quality water from the mine should be less than these estimates. Particle tracking also does not consider dilution or attenuation of lower quality water which would occur during transport away from the mine. Because of these factors, no degradation of groundwater quality outside the permit area is expected to occur.

Draft EA at 7. DEQ's reasoning is simply incredible, and wholly indefensible. The agency cites no studies or other empirical analysis that indicates how the *unconsidered* factors of dilution or

attenuation would significantly reduce the impacts of polluted, Class III ground water migrating from the mine. Even SPE, in its probable hydrologic consequences analysis, did not suggest dilution or attenuation would negate the impact of ground water pollution from the mine, only noting that such factors were "not accounted for" in its modeling of ground water migration. Appx. 314-5 at 59-60. It is apparent that DEQ has not done further analysis of potential dilution or attenuation of polluted spoils water. It is simply not credible and is arbitrary and capricious for DEQ to conclude that that there would be no degradation of water outside the permit area without any studies or analysis on which to base the conclusion, especially given that the existing studies all indicate that the mine would degrade water quality and cause the polluted water to migrate beyond the permit area.

5. Hydrologic Reclamation

As part of its analysis of hydrologic impacts, DEQ must consider reclamation of water as a resource and not simply whether water can be reclaimed to meet projected post-mining uses. 70 Fed. Reg. 8,002, 8,003-05 (Feb. 16, 2005) ("In other words, the Department would not be allowed to prescribe some actions to minimize disturbances to the hydrologic balance if postmining land uses would not be adversely affected or if material damage in the adjacent area would not occur without those actions. This limitation would limit the discretion of the regulatory authority provided by SMCRA and hence render the Montana statute less stringent than SMCRA."); *see also* 30 U.S.C. § 1258(a)(13)(A) (reclamation plan must "*assure* the protection of the quality of surface and ground water systems both on- and off-site from adverse effects of the mining and reclamation process" (emphasis added)). Despite this requirement, personnel from OSM and DEQ have informed landowners that mining companies (here, SPE) do not have to reclaim water as a resource, but only as necessary to support projected post-mining land uses. It is troubling to hear of such assertions coming from regulatory authorities (who were, after all, created to protect the public from the impacts of mining and from the coal companies that are only motivated, as Wendell Berry has noted, to "take as much value as they can, as cheaply and quickly as they can take it"). Further, it seems from SPE's permit application that the company only intends to protect and reclaim water resources as necessary to support projected post-mining land uses. For example, SPE's hydrologic reclamation plan plainly states that its reclamation goal is simply to assure that post-mining water resources are sufficient for post-mining land uses (and as shown below, achievement of this asserted goal is far from assured): "Postmining groundwater quality is predicted to be suitable for its proposed uses." Application at 314-1. Additionally, the probable hydrologic consequences analysis (PHC) repeatedly discounts potential adverse impacts to water quality and quantity by asserting that SPE will just find replacement water sources:

> If monitoring indicates that water levels drop substantially in the shallow aquifer system downstream from mining and such changes would lead to an adverse impact, the permittee will consult with the Department regarding the need to replenish the water.

Appx. 314-5 at 49.

> In summary, the overall hydrologic balance changes that will accrue at the mine are limited primarily to temporal changes in groundwater storage. Such storage will recover over time, although this same storage will be redistributed as a result of the hydrologic changes of the mine gob and underground workings when compared to the Mammoth Coal and the adjacent/overlying Overburden. *None of these changes are anticipated to cause adverse affects [sic] to existing users. However, if such adverse affects [sic] do arise, SPE is committed to mitigating impacts and will coordinate with DEQ accordingly as to the appropriate mitigation approach.*

Appx. 314-5 at 50-51.

> In summary, any groundwater quality degradation that occurs is likely to be associated with desaturation/saturation of mining gob during and following mining activity. Such degradation is predicted to remain within, or very near the mine workings and permit boundaries, for the next 50 years assuming that the mine gate roads remain intact (Scenario 2). If the gate roads collapse (Scenario 1), then any potential migration of degraded groundwater will be much slower. Otherwise, it is unlikely that there will be a diminution of groundwater outside LOM boundary that could adversely affect domestic, agricultural or other legitimate uses of groundwater. It is considered highly likely that water use classifications will remain the same after mining as it was before mining for areas outside the LOM.
>
> In the unlikely event that impacts do occur leading to a given groundwater well's quality being degraded outside the LOM as a result of mining, and that a given beneficial [use] cannot thereby be maintained, then Signal Peak Energy is committed to the appropriate mitigation measures as approved by DEQ. This could include [replacing wells] [with] deeper Underburden wells, or using other measures that DEQ agrees is [sic] appropriate.

Appx. 314-5 at 59-60. Aside from contradicting other conclusions by SPE and DEQ that water pollution from the mine will cause degradation and reclassification of groundwater from Class II to Class III waters, *see* Appx. 314-5 at 52-54; Draft EA 6, and aside from the practical difficulty and unlikelihood of DEQ's forcing SPE to mitigate ground water pollution outside of the mine area that manifests itself 50 years or more hence, the thrust of SPE's analyses is that its operations may impact water quality and quantity, but that the company will nevertheless be able to assure that alterative sources of water are available for post-mining land uses. Because SPE is applying the incorrect standard for hydrologic reclamation, its analysis is unacceptable, its conclusion invalid, and permit approval would be unlawful.

DEQ's Draft EA makes the same error, indicating that the agency considers hydrologic reclamation to be sufficient if it meets the low hurdle of allowing projected post-mining uses. For example, DEQ acknowledges that water quantity is going to decrease post-mining, Draft EA at 6 ("In any case residual drawdown within the LOM boundary is predicted to persist for at least 50 years after mining and decreased water levels in the southern part of the mine may be

permanent due to the increased permeability of the mine gob."), and that water quality will also decrease, *id.* ("A decline in water quality is expected in groundwater that comes into contact with the fresh material surfaces created . . . ."); however, the agency dismisses the gravity of such impairments, noting that SPE "is committed to replacing" lost or polluted flows, *id.* at 8. But again, replacement is not sufficient reclamation of the hydrologic balance.

Furthermore, for replacement of decreased or polluted water supplies, DEQ asserts that "underburden sandstones have been identified as a source of replacement water." Draft EA at 5. But even SPE has acknowledged that not enough is currently known about this proposed alternative water source to assure that it can provide replacement water: "In effect, if this [underburden] aquifer is to be used to serve the existing uses, and also to serve potentially as a mitigation sources [sic], a better understanding of its overall capacity to meeting existing and potential future demand is necessary." Appx. 314-5 at 45; *cf.* 30 U.S.C. § 1258(a)(13)(A) (hydrologic reclamation plan must "*assure*" the quality of on-site and off-site groundwater and availability of replacement water); *accord* Admin. R. Mont. 17.24.314(1). Setting aside all other shortcomings, it is hard to conceive how DEQ can find this proposed hydrologic reclamation plan sufficient when SPE acknowledges that it does not even know if the proposed replacement water source has sufficient capacity to meet post-mining needs. Thus, DEQ's analysis of hydrologic reclamation fails to meet the standard of SMCRA or MEPA. It also violates Montana's constitutional reclamation requirement. Mont. Const. art. IX, § 2 ("All lands disturbed by the taking of natural resources shall be reclaimed.").

6. Water from the Madison Formation

As noted, one basic purpose of MEPA is to "inform the public of the anticipated impacts in Montana of potential state actions." Mont. Code Ann. § 75-1-102(1)(b). The Draft EA fails to include any mention of SPE's use of ground water from the Madison Formation. This water, the PHC informs, "is not suitable for potable purposes as it contains high hydrogen sulfide concentrations, elevated fluoride and radionuclides." Appx. 314-5 at 36. Testing of water from the Madison formation further reveals elevated concentrations of arsenic, as well as the presence of benzene, a known carcinogen. Appx. 314-5, attachment E at 21, 24. The arsenic levels in some Madison water samples appear significantly higher than Montana human health standards. *Id.* at 21 (two samples from Madison #2 showing concentrations greater than 50 Mcg/L); *cf.* Mont. Dep't Envt'l Quality, Circular 7 (2012) (limit 10 Mcg/L). Samples also appear to show levels of Radium 226 (a radioactive and carcinogenic element) that exceed state human health standards. Appx. 314-5, attachement E at 22 (samples showing 8 and 17 pCi/L); *cf.* Mont. Dep't Envt'l Quality, Circular 7 (limit 5 pCi/L). This is concerning because SPE used nearly 200 million gallons (over 500 acre feet) of water from the Madison formation in 2010 alone. *Id.* at 8-9).

SPE stores Madison water in an aeration pond. Appx. 314-5 at 36. It is unclear whether this pond is lined (is it?). The company uses this contaminated water for "equipment cooling, dust suppression, and coal processing. Appx. 314-5 at 36. SPE asserts that "excess water" is pumped back to the aeration pond for "recycling," *id.*; however, it is unclear how water used for dust suppression and coal processing can be pumped back for recycling. SPE also asserts that residual water ends up in the coal processing waste disposal area. *Id.* But that area is not lined

or designed to prevent leaching, even if, as SPE asserts, the waste area is "compacted 90 percent." *Id.* SPE, of course, insists that its use of volumes of water contaminated with elevated levels of radioactive and carcinogenic elements will not cause any serious problems, *id.* at 55 (asserting that carcinogenic water will be diluted by other water polluted with dissolved solids); however, this determination should not be left to the mine applicant, which has a powerful economic interest to minimize impacts. DEQ—which is responsible for upholding Montanan's fundamental right to a healthful environment—has a duty under MEPA and Montana's Constitution to disclose and independently review this material to assure that the public and the environment will not be harmed.

Relatedly, the waste disposal area, which contains contaminated Madison water (among other waste), was apparently breached due to flooding in May 2011. Appx. 314-5 at 61. This information is certainly relevant to the environmental impacts of continued mining at the Bull Mountain Mine. What were the impacts of this flooding? Did DEQ or SPE conduct any analysis? Unfortunately, like mention of SPE's use of Madison water, this information is wholly omitted from DEQ's Draft EA. This is unacceptable. Equally unacceptable is SPE's response to this breach. The company insists: "The potential for future off-site surface water quality impacts associated with breaching of the WDA [waste disposal area] is considered very unlikely at this stage, primarily because the event of 2011 was unique, and also because the pond was enlarged." *Id.* at 314-5 at 61. This statement ignores that flooding and extreme precipitation events are becoming more common and are likely to be repeated. The Intergovernmental Panel on Climate Change, in its Fifth Assessment Report, writes: "Extreme precipitation events over most mid-latitude masses and over wet tropical regions will *very likely* become more intense and more frequent by the end of this century, as global mean surface temperature increases." Intergovernmental Panel on Climate Change, Summary for Policy Makers at 16 (2013) (attached as Exhibit 1).

In short, DEQ must disclose and evaluate the impacts of SPE's use of Madison water at the mine.

7. Coal Combustion

In considering the impacts of a given action, DEQ and OSM must consider "primary, secondary, and cumulative impacts." Mont. Admin. R. 17.4.617(4)(b). Primary impacts are not defined. Secondary impact is defined as "a further impacts to the human environment that may be stimulated or induced by or otherwise result from a direct impact of the action." Mont. Admin. R. 17.4.607(18). Cumulative impact is defined as "the collective impacts on the human environment of the proposed action when considered in conjunction with other past or present actions related to the proposed action by location or generic type. Related future actions must also be considered when these actions are under concurrent consideration by any state agency through preimpact studies, separate impact statement evaluation, or permit processing procedures." Mont. Admin. R. 17.4.603(7).

Here, there is no question that the coal mined at the Bull Mountain Mine is going to be burned in coal-fired power plants. The combustion of the coal will cause significant amounts of air pollution, solid waste (coal combustion waste), and subsequent water pollution. These are

secondary and cumulative impacts, which must be evaluated by DEQ. *E.g.*, *Mid States Coal. for Progress v. Surface Transp. Bd.*, 345 F.3d 520, 548-50 (8th Cir. 2003) (agencies required to consider impacts of coal combustion prior to approval of proposed railroad). Despite the requirement to consider secondary and cumulative impacts, and despite the fact that every ton of coal is certainly destined to be burned, the Draft EA fails entirely to address the impacts of coal combustion.

8. Climate Change Impacts

It is "unequivocal" that climate change is occurring, and the great weight of science indicates that human combustion of fossil fuels (like coal) is to blame. Intergovernmental Panel on Climate Change, Summary for Policy Makers at 3, 10, 12, 20. Indeed, the world's leading minds and most respected institutions—guided by increasingly clear science and statistical evidence—agree that dramatic action is necessary to avoid planetary disaster.[4] Greenhouse gas (GHG) concentrations have been steadily increasing over the past century, and our insatiable consumption of fossil fuels is pushing the world to a tipping point where, once reached, catastrophic change will be unavoidable.[5] In fact, the impacts from climate change are already being experienced, with drought and extreme weather events becoming increasingly common, as more fully discussed below.[6] Renowned NASA climatologist Dr. James Hansen provides the analogy of loaded dice—suggesting that there still exists some climate variability, but that climate change is making extreme events ever more common.[7] Of course, coal is recognized as a

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[4] *See, e.g.*, Rob Atkinson, et. al., Climate Pragmatism: Innovation, Resilience, and No Regrets (July 2011) (attached as Exhibit 2); Veerabhadran Ramanathan, et. al., *The Copenhagen Accord for Limiting Global Warming: Criteria, Constraints, and Available Avenues* (Feb. 2010) (attached as Exhibit 3); Intergovernmental Panel on Climate Change, United Nations, Climate Change 2007: Synthesis Report; A.P. Sokolov, et. al., *Probablistic Forecast for Twenty-First-Century Climate Based on Uncertainties in Emissions (without Policy) and Climate Parameters*, J. of Climate (Oct. 2009) (attached as Exhibit 4); Bill McKibben, *Global Warming's Terrifying New Math*, ROLLING STONE, July 19, 2012 (attached as Exhibit 5).

[5] *See, e.g.*, James Hansen, *Tipping Point: Perspective of a Climatologist*, State of the Wild 2008-2009 (attached as Exhibit 6); Global Carbon Project, A framework for Internationally Co-ordinated Research on the Global Carbon Cycle, ESSP Report No. 1 (2003) (attached as Exhibit 7); International Energy Agency, CO_2 Emissions from Fuel Combustion, Highlights 2011 (attached as Exhibit 8); Global Carbon Project, 10 Years of Advancing Knowledge on the Global Carbon Cycle and its Management (2010) (attached as Exhibit 9).

[6] *See, e.g.*, Intergovernmental Panel on Climate Change, United Nations, Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (2011) (attached as Exhibit 10); Aiguo Dai, *Increasing Drought Under Global Warming in Observations and Models*, Nature: Climate Change (Aug. 2012) (attached as Exhibit 11); Stephen Saunders, et. al., Hotter and Drier: The West's Changed Climate (2008) (attached as Exhibit 12).

[7] *See*, James Hansen, et. al., Climate Variability and Climate Change: The New Climate Dice (2011) (attached as Exhibit 13); James Hansen, et. al., *Perception of Climate Change*, Proceedings in the National Academies of Science (March 4, 2012) (attached as Exhibit 14); James Hansen, et. al., Increasing Climate Extremes and the New Climate Dice (Aug. 2012) (attached as Exhibit 15).

principle driver behind climate change—representing over 40% of anthropogenic CO_2 emissions and more that 70% of CO_2 emissions from power generation—making it imperative that GHG emissions are considered in the this EIS.[8] Research conducted by the National Research Council has confirmed the fact that the negative impacts of energy generation from fossil fuels, principally coal generation, are not represented in the market price for such generation.[9] In other words, failing to internalize these externalities of coal generation—such as the impacts to climate change and human health—has resulted in a market failure that requires government intervention. This failure threatens to be exceedingly expensive, as the International Energy Agency recently concluded:

> If stringent new action is not forthcoming by 2017, the energy-related infrastructure then in place will generate all the CO_2 emissions allowed in a 450 scenario up to 2035, leaving no room for additional power plants, factories, and other infrastructure unless they are zero-carbon, which would be extremely costly. Delaying action is a false economy: for every $1 of investment avoided in the power sector before 2020 an additional $4.3 would be needed to be spent after 2020 to compensate for the increased emissions.[10]

Accordingly, the MEPA analysis of the Bull Mountain Mine must address the externalities of coal generation, including a pathway toward mitigating climate change.[11]

The Citizens recognize that the Montana Legislature has attempted to restrict the effects that can be considered under MEPA. Montana Code Annotated § 75-4-201(2)(a) was recently amended to read: "Except as provided in section (2)(b), an environmental review conducted pursuant to subsection (1) may not include a review of actual or potential impacts beyond Montana's borders. It may not include actual or potential impacts that are regional, national, or global in nature."

This provision should not prevent DEQ from fully addressing the effects of climate change (including how climate change will be exacerbated by the proposed expansion of the Bull Mountain Mine). This is because the Citizens do not seek to have DEQ analyze the impacts of

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[8] *See*, International Energy Agency, Power Generation from Coal (Oct. 2011) (attached as Exhibit 16).

[9] *See, e.g.*, National Research Council, Hidden Costs of Energy: Unpriced Consequences of Energy Production and Use (2010) (attached as Exhibit 17); Paul Epstein, et. al., *Full Cost Accounting for the Life Cycle of Coal*, Ann. NY. Acad. Sci. 1219, at 73-98 (2011) (attached as Exhibit 18); Nicholas Muller, et. al., *Environmental Accounting for Pollution in the United States Economy*, American Economic Review at 1649-1675 (Aug. 2011) (attached as Exhibit 19).

[10] International Energy Agency, World Energy Outlook: Executive Summary (2012) (attached as Exhibit 20).

[11] *See, e.g.*, International Energy Agency, Executive Summary, Energy Technology Perspectives 2012: Pathways to a Clean Energy System (2012) (attached as Exhibit 28); United Nations, Intergovernmental Panel on Climate Change, Renewable Energy Sources and Climate Change Mitigation (2012) (attached as Exhibit 21).

climate change beyond the borders of Montana. On the contrary, the Citizens seek and the plain language of § 75-4-201(1)(iv)(B) (providing that EIS must evaluate "*any* adverse effects on Montana's environment) mandates that DEQ address the impacts of climate change on the lands *within* the state of Montana. And it is clear that there are many and worsening impacts, including: more extreme temperatures, more severe drought, more severe forest fires, outbreaks of forest pests, ecosystem disruption, decreased snowpack, lower summer stream flow, stressed water supplies, increased fish kills, and more extreme precipitation events, and fundamental precipitation alterations.[12] These climatic and ecological impacts are and will continue to harm the state's economy and the well-being of Montanans, including: impacts to the forestry industry (fire, pests, and changing composition of forests), agriculture (hotter weather, increased drought, strained water), and tourism (decrease snowpack, dying forests, reduced cold-water fisheries).[13] Climate disruption is and will continue to have negative impacts on human health in Montana through more thermal stress, harm from increased extreme weather events, such as storms and floods, and increased spread of disease such as *Salmonella*, *Cryptosporidium*, *Girardia*, West Nile virus, equine encephalitis, Lyme disease, hantavirus, and Rocky Mountain spotted fever.[14]

For DEQ to construe § 75-4-201(2)(a) to preclude any consideration of the impacts of climate disruption on Montana (the contribution to this disruption from coal mined at the Bull Mountain Mine) would plainly violate the environmental protection provisions of Montana's Constitution. Montana's Constitution. Mont. Const. art. II, § 3, art. IX, § 1. These provisions are "anticipatory and preventative." *Mont. Envtl. Info. Ctr. v. Dep't of Envtl. Quality*, 296 Mont. 207, 230 (1999). To the degree that § 75-4-201(2)(a) purports to arbitrarily exempt certain undeniable impacts from review—impacts acknowledged by DEQ[15] and which will be aggravated by the voluminous emissions that would be caused by combustion of the coal at the Bull Mountain mine—it implicates the Citizens' right to a clean and healthful environment.

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[12] Stephen Saunders, et. al., Hotter and Drier: The West's Changed Climate at 7-13, 19-29; U.S. Global Change Research Program, Global Climate Change Impacts in the United States 123-28, 135-38 (2009) (attached as Exhibit 22).

[13] *Id.*; *see also, e.g.*, Tom Lutely, *West Nile Virus Cases Surface in Southern Montana*, Billings Gazette (Aug. 22, 2012), *available at* http://billingsgazette.com/news/state-and-regional/montana/west-nile-virus-cases-surface-in-southern-montana/article_e94cc220-27da-5f8d-9d8b-358148b8e78d.html.

[14] U.S. Global Change Research Program, Global Climate Change Impacts in the United States at 89-98; National Research Council of the National Academies of Science, Advancing the Science of Climate Change 309-19 (2010) (attached as Exhibit 23).

[15] Montana DEQ, Climate Change in Montana, http://www.deq.mt.gov/ClimateChange/default.mcpx ("Global climate change is affecting Montana now and will continue to do so into the future. . . . Climate change will affect all of Montana's major economic sectors: agriculture, forestry, transportation and tourism, and energy supply. We may be challenged with decreased crop yields, longer forest fire seasons, reduced snowpack, and declining hydropower. The environmental costs may include reduced wildlife habitat and diminished water quality and stream flow. It is imperative that we all begin to do what we can to address this crucial issue for our own sake and the sake of the generations of Montanans to come.") (last visited Nov. 5, 2012).

Because the provision would not pass muster under strict scrutiny review, it would be unconstitutional if applied in this case.

Once the EIS quantifies the total GHG emissions directly, secondarily, and cumulatively caused by and related to the proposed mining at Bull Mountain, it must then actually consider how those GHG emissions will impact the climate. The EIS should then address means of reducing or mitigating the impacts of the emissions and compare emissions and impacts across various alternatives. Without a hard look at cumulative GHG emissions, DEQ will not be able to craft a legally defensible EIS. The EIS must assign a monetary value for the GHG emissions that would result from the proposed mining at Bull Mountain and the subsequent combustion of the coal. Such monetization of the costs of GHG emissions is critical to inform decision-makers and the public about the value of the proposed action.

Given the implications of what climate change is doing to our global ecosystems, and the recognition by DEQ of GHGs contributing to climate change impacts in Montana, it is incumbent upon the preparers of the EIS to identify how the approval of the proposed expansion of the Bull Mountain mine would affect global and local climate change and the related impacts of that change. The National Aeronautics and Space Administration (NASA) has noted recent evidence of global climate change, including sea level rise, global temperature rise, warming oceans, shrinking ice sheets, declining Arctic sea ice, glacial retreat, extreme weather events, and ocean acidification.[16] Local climate change concerns in Montana include drought, decreased water availability, decreased snow packs, increased wildfire, degraded landscapes, desertification, pollutant deposition, altered plant growing seasons, and adverse impacts to people and flora/fauna, among others stated above.

9. Prospecting and Additional Mining

It is clear that SPE is actively looking to conduct additional mining operations in the Bull Mountains, as the company is currently seeking prospecting permits from DEQ for lands adjacent to the current mine. *See* Mont. Dep't of Envtl. Quality, Coal and Uranium Program, Pending Applications & Environmental Assessments, http://www.deq.mt.gov/ea/coal.mcpx. The impacts of prospecting must be considered as potential cumulative impacts because they are under "concurrent consideration" by DEQ. Admin. R. Mont. 17.4.603(7). The Draft EA, however, wholly fails to even acknowledge this prospecting, let alone address potential cumulative impacts. *See* Draft EA at 13 ("No new activities have been identified in the area."). This is a clear violation of MEPA. DEQ may analyze potential cumulative impacts from prospecting (for example, cumulative surface impacts from mining-related and prospecting equipment on private land above the mine) and concludes that they are not significant, but DEQ may not simply ignore them.

Additionally, DEQ must consider the potential future mining, which is certainly foreseeable given the investment SPE is making in prospecting. Future mining is a secondary impact of prospecting. Admin. R. Mont. 17.4.603(18) (defining secondary effects as "a further impact to

[16] *See* NASA, Global Climate Change: Vital Signs of the Planet, *available at* http://climate.nasa.gov/evidence/.

the human environment that may be stimulated or induced by *or otherwise result from a direct impact of the action*." (emphasis added)). Furthermore, it is a fundamental tenet of federal NEPA jurisprudence that agencies and applicant may not segment or "piecemeal" a larger project to avoid preparation of an EIS. *E.g.*, *Chelsea Neighborhood Ass'n v. U.S. Postal Serv.*, 516 F.2d 378 (2d Cir. 1975). Courts have repeatedly overturned agencies that have analyzed piecemealed expansions of coal mines (even if the segmentation tactic began with the coal company). *E.g.*, *Cady v. Morton*, 527 U.S. 786 (9th Cir. 1976); *Bragg v. Robertson*, 54 F. Supp. 2d 635 (S.D. W. Va. 1999). As such, the impacts of future mining must be considered in the EA. The Draft EA does not currently consider such impacts. This oversight must be corrected.

10. Waste Disposal Area

The Draft EA acknowledges that the current waste disposal area (WDA) for the Bull Mountain Mine is going to reach capacity before completion of the mining proposed in Amendment 3: "Soil and suitable material salvage associated with development of a waste disposal area (WDA) would create the largest disturbance outside the facilities area. The current WDA will reach capacity prior to completion of the long wall panels." Draft EA at 4. Thus, the construction of another WDA is an impact that will result from approval of the proposed expansion. As such, it is a secondary impact, which must be analyzed in the Draft EA. Admin. R. Mont. 17.4.603(18). The Draft EA, however, completely ignores DEQ's mandatory duty to evaluate secondary impacts, and seeks to defer analysis of the impacts of the second WDA. Draft EA at 4 (stating that once current WDA fills, "SPE will submit plans for a new WDA"). DEQ's failure to consider, analyze, and disclose the impacts of construction of the second WDA violates MEPA as well as the environmental provisions of Montana's Constitution. Mont. Const. art. II, § 3; art. IX § 1. This oversight must be correct prior to any approval of the proposed mine expansion.

Additionally, the EA does not adequately evaluate the current impacts of the existing WDA. In addition to failing to address impacts from disposal of Madison formation water in the WDA, the Draft EA does not adequately disclose or evaluate what waste is being disposed in the WDA. Nor does the Draft EA address the potential effects of water pollution leaching out of the WDA. It is apparent from SPE's PHC that the WDA is not lined. And while SPE insists that compaction of the WDA reduces permeability, it does not render the WDA impermeable. Appx. 314-5 at 60-61 (noting that compaction "reduce[s] vertical permeability so that it is very low"). What amount of pollution will leach through the partially permeable WDA? What will the constituents be? How will the WDA be reclaimed? DEQ must address these concerns both for the existing WDA and the WDA that will have to be constructed to accommodate waste from the proposed expansion. As currently written the Draft EA violates NEPA, Montana's fundamental right to clean and healthful environment, and the constitutional requirement of full reclamation. Mont. Const. art. III, § 3, art. IX §§ 1-2.

11. History of Violations

As part of the permit application process, SPE is required to submit to DEQ a list of all violations of SMCRA or any other law, rule, or regulation of the United States or any state. Admin. R. Mont. 17.24.303(1)(n). Here, SPE's submission lists a dozen violations in the past three years. Application Tbl. 303-5. Such serial disregard for the law should be expected from a

corporation that is owned by foreign investors, with no connection to Montana. *See* Application Tbl. 303-4. As Wendell Berry has perceptively noted, the interest of such a corporation is simply to "take as much value as they can, as cheaply and quickly as they can take it." Compliance with laws and regulations is, apparently, just a secondary concern that receives little emphasis. Indeed, the mine was recently cited for eight safety violations. *See Roundup Mine Cited for Safety Violations*, Helena Independent Record (Mar. 1, 2013), *available at* http://helenair.com/news/state-and-regional/roundup-coal-mine-cited-for-safety-violations/article_332dff4e-82f9-11e2-94f1-0019bb2963f4.html. These violations were not included in the permit application. As such, DEQ may not approve the application at this time.

Relatedly, it is noteworthy, that one of the owners of SPE is a Cypriot company. Application Tbl. 303-4. As such, DEQ may not permit the mining unless it can show that Cyprus affords American companies the same rights and privileges available to SPE in the United States. Mont. Code Ann. § 77-3-305(1).

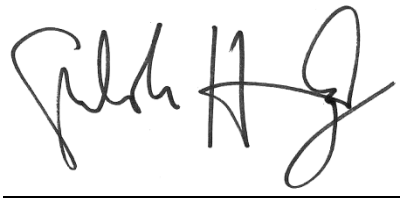
12. DEQ Must Prepare an EIS

Given the multifarious impacts of the proposed expansion of the Bull Mountain Mine, the large quantity of coal involved, the long period of mining and reclamation involved (through 2025, according to SPE, though it is possible that mitigation measures will be required in perpetuity), DEQ must prepare an EIS for the proposed mine expansion. *See* U.S. Dep't of the Interior, 516 Departmental Manual 13.4 (providing that an EIS should normally be prepared for a mine expansion that is greater than 1,250 acres and that will require 15 years or more for mining and reclamation operations).

13. Conclusion

The Citizens look forward to continued participation in DEQ's and OSM's continued evaluation the proposed expansion of the Bull Mountain Mine. Should you have any questions about these comments, please do not hesitate to contact me.

Sincerely,



Shiloh Hernandez
Western Environmental Law Center
103 Reeder's Alley
Helena, Montana 59601
406.204.4861
hernandez@westernlaw.org

Montana Department of
ENVIRONMENTAL QUALITY

Steve Bullock, Governor
Tracy Stone-Manning, Director

P. O. Box 200901 • Helena, MT 59620-0901 • (406) 444-2544 • Website: www.deq.mt.gov

October 18, 2013

Mr. Dusty Weber
Signal Peak Energy LLC
Bull Mountain Coal Mine #1
100 Portal Drive
Roundup, MT 59072

Permit ID: C1993017
Revision Type: Amendment
Permitting Action: Approval
Subject: Approval; Amendment 03

Dear Dusty:

The Department of Environmental Quality (DEQ) has completed preparation of its Written Findings, including the Cumulative Hydrologic Impact Assessment, for Amendment Application 03. Based on the information in Amendment Application 03 and our Written Findings, DEQ has approved Amendment 03, Bull Mountain Mine No.1. Enclosed for your records is a copy of the updated mining permit (C1993017), which will expire on May 9, 2018. Also enclosed please find a copy of DEQ's Written Findings.

Upon receipt of this approval, Signal Peak Energy, LLC (SPE) must submit the necessary documents to the Office of Surface Mine to amend the Federal Mine Plan. The federal coal located in Sections 4, 8, 10, 14, and 22 Township 6N, Range 27E cannot be mined until the Federal Mine Plan has been amended. Additionally, the state coal located in Section 16, Township 6N, Range 27E cannot be mined until the Montana Board of Land Commissioner's has approved the mine operation and reclamation plan as required by the state lease.

A copy of these materials and the updated permit materials will be forwarded to the OSM offices in Casper and Denver.

Sincerely,

Chris A. Yde, Supervisor
Coal and Uranium Program
Industrial and Energy Minerals Bureau
Ph: 406 444.4967
Fax: 406 444.4988
E-mail: cyde@mt.gov

Cc: Jeff Fleischman, OSM Casper Office
Gene Hay, OSM Denver Office
Ed Coleman, IEMB Bureau Chief (via email)

Enclosures

FC: 620.903 (AM03)

SURFACE/UNDERGROUND MINING PERMIT

STATE OF MONTANA
Department of Environmental Quality
PO Box 200901
Helena, Montana 59620-0901
Phone (406) 444-4970

UNDERGROUND MINING PERMIT NO. C1993017
Pursuant to Title 82, Chapter 4, Part 2, MCA

Pursuant to Application for Coal Mine Permit Amendment No. 03 received by the Department on October 5, 2012, Coal Mine Permit No. C1993017 issued to Signal Peak Energy on May 9, 1993 is hereby amended as follows:

Legal Description of Amendment Area:	**Change in Permitted Acres:**	**Amount of Change in Bond:**
See Attached Table	7,161	$762,357

THIS PERMIT, WHEN EXECUTED BY THE CHIEF, INDUSTRIAL AND ENERGY MINERALS BUREAU, DEPARTMENT OF ENVIRONMENTAL QUALITY, SHALL AUTHORIZE THE OPERATOR TO COMMENCE COAL MINING ACTIVITIES AS SPECIFIED HEREIN AND AS SHOWN ON MAPS, PLANS, SPECIFICATIONS AND APPLICATIONS SUBMITTED BY THE OPERATOR.

Name and Address of Operator:
Signal Peak Energy LLC
100 Portal Drive
Roundup MT 59072

Legal Description of Mine:
See attached Table

Mineral to be Mined: Coal

County: Musselshell and Yellowstone

Total Bond Level: $11,700,000
(Total Bond Level did not change as the required bond after the adjustment is $11,194,411.)

Total Permitted Acreage: 14,896 acres, more or less

Acreage Breakdown	Permit Acreage Mineral	Permit Acreage Surface
Federal:	2,675	941
Tribal:	0	0
State:	642	642
Private:	11,579	13,313
County:	0	0
Total:	14,896	14,896

THIS PERMIT AUTHORIZES THE PERMITTEE TO CONDUCT MINING ACTIVITIES AS SPECIFIED IN:

1. The mining and reclamation permit numbered C1993017 covering this mine or mine complex approved by the Commissioner, Department of State Lands, or Director, Department of Environmental Quality on October 15, 1993, and any approved amendments, revisions, and renewals.
2. The application for amendment Surface/Underground Coal Mine Permit numbered C1993017, received by the Department of Environmental Quality on October 5, 2012 and revised through August 19, 2013.

Stipulations: ARM 17.24.304(1)(b) requires "listing, location and description of all archaeological, historical, ethnological and cultural resources and values of the proposed mine plan and adjacent area." Amendment 03 is for extension of underground activities of an existing mine, and the only significant surface disturbance anticipated is the possibility of some surface failure in areas of steep slopes where few archeological/historical resources are expected. No additional archeological or historical sites have been discovered, and no impacts to known archeological or historical sites should occur. Protection of any incidentally discovered sites is stipulated in the approved surface mining permit.

ARM 17.24.303(1)(o) requires "copies of the documents upon which the applicant bases his or her legal right to enter and begin mining operations in the permit area." SPE must provide documents from the State of Montana Board of Land Commissioner's approval of mine operation and reclamation plan for coal located in Section 16, Township 6N, Range 27E.

ARM 17.24.303(1)(o) requires "copies of the documents upon which the applicant bases his or her legal right to enter and begin mining operations in the permit area." SPE must provide the amended Federal Mine Plan allowing mining in all or portions of Sections 4, 8, 10, 14, and 22 Township 6N, Range 27E to complete mining in these areas.

THIS PERMIT IS ISSUED PURSUANT TO AND SUBJECT TO THE PROVISIONS OF TITLE 82, CHAPTER 4, PART 2, MCA, AND RULES ADOPTED PURSUANT TO TITLE 82, CHAPTER 4, PART 2, MCA.

THIS PERMIT IS APPROVED AND ISSUED BY:

Chief, Industrial and Energy Minerals Bureau
Department of Environmental Quality

Date: 10/18/2013

Effective Date: October 18, 2013
Expiration Date: May 9, 2018
This permit is valid for 5 years and is subject to renewal, suspension or revocation as deemed necessary by the Department.

LEGAL DESCRIPTION FOR PERMIT NUMBER C1993017

AREA	LEGAL DESCRIPTION	ACRES
ORIGINAL PERMIT AREA (93017)		
	Township 6 North, Range 26 East	
Section 12	S½S½NW¼; S½SW¼NE¼; S½ Lot 2, Lots 3 and 4; W½SE¼; SW¼	384
Section 13	All (Lots 1,2,3,4; W½E½; W½)	598
Section 14	All	640
	Subtotal:	1,622
	Township 6 North, Range 27 East	
Section 7	Lot 4; SE¼SW¼; SE¼; SE¼NE¼	276
Section 16	SW¼SW¼	40
Section 17	W½; W½NE¼; SE¼	561
Section 18	All (Lots 1,2,3,4; E½; E½W½)	634
Section 19	Lots 1,2,3; E½W½; E½	604
Section 20	N½; W½SW¼; NE¼SW¼	444
Section 21	NW¼NW¼	40
	Subtotal:	2,599
	TOTAL ORIGINAL PERMIT AREA ACREAGE*:	**4,220**
PERMIT AMENDMENT #1 AREA (0178)		
	Township 6 North, Range 27 East	
Section 20	SE¼; SE¼SW¼	202
Section 28	SW¼; SW¼NW¼	201
Section 29	All	645
Section 30	E½NE¼	81
Section 32	N½	322
Section 33	All	641
Section 34	W½SW¼	79
	TOTAL PERMIT AMENDMENT #1 AREA ACREAGE*:	**2,172**
PERMIT AMENDMENT #2 AREA (0187)		
	Township 6 North, Range 27 East	
Section 8	SW¼SW¼; Portions of SE¼SW¼; N½SW¼; SW¼NW¼; SW¼SE¼	140
Section 16	Portion of NW¼SW¼	1
	Deleted Portion of SW¼SW¼	-21
Section 17	Portion of SE¼NE¼	7
	Deleted Portions of W½NE¼; NE¼SE¼	-29
Section 21	SW¼; Portions of SE¼; S½NW¼; NE¼NW¼; SW¼SW¼NE¼	298
	Deleted Portion of NE¼NW¼NW¼	-1
Section 27	SW¼SW¼; Portion of SW¼NW¼; NW¼SW¼; NE¼SW¼; SE¼SW¼	121
Section 28	N½NW¼; SE¼NW¼; NW¼NE¼; S½NE¼; SE¼	430
Section 34	NW¼; NE¼SW¼; Portions of SW¼NE¼; NW¼NE¼	246
	NET PERMIT AMENDMENT #2 AREA ACREAGE*:	**1,193**

AREA	LEGAL DESCRIPTION	ACRES
PERMIT AMENDMENT #3 AREA		
	Township 6 North, Range 27 East	
Section 3	SW¼; SW¼SE¼; W½NW¼	285
Section 4	S½NE¼; NE¼NE¼; SE¼NW¼; S½	474
Section 5	S½SE¼	79
Section 8	NE¼; E½NW¼; Portion SW¼NW¼; Portion S½;	454
Section 9	ALL	637
Section 10	S½; NW¼;W½NE¼; SE¼NE¼	601
Section 11	S½SW¼; NW¼SW¼; SW¼NW¼	160
Section 14	S½; NW¼; SW¼NE¼	520
Section 15	ALL	641
Section 16	N½; SE¼; E½SW¼; Portion W½SW¼	622
Section 17	Portion E½	101
Section 21	Portion N½; Portion SE¼	306
Section 22	ALL	640
Section 23	N½; SW¼; NW¼SE¼	520
Section 26	W½; W½SE¼; NE¼SE¼; W½NE¼; SE¼NE¼	559
Section 27	E½; Portion W½	518
Section 28	Portion NE¼NE¼	12
Section 34	Portion W½NE¼	32
	TOTAL AMENDMENT NO. 3 AREA ACREAGE*:	**7,161**
INCIDENTAL BOUNDARY CHANGES		
MR 07-17-04	Township 6 North, Range 27 East	
Section 30	NW¼NE¼	40
MR 10-17-09	Township 6 North, Range 26 East	
Section 25	(Road Corridor)	19
	Township 6 North, Range 27 East	
Section 30	(Road Corridor)	18
MR 10-17-12	Township 5 North, Range 27 East	
Section 4	N½NE¼ (Select Tract)	26
MR 10-17-23	Township 4 North, Range 25 East	
Section 13	(Comanche Basin Loadout. This area was not contiguous to current mine and is not calculated in the acreage.)	-20
MR 135	Township 6 North, Range 26 East	
Section 25	(Soil Stockpile)	8
	Township 6 North, Range 27 East	
Section 30	(Soil Stockpile)	12
Section 31	E½NE¼ (Select Tract)(Road Corridor)	5
Section 32	(Road Corridor)(Soil Stockpile)	19
	Township 5 North, Range 27 East	
Section 4	(Road Corridor)NW¼	4
	TOTAL INCIDENTAL BOUNDARY CHANGE ACREAGE*:	**150**
	TOTAL LOM PERMIT ACREAGE**:	**14,896**

* Acreages calculated using AutoCAD MAP. Any minor acreage totaling differences can be attributed to decimal/fractional acreages in actual Microsoft Excel Spreadsheet.

** LOM PERMIT ACREAGE = ORIGINAL + AMENDMENTS 1, 2 & 3 + INCIDENTAL BNDRY CHANGES



Below is a compilation of the public comments from the Signal Peak Energy (SPE) Permit Amendment 3 (AM3) Acceptability comment period. The comment period ended Monday, October 7, 2013. The comment topics laid out below are not exact from individuals, but attempted to draw out the environmental concerns from each comment. Many comments were simply statements that are not addressed below.

Comment responses for SPE AM3 Acceptability:

1. **Longwall mining impacts and issues need to be studied more sufficiently. Longwall mining is damaging the land surface and the impacts cannot be ignored.**

   While new to Montana, the longwall mining process has been used in other parts of the US and other countries for many decades. That body of experience provides a general understanding of subsidence mechanisms and their estimation. Prior to issuance of the initial permit a study was conducted to predict probable subsidence impacts considering the geology and other conditions specific to this site. Monitoring and observation of two completed panels indicates that subsidence has occurred consistent with initial predictions.

2. **Subsidence issues need to be looked at as they pose a danger to people and livestock. Long-term effects of subsidence need to be looked at and should be monitored. Subsidence poses a danger to livestock, wildlife, and people in the area. Subsidence causes large cracks - some 19 feet deep. Subsidence has impacted livestock production.**

   Reclamation of Subsidence Features:

   Subsidence features generally include surface cracks. In local areas, cracks with significant width or scarps have occurred. Subsidence features are reclaimed as necessary to restore the premining land use. Although not anticipated, any features that are found to significantly 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 land disturbance associated with transporting equipment, minor surface cracks (generally less than 6 inches in width) or cracks on slopes greater than 20% will not be repaired unless repairs are agreed to by the operator, landowner, and DEQ. DEQ can prescribe the repair if the operator is nonresponsive.

   Where repairs are to be undertaken, the method will vary according to the specific feature and specific site condition. The repair of cracks with significant width is described on Figure 313-2 through Figure 313-4. 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 topsoil into the crack. It is expected that heavy equipment will be required for

most repairs. The method and equipment chosen will 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. Exceptions may include times where repair is needed to facilitate mining; or where delay has potential to exacerbate a problem such as erosion or negatively affect water resources. To the extent possible, prior to significant surface disruption, DEQ 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.

A subsidence monitoring program is in place which records the vertical displacement of a number of survey markers in the mine area. In addition, a LIDAR aerial survey was conducted over the entire life of mine area prior to mining. The survey provides a very detailed baseline elevation contour map. A further LIDAR survey was conducted after mining of the first two panels. Comparison of the two surveys allows for a very accurate and detailed view of the overall subsidence that has occurred.

The nature of the subsidence produces a number of expressions at the surface including cracks, ridges, and slumps. The surface features are monitored with periodic ground tours of mined areas. The ground tours are supplemented with periodic helicopter inspections of steep and remote features. Additionally, SPE has agreed to periodically monitor one large crack on the southwest corner of Dunn Mountain.

Undoubtedly, open cracks will present some increased risk to livestock. Observations to date indicate most cracks close back up as mining progresses. Field observations indicate many of the remaining cracks are healing fairly quickly. The mine is committed to repairing persistent large cracks where the repair itself does not cause undue surface damage. Cattle have been grazing throughout the mining operation with little or no adverse effect to date.

SPE has conducted repair of select subsidence features. The methods used to date include grading (flat areas), grouting (steep areas), and dozer work. The dozer repairs were rather disruptive and required seeding of the disturbed areas.

3. **Signal Peak Energy's permit application for Amendment 3 is incomplete. Data for existing wells in the area, archaeological studies, new waste disposal area needs to be reviewed.**

SPE's amendment application was determined to be complete on December 14, 2013. All applicable data has been reviewed. Data for existing wells in the area are collected monthly or quarterly and it is reported to DEQ two times per year and/or upon request by DEQ.

A Class I survey has been conducted over the entire Life-of-Mine (LOM) area. A class III inventory has been conducted in the facilities area, as well as the area all areas up to Panel 6. A Class III inventory was also completed on the surface related to the federal coal leases.

Therefore, only a portion of the area has not been covered by a Class III survey. SPE has committed to complete Class III surveys two panels in advance of mining.

SPE acknowledges that a new waste disposal area may be needed in the future, however; there is no new waste disposal area proposed in this amendment. When SPE determines the location and operating plan needed for a second Waste Disposal Area, SPE will be required to submit the application as a major revision; there will be a significant adjustment to the bond and the hydrologic balance will be affected.

4. **DEQ needs to look at the location for the proposed waste disposal area.**

   See comment 3 above.

5. **Signal Peak has a long history of safety issues and violations. These should be considered in DEQ's review of the application.**

   DEQ does not have a law or rule that would allow SPE's history of safety issues and associated violations to be considered during the review of the amendment application.

6. **There are additional impacts to the following: air quality (dust), roads (visibility is impaired by trucks disposing of material), vegetation (no new plants should be introduced-such as Knapweed), wildlife (animals such as Canada geese, mallards, teal, black duck were not mentioned in the list of birds), water (how does one replace a dried up spring, well, or pond?), archeological studies and pipelines. How will these impacts be mitigated?**

   Air Quality – There should be no additional impacts other than extending the same impacts that are occurring today. The air quality permit issued by DEQ's Air Resource Management Bureau addresses these issues.

   Roads – SPE in conjunction with the county recently cold paved the county road up to the WDA to reduce the amount of dust generated and improve the visibility situation. Dust is required to be controlled by use of best management practices (e.g. water).

   Vegetation – As committed to by SPE in Permit Section 313, "Noxious weeds found on the permit area will be controlled throughout the life of the operation to reduce the seed source available to invade reclaimed areas. Re-vegetated areas will be qualitatively evaluated annually to assess weed populations. Weed control plans have been developed in accordance with the Noxious Week Management Act in cooperation with the Musselshell and Yellowstone County Weed Control Boards and are included in Section 17.24.308 of the permit.

   Wildlife – The above mentioned are not considered species of special concern and for that reason not mentioned in the list of species of concern. A complete list of wildlife species

observed on the mine site is incorporated into the Annual Wildlife Monitoring Reports. These reports provided the baseline information needed for this discipline.

Water – Current operations at SPE indicate only short term disruption or interruption of springs, ponds, and wells pumping from the upper overburden directly above active underground mining. Nevertheless, section 313 of the permit describes the commitments SPE has made to mitigate dried up springs, wells or ponds in the event of long term disruption or interruption. Mitigation measures include the enhancement of existing natural springs, seeps and water holes, and the construction of water developments such as wells, reservoirs, small ponds, tanks, and guzzlers. The selection of appropriate enhancement/development techniques depends on many site specific factors such as current function and management of existing water resources, existing level of development of at spring sites, seasonal water availability and flow, potential for increasing existing spring flow, topographic characteristics at spring sites and habitat enhancement goals and objectives, and the needs of local water users . SPE is committed to mitigate springs, stream reaches, and ponds to achieve post mining land use and to ensure no net loss of wetlands.

Archaeology - The archaeological studies are required to be completed in areas that disturbance is going to occur. SPE has committed to conducting Class III level surveys approximately two panels (2 years) in advance of longwall extraction. SPE has committed to protect all eligible sites per Section 106 of the National Historic Preservation Act and mitigated with SHPO and DEQ approval.

7. **Signal Peak Energy's postmining plant mix has low nutritional value. Post-mining plants need to be able to sustain wildlife and agriculture.**

   The postmining seed mix used by SPE is adjusted based on the surrounding vegetation, agreements with land owners, pre-veg surveys etc. Additionally, the areas re-seeded associated with AM 3 will be areas associated with roads and drill pads. There will be a very limited amount of disturbance associated with AM3 (proposed 25 acres of 7,161 acres).

8. **Longwall mining and subsidence issues put burdens on local farmers and ranchers. Ranching is a lifestyle and DEQ needs to represent the people in their livelihoods. Ranch country depends on water and high-quality springs. Agriculture is the biggest industry in Montana.**

   DEQ acknowledges that subsidence related to underground mining at SPE places short term burdens on owners of surface rights. However, results of current operations indicate that cracking and fracturing related to subsidence heal rapidly. SPE has agreed to provide surface owners with information about the location of mining activity so that ranch operators can avoid losses. SPE has also committed to mitigate effects of subsidence as explained in the response to comment no. 2. Also, see response to comment 6 for further details.

9. **The data that the state is looking at is old and outdated.**

   SPE is required to collect and submit a variety of data. Data collection efforts are on-going and DEQ utilizes the most up-to-date information available in making regulatory decisions. DEQ utilizes both original data associated with the permit and monitoring data collected since the mine was initially permitted.

10. **A fourteen page checklist environmental assessment is not sufficient to cover this expansion.**

    The checklist EA is utilized to refresh the existing EIS for the mine. In addition to the Environmental Assessment, the DEQ conducts a Cumulative Hydrologic Impact Analysis (included in the Written Findings) that considers potential hydrologic impacts from mining activities.

    The EA is the fourth that DEQ has completed to update the EIS. Additionally, the Bureau of Land Management completed an EA for the Federal Coal leasing action.

11. **Requesting that the Montana Department of Environmental Quality (DEQ) prepare a full Environmental Impact Statement (EIS). The DEQ should finalize an EIS before considering this permit expansion.**

    DEQ determined at completeness that an EIS was not necessary for this mine amendment as the original EIS conducted for the Bull Mountain Mine addressed all anticipated and potential impacts from mining in the LOM. The amendment area is included in the LOM area addressed in the original EIS.

12. **The expansion will reduce the value of property in the area. We need to ensure that the land is left economically viable for future ranching opportunities.**

    See comment 6 above for further discussion.

13. **DEQ has a statutory duty to study the impacts of coal mining in our state and not ignore them.**

    DEQ works diligently at seeing that the law and the rules associated with Coal Mining are followed.

14. **The U.S. market for coal is declining.**

    DEQ disagrees with the premise of the comment. U.S. domestic demand for western coal and has been relatively stable since 2008. See U.S. Energy Information Administration, July 26, 2013, report. In addition, the strength of existing or future demand for the product of a particular coal mine for the term of a permit may not follow a general market trend. Most importantly, the

marketability of the anticipated production of an operator seeking a permit falls outside the scope of considerations appropriate for review of a permit amendment under MSUMRA.

15. **Coal will be shipped to China. Air pollution from China's coal plants cause severe respiratory health problems. These air pollutants affect the air quality in the US. People who suffer from asthma or other issues that affect a person's ability to breathe will be impacted by higher levels of air pollutants.**

    The proposed activity is the mining, processing, and transportation of coal at SPE and does not include how the coal is used outside Montana. Although the impacts of burning coal may qualify as an indirect impact for the purpose of environmental review under NEPA, MEPA, specifically section 75 -1- 201(2)(a) MCA, excludes from the scope of environmental review actual or potential impacts beyond Montana's borders or impacts that are regional, national, or global in nature. Although one commenter questions the legality of the section 75-1-201(2)(a) limitations on MEPA review, as an agency of the State of Montana, DEQ is obligated to enforce statutes within its delegated authority. See response to comment 18.

16. **The EA does not address global warming**

    See response to comment 15.

17. **DEQ has violated federal and state legal requirements by failing to make the original EIS, which is supplemented by the environmental review for AM3, reasonably available to the public.**

    DEQ disagrees with the comment. DEQ complied with the procedures for supplementing an EIS described in MEPA Model Rule X. In response to comments received, the original EIS is available for public review on the DEQ website as explained in the text of the EA under the "Background" heading.

18. **The Montana Constitution provides a right to a clean and healthful environment.**

    DEQ acknowledges that the Montana Constitution provides a right to clean and healthful environment. Nevertheless, MSUMRA describes the standards and criteria, in part to evaluate whether a proposed coal mine operation to implement those constitutional rights. MSUMRA authorizes strip and underground coal mining operations within the state in accordance with its provisions and requirements. The Legislature has authorized DEQ to permit and regulate surface and underground coal mining operations in accordance with MSUMRA and other environmental laws applicable to coal mining operations. DEQ, as a state agency, "must faithfully execute the laws of Montana" and the authority to determine the constitutionality of state statute such as MSUMRA rests outside of its purview. *See Merlin Myers Rev. Trust v. Yellowstone County*, 2002 MT 201, P22, 311 Mont. 194, 200, 53 P.3d 1268, 1272.

19. The presence of federal coal requires NEPA analysis of the proposed mine expansion and preparation of an EIS.

DEQ disagrees that state review and possible approval of the SPE AM3 application triggers federal NEPA review by DEQ. DEQ recognizes that that the presence of federal coal requires federal approval of the mining plan under SMCRA and Montana's State-Federal Cooperative Agreement, 30 CFR § 746 and 30 CFR § 926.30. The Office of Surface Mining is responsible for any environmental review under NEPA. No provision of NEPA or MEPA requires joint federal and state environmental review.

Renewal of the SPE AM3 permit application is state action that requires environmental review under MEPA. DEQ determined that preparation of an environmental assessment is the appropriate level of environmental review for renewal of the SPE AM3. DEQ issued its draft environmental assessment simultaneously with the public notice of acceptability of the application on September 3, 2013.

20. The proposed expansion of mining operations will cause violation of water quality standards in the permit area and material damage to the hydrologic balance outside the permit area.

DEQ agrees that impact of mining operations on the hydrologic balance and prevention of material damage outside the permit area are considerations that must be evaluated before the permit may be issued. Although DEQ assesses whether the proposed operation is designed to prevent disruption to the hydrologic balance in the permit area, Montana water quality standards do not apply within the permit area. DEQ must assess the cumulative hydrologic impacts and whether the operation is designed to prevent material damage to the hydrologic balance outside the permit area. Violation of a water quality standard is an indicator of material damage. The assessment of cumulative hydrologic impacts is incorporated within the findings that DEQ must issue with the permit. See Findings, Appendix I. In the assessment, DEQ finds that the mining operation described in the application is designed to prevent material damage outside the permit area as neither drawdown nor a decrease in water quality is expected to be sufficient to disrupt or interrupt the beneficial use of water. This finding is based in large part on current groundwater monitoring which indicates that no material damage has resulted from current operations. Findings, Appendix 1, ¶10.2.2, 10.3. The assessment considers mitigation measures available in the event that mining operations disrupt or interrupt either a surface or groundwater resource. In any event, the reclamation bond will not be released until the operator demonstrates that concentration of TDS in groundwater within the mined area no longer poses a reasonable threat of material damage.

21. The provisions for hydrologic reclamation are inadequate.

DEQ disagrees with this comment. Reclamation by providing alternate sources of water that support an existing use is consistent with MSUMRA. This conclusion is reasonable based on current usage of water from the underburden for existing beneficial uses. Otherwise,

groundwater monitoring of current mine operations indicates no material damage to groundwater resources. See DEQ's response to Comment No. 20.

22. The Draft EA does not address possible pollution from use of waters taken from the Madison Formation in mine operations.

DEQ added language in the final EA to address this comment. SPE proposes to use Madison Formation water for coal processing and dust suppression. Although Madison Formation water is not suitable for use as portable water, DEQ concludes the proposed use poses no threat of contamination of state waters outside the permit area. This conclusion is based on storage of Madison Formation water in a lined pond and use for dust suppression which does not constitute a discharge to state waters. One commenter's claim that Madison Formation water exceeds DEQ Circular 7 standards for arsenic is attributable to misreading of the information in the application.

23. The EA fails to consider cumulative impacts from prospecting.

DEQ added language to the final EA to address this comment. The impacts from prospecting activity at the Bull Mountains Mine are minimal and are not significantly cumulative to the direct or indirect impacts of the proposed activity, as the SPE's prospecting activities are subject to a prospecting permit that precludes any substantial disturbance, as defined in ARM 17.24.301, of the natural land surface.

24. The EA fails to consider indirect impacts from the need to enlarge the Waste Disposal Area.

DEQ added language to the final EA to address this comment. DEQ acknowledges that the Waste Disposal Area is insufficient to handle additional waste from mining activity contemplated by the AM3 expansion. Environmental review for expansion of the Waste Disposal Area will be addressed in a subsequent major revision to allow SPE to prepare a comprehensive proposal for the expanded Waste Disposal Area. Because the impacts of expansion of the Waste Disposal Area are reasonably expected to be confined within the permit area, it is not necessary to address this issue at this time.

Appendix I

Bull Mountains Mine No. 1

Cumulative Hydrologic Impact Assessment

Amendment 3

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Acronyms used within this document.	
Acronym	**Definition**
ARM	Administrative Rules of Montana
CDFA	Cumulative Departure From Average
CHIA	Cumulative Hydrologic Impact Assessment
CIA	Cumulative Hydrologic Impact Area
DEQ	Department of Environmental Quality
DNRC	Department of Natural Resources and Conservation
EPA	Environmental Protection Agency
GWIC	Groundwater Information Center
LOM	Life of Mine
MBMG	Montana Bureau of Mines and Geology
MCA	Montana Code Annotated
MCL	Maximum Contaminant Levels
MPDES	Montana Pollutant Discharge Elimination System
MSUMRA	Montana Strip and Underground Mine Reclamation Act
NRWQC	National Recommended Water Quality Criteria
NSDWR	National Secondary Drinking Water Regulations
OSMRE	Office of Surface Mining Reclamation and Enforcement
PHC	Probable Hydrologic Consequences
PMT	Post Mine Topography
SMCRA	Surface Mining Reclamation and Control Act
SPE	Signal Peak Energy LLC
SWL	Static Water Elevation
TDS	Total Dissolved Solids
TSS	Total Suspended Solids
USGS	United States Geological Survey

1.0 INTRODUCTION

The Montana Department of Environmental Quality (DEQ) is the regulatory authority for coal mining operations in the state of Montana and implements the Montana Strip and Underground Mine Reclamation Act (MSUMRA) and the administrative rules pursuant to the Act. The Federal Office of Surface Mining Reclamation and Enforcement (OSMRE) implements the Surface Mining Reclamation and Control Act of 1977 (SMCRA), and has granted primacy to DEQ as the regulatory agency for coal mining in Montana. As such, DEQ is responsible for the review and decisions on all permit applications to conduct surface coal mining operations within the state with oversight from OSMRE.

This assessment of cumulative hydrologic impacts is prepared by DEQ as part of the permit review process for Amendment 3, submitted by Signal Peak Energy, LLC (SPE) for the Bull Mountains Mine No. 1 (SMP C1993017). It includes an analysis of anticipated hydrologic impacts associated with mining in and adjacent to the proposed permit area.

2.0 REGULATORY ENVIRONMENT

Administrative Rule of Montana (ARM) 17.24.314(1) requires that DEQ determine that a given proposed mining and reclamation operation has been designed to minimize disturbance to the hydrologic balance on and off the mine plan area, and prevent material damage[1] to the hydrologic balance[2] outside the permit area. In order to evaluate whether the proposed mining and reclamation plan has been designed to prevent material damage, a Cumulative Hydrologic Impact Assessment (CHIA) is prepared by DEQ. Prior to making a permitting decision, DEQ makes an assessment of cumulative hydrologic impacts of all existing and anticipated mining operations. The CHIA analysis must be sufficient to determine whether mining impacts to the hydrologic balance on and off the permit area have been minimized and material damage outside the permit area has been prevented [ARM 17.24.314(5)].

2.1 MATERIAL DAMAGE CRITERIA

Following the definition of material damage in 82-4-203(31), Montana Code Annotated (MCA), material damage criteria are established for the evaluation of both groundwater and surface water quality and quantity, and are used to determine whether water quality standards and beneficial uses of water, including water rights, outside the permit boundary have been or are expected to be impacted by mining activities. The interruption or diminution of a surface water or groundwater supply to the extent that an existing use is precluded is considered to be material damage. When material damage occurs mitigation is required; mitigation would include dependable, long-term replacement of a resource acceptable for the designated use [ARM 17.24.314(1)(c) and 17.24.648] or treatment to return water quality to state standards.

Material damage criteria include applicable numeric and narrative water quality standards, and criteria established to protect existing beneficial uses of water. Baseline water quantity and quality is compared against changes or anticipated changes in quantity and quality associated with mine activity to determine if uses have been impacted or water quality standards exceeded outside the permit boundary. Threshold criteria are used by DEQ to identify potential problems in water quality and quantity before these problems escalate to material damage (**Table 2-1**).

The Montana Water Quality Act (MWQA) is the primary basis for water quality protection in the state of Montana. Rules promulgated under the authority of MWQA establish surface water and groundwater standards [ARM 17.30.subchapter 6 and 17.30.subchapter 7] to protect the designated beneficial uses of state waters. Numeric standards published in Circular DEQ-7, Montana Numeric Water Quality Standards, were developed using guidance from the Environmental Protection Agency (EPA) which includes:

[1] "Material damage" means, with respect to the protection of the hydrologic balance, degradation or reduction by coal mining and reclamation operations of the quality or quantity of water outside of the permit area in a manner or to an extent that land uses or beneficial uses of water are adversely affected, water quality standards are violated, or water rights are impacted. Violation of a water quality standard, whether or not an existing water use is affected, is material damage. [82-4-203(31), MCA]

[2] "Hydrologic balance" means the relationship between the quality and quantity of water inflow to, water outflow from, and water storage in a hydrologic unit, such as a drainage basin, aquifer, soil zone, lake, or reservoir, and encompasses the dynamic relationships among precipitation, runoff, evaporation, and changes in ground water and surface water storage. [82-4-203(24), MCA]

- National Recommended Water Quality Criteria (NRWQC) developed under Section 304(a) of the Clean Water Act
- Drinking Water Lifetime Health Advisory (HA) and Maximum Contaminant Levels (MCL) developed under the Safe Drinking Water Act

Montana's surface water and groundwater rules also contain narrative standards [ARM 17.30.620 through 17.30.670 and 17.30.1001 through 17.30.1045]. The narrative standards are designed to address water quality for which sufficient information does not yet exist to develop parameter-specific numeric standards. These narrative standards are established to protect beneficial uses from adverse effects, supplementing the existing numeric standards.

2.1.1 Surface Water Material Damage Criteria

Material damage to surface water occurs when, as a result of mining, any of the following are met:

- Surface water quality standards outside of the permit area are violated
- Land uses or beneficial uses of water outside of the permit area are adversely affected to the extent that an existing use is precluded
- A surface water right is adversely impacted

Material damage criteria for surface waters[3] include the numeric water quality standards established in Circular DEQ-7 (where applicable) and water use criteria established for parameters where specific numeric standards have not been developed. Surface water quality standards contained in ARM 17.30.620 through 17.30.670 vary according to stream classification. Numeric standards for parameters including *Escherichia coli* bacteria, color, turbidity, pH, and temperature, change with stream classification. Surface waters in the Bull Mountains Mine area are classified as C3 surface waters [ARM 17.30.611]. Beneficial uses of surface waters are established according to the streams' water use classification. Specific water quality standards (along with general provisions) protect the established beneficial uses for each classification [ARM 17.30.620].

Beneficial uses of C3 waters are given in ARM 17.30.629:

> *"Waters classified C-3 are to be maintained suitable for bathing, swimming, and recreation, and growth and propagation of non-salmonid fishes and associated aquatic life, waterfowl, and furbearers. The quality of these waters is naturally marginal for drinking, culinary, and food processing purposes, agriculture, and industrial water supply. Degradation which will impact established beneficial uses will not be allowed."*

With the exception of some spring-fed stream reaches and stockwater ponds, surface waters in the vicinity of the Bull Mountains Mine are typically ephemeral[4], flowing only in response to precipitation

[3] "Surface waters" means any waters on the earth's surface including, but not limited to, streams, lakes, ponds, and reservoirs; and irrigation and drainage systems discharging directly into a stream, lake, pond, reservoir, or other surface water. Water bodies used solely for treating, transporting, or impounding pollutants shall not be considered surface water. [ARM 17.30.602(33)]

[4] "Ephemeral stream" means a stream or part of a stream which flows only in direct response to precipitation in the immediate watershed or in response to the melting of a cover of snow and ice and whose channel bottom is always above the local water table. [ARM 17.30.602(12)]

events or for short reaches below the issue point of springs or seeps. As stated in ARM 17.30.637(6), "*Ephemeral streams are subject to ARM 17.30.635 through 17.30.637, 17.30.640, 17.30.641, 17.30.645, and 17.30.646 but not to the specific water quality standards of ARM 17.30.620 through 17.30.629"* (including Circular DEQ-7, Montana Numeric Water Quality Standards).

Applicable water quality standards for ephemeral surface waters are therefore predominantly narrative and primarily include the General Treatment Standards [ARM 17.30.635], General Operational Standards [ARM 17.30.636], General Prohibitions [ARM 17.30.637], and other descriptive portions of the surface water quality standards.

Numeric surface water standards for perennial and intermittent streams are in **Table 2-2**. This list is not exhaustive, and only includes selected parameters known to be potentially associated with coal mining impacts that are monitored by Montana coal mines. These numeric water quality standards apply to perennial/intermittent streams only and not to ephemeral streams.

The predominant beneficial use of surface water in the area is drinking water for livestock and wildlife. Water quality guidelines established for livestock use (**Table 2-3**) are based on limits for livestock consumption found in documents published by the Montana Extension Service (Sigler and Bauder, 2012, Hutcheson, 2001). These are not enforceable standards but are used by DEQ for guidance in evaluating suitability of pre- and postmine water quality for livestock use. It is not uncommon for water quality in the area to naturally exceed these livestock water quality guidelines.

Surface water availability is variable in the Bull Mountains area. Surface water quantity is generally governed by the seasonal runoff from storms and snow melt. Runoff models submitted with as-built pond designs model the water and sediment retention of sediment control ponds. These models are also used to assess water quantity impacts to downstream users and uses from the capture and/or attenuation of storm runoff. Runoff from areas disturbed by mining operations is required to be managed in a manner that prevents surface water pollution (e.g. increased suspended solids, changes in pH, increases in metals of concern, etc.) outside the permit area to the extent possible with the best technology currently available [ARM 17.24.633].

Impacts to surface water supply and water rights are evaluated with respect to regional and local impacts to surface water resources and natural variations in seasonal and yearly runoff. Mitigation for the loss of a beneficial use of surface water or a water right requires provision of a dependable, long-term replacement water resource of acceptable quality for the designated use and adequate quantity to support the existing and/or planned future use [ARM 17.24.314(1)(c) and 17.24.648].

Material damage criteria are therefore a combination of applicable narrative standards, numeric standards, and livestock beneficial use criteria. Impacts to surface water rights are evaluated on a case-by-case basis, and include an analysis of climatic conditions and the natural availability of surface water.

2.1.2 Groundwater Material Damage Criteria

Groundwater material damage occurs when, as a result of mining, any of the following circumstances occur:

- Groundwater quality standards outside of the permit area are violated

- Land uses or beneficial uses of groundwater outside of the permit area are adversely affected to the extent that an existing use is precluded
- A groundwater right is adversely impacted

Protection of groundwater quality for beneficial uses is based on narrative standards established by ARM 17.30.1006 (**Table 2-4**) and numeric standards for individual parameters in Circular DEQ-7 (**Table 2-2**). Water quality guidelines established for livestock use are shown in **Table 2-3**. Groundwater quality in the area may naturally exceed these livestock water quality guidelines. Groundwater released from the mine is not required to be purer than natural, background conditions [75-5-306, MCA and ARM 17.30.629(2)(k)].

Beneficial uses of groundwater outside the permit boundary include livestock and domestic use. Wells completed in the alluvium, overburden, and underburden supply livestock water. Wells for domestic use typically have reported completion depths that suggest utilization of groundwater from the underburden. The location of private wells and water rights are discussed in Section 6.0, Water Resource Uses.

Water levels and water quality are monitored inside and outside the permit boundary to establish baseline conditions and measure subsequent changes so that impacts during and after mining can be anticipated and evaluated. Analytical results of water quality parameters most likely to be affected by mining are compared to standards to determine suitability of the water for current and anticipated uses. The amount of change to water quality or quantity that can be tolerated before material damage results will depend upon the baseline water level and water quality at a given location. Baseline water levels or water quality that is marginally supportive of a given use are more vulnerable to changes that would cause material damage than water levels or water quality more supportive of an established use.

A transient groundwater flow model was developed to predict drawdown impacts to water levels in aquifers affected by operations at the Bull Mountains Mine. Impacts to wells and springs located within the modeled drawdown area can be anticipated and mitigated to avoid material damage. Mitigation for the loss of a beneficial use of groundwater or a water right requires providing a dependable, long-term replacement water resource of acceptable quality for the designated use and adequate quantity to support the existing and/or planned future use [ARM 314.24.314(1)(c) and 17.24.648].

2.2 CUMULATIVE HYDROLOGIC IMPACT ASSESSMENT

The Cumulative Hydrologic Impact Assessment (CHIA) includes an assessment of the Probable Hydrologic Consequences (PHC) of the proposed operation (Nicklin, 2013[1]). The PHC determination is prepared by the applicant [ARM 17.24.314(3)] and approved by the regulatory authority (DEQ). Prior to making a permitting decision, DEQ makes an assessment of all hydrologic impacts of the proposed operation, existing, previous, or anticipated mining that collectively impact surface and groundwater systems in a cumulative impact area. The CHIA analysis must determine whether mining impacts to the hydrologic balance on and off the permit area have been minimized and material damage outside the permit area has been prevented [ARM 17.24.314(5)]. The hydrologic balance is defined as "the relationship between the quality and quantity of water inflow to, outflow from, and storage in a hydrologic unit such as a drainage basin, aquifer, soil zone, lake, or reservoir, and encompasses the dynamic relationships among precipitation, runoff, evaporation, and changes in ground and surface water storage as they relate to uses of land and water within the area affected by mining and the adjacent area" [ARM 17.24.301(54)].

CHIA development involves the analysis of critical aspects of the hydrologic system within a defined cumulative impact area to predict the type and magnitude of impacts to the hydrologic system from proposed and existing mining. The CHIA process includes the following: 1) define the area to the studied, 2) describe the hydrologic system, the baseline values, and subsequent changes, 3) identify hydrologic resources likely to be affected, 4) develop criteria for evaluating the impacts, 5) estimate the impacts of mining on hydrologic resources, and 6) make a material damage determination and prepare a statement of findings.

3.0 PROPOSED PERMITTING ACTION

Signal Peak Energy, LLC (SPE) submitted Permit Amendment Application No. 3 that would increase the mine permit area of their underground coal mine (Bull Mountain Mine No. 1) by adding 7,161 acres and expanding the mine from five longwall panels (approved under Amendment 00187) to fourteen longwall panels (**Figure 3-1**). This area is included in 18 sections within Township 6 North, Range 27 East.

SPE is the operator of Montana's only active underground coal mine. The proposed plan includes room and pillar mining to develop nine additional panels for longwall mining. If approved, Amendment No. 3 would extend the permit boundary toward the northeast and increase the permit area by 7,161 acres for a total area of 14,896 acres. Total acreage of the underground mine plan would be 10,569 acres. Approval of this amendment would increase the potential of the ground surface (directly above the panels and within the angle of draw) to be adversely affected by subsidence caused by mining.

Approximately 20 acres of additional surface disturbance is expected as a result of this amendment. This amount of additional disturbance is necessary to construct temporary surface facilities that support underground mining. Temporary surface support facilities include boreholes, associated pads, power lines, and roads. No significant changes to the reclamation plan are proposed since Amendment No. 3 only addresses expansion of the permit area to allow continuation of underground mining. Plans for the mitigation of impacts to springs, seeps and drainages are included in SMP C1993017. Site-specific plans for the repair or mitigation of impacts related to subsidence or other mining impacts will be developed as they are identified, in consultation with DEQ and affected landowners.

If approved, Amendment No. 3 would add approximately 176 million tons of in-place coal reserves or 110 million tons of mineable coal. Of this, approximately 83 percent would be recoverable (91 million tons of coal.

3.1 BACKGROUND & MINING HISTORY

Bull Mountain Mine No. 1 (**Figure 4-1**) is approximately 15 miles southeast of Roundup, MT in Musselshell and Yellowstone counties. Mining Permit C1993017 was originally issued to Meridian Minerals on October 15, 1993, transferred to Glacier Park Company on September 25, 1995, transferred to Mountain Inc., on November 20, 1995, and to BMP Investments, Inc. (BMPII) on July 2, 2002. BMPII was renamed Bull Mountain Coal Mining (BMCM), Inc. on December 13, 2006 and the permit was transferred to SPE on September 15, 2008.

Coal fields in the area extend from the Bull Mountains to just north of Roundup and the Musselshell River (Perry, 1962). Mining in the greater region began in the early 1880's, and commercial mining was underway by about 1906. Coal was shipped to smelters and used as a source of fuel for the railroads (Slagle and others, 1986). All of the mines near the town of Roundup were abandoned by 1956. By the mid-1980's, the last few mines operating in the coal field were located south of Roundup in the Bull Mountains and included the P.M. Mine, the Divide mine, and the Storm King Mine (Slagle and others, 1986) (**Figure 3-2**). These mines mined the Mammoth Coal seam underlying the Bull Mountains that is approximately 10 feet to 15 feet in thickness.

The largest mines were the Divide (or Carlson) mine and the adjacent Gildroy mine, each with about 70 to 80 acres of underground room and pillar mining. These mines are approximately 1.5 miles south of

the Bull Mountains Mine No.1 portals area and extracted Mammoth Coal. Two mines, the P.M. Mine and Meridian Test Pit (**Figure 3-2**), are the predecessors of Bull Mountains Mine No.1. The P.M. Mine included 51 acres of room and pillar mining. The Meridian test pit included 90 acres of strip mining that were reclaimed upon completion of mining. The P.M. Mine was operated as an underground coal mine in the 1930's that was converted to a surface mine in 1972 by the Maged Family. In 1989 Meridian Minerals Company (Meridian) opened the Meridian Test Pit surface mine to the southeast. P.M. Coal Company then reopened the underground mine in 1991. The Meridian Test Pit surface mine and the underground mine combined were termed the Bull Mountains Mine. The remaining mines in the area were all much smaller underground operations that used room and pillar or other simple mining techniques and have been abandoned. The majority of mines are located where the Mammoth Coal crops out at the surface, and it is the coal seam that was most likely mined.

3.2 CURRENT MINING OPERATIONS

Coal at Bull Mountains Mine No. 1 is recovered using continuous mining and longwall mining methods. Continuous mining includes cutting parallel entries (main entries) approximately 8 to 10 feet high by about 20 feet wide intersected by regularly spaced tunnels or crosscuts. Pillars or unmined areas between the entries and crosscuts are the primary supports of the mine. This method of mining is known as "room-and-pillar mining" and is used primarily for developing entries necessary for transportation, ventilation, utilities, and providing access to longwall panels.

Longwall mining requires a significant amount of up-front preparation, or "development" using continuous mining methods. In order to supply power, water, air, and safe transportation corridors to the longwall panels, a set of parallel entries must be established. These main entries, or "mains," are designed to remain intact for the life of mine, and allow access to the longwall panels via "gate roads". Gate roads are driven roughly perpendicular to the mains, and consist of three parallel entries. Besides providing worker access to the longwall panels, gate roads are vital for the installation of longwall equipment, ventilation of the working area, and transportation. Once gate roads have been developed around a panel, the longwall equipment can be installed.

Longwall mining is a method that removes all coal from each longwall panel, effectively achieving 100 percent coal extraction, and causes surface subsidence. Longwall mining uses a series of hydraulic supports, or shields, set up along the longwall face that function as temporary supports to protect workers and equipment. A cutting machine or shearer moves back and forth along the coal face and line of shields, cutting the coal in a series of passes. After the shearer completes a pass the entire system (shields, shearer, and face conveyor) advances (perpendicular to the shearer) and unsupported overburden is allowed to collapse into the void formally occupied by coal.

At full production SPE is capable of mining longwall panels at a rate of 11,000,000 tons of raw coal per year. This is equivalent to the longwall face advancing approximately 55 feet per day. However, actual production rates are expected to be less. Each gate road is designed to stay open for the first panel, but yield as the adjacent panel is mined-out, mining out of sequence would limit access to some panels and limit coal conservation. Panels must be mined in sequential order to achieve maximum coal recovery.

4.0 REGIONAL OVERVIEW

The permit and proposed amendment area of Bull Mountains Mine No.1 is located in the Bull Mountains in central Montana, within the Northern Great Plains physiographic province (**Figure 4-1**). The Bull Mountains lie within the drainage basins of the Yellowstone River and the Musselshell River. The lands to the north of the Bull Mountains drain to the Musselshell River while the lands to the south drain to the Yellowstone River. The majority of the proposed permit amendment area is located within the Rehder Creek and Fattig Creek drainages, which are tributaries of the Musselshell River.

Differential erosion of rocks of varying hardness and resistance is the main process active in forming the present landscape. The underlying rocks are composed of interbedded shales, claystones, siltstones, coals, and sandstones; however, the high mesas and ridges are capped by "clinker". Clinker is a term used to describe the baked sedimentary rocks resulting from burning of underlying coal beds. The shales and claystones tend to be easily eroded, while the sandstone and clinker are more resistant to erosion. Sheet and rill erosion are active geomorphic processes in the upper drainage basins, and mass wasting occurs locally along the steep-walled ridges. Ephemeral streams occur throughout the area; intermittent flow, which may occur on lower reaches of Rehder and Fattig creeks during wet years, has been observed along portions of the streams supported by springs or seeps associated with groundwater base flow.

Vegetation in the Bull Mountains Mine No. 1 study area includes silver sagebrush-mixed grasslands, mixed grasslands, ponderosa pine-mixed grassland, burned ponderosa pine-mixed grassland, and relatively small areas of improved pasture and wetlands. In 1984 an intense fire burned much of the forest leaving many scattered charred logs and dead trees. Currently the burned area is dominated by grasses.

4.1 CLIMATE

The climate of south central Montana is classified as semiarid continental. Precipitation and temperature measurements have been collected at the mine and also at the nearby climate stations at Roundup, MT (National Weather Service Cooperative Observer ID 247214) and Billings, MT (National Weather Service Cooperative Observer ID 240807). Climate data are available from the Western Regional Climate Center (WRCC, 2013) with temperature and precipitation records for Roundup and Billings going back to 1914 and 1948, respectively.

Figure 4-2 shows average precipitation data from the past 30 years at Roundup and Billings, MT. The average annual precipitation (1983-2012) at Roundup (elevation 3,230 ft) is 13.58 inches and Billings (elevation 3,570 ft) is 13.36 inches. The average peak precipitation month is June at Roundup (2.53 inches) and May at Billings (2.21 inches), while the average minimum monthly precipitation occurs in January at Roundup (0.37 inches) and December at Billings (0.46 inches).

4.2 TOPOGRAPHY

The topography in the mine area consists of gently sloping valleys bounded by moderately steep to very steep ridges capped by isolated sandstone and clinker mesas. Elevations range from approximately 3,700 to 4,700 feet above mean sea level. Surface slopes vary from zero to 15 percent in the vicinity of

the proposed surface facilities and up to 50 percent or more in the higher elevations of the Bull Mountains.

4.3 GEOLOGY

Alluvial deposits (gravel, sand, and silt) are generally unconsolidated and typically occur in ephemeral drainages or areas of lower elevation in the stream and valley bottom areas. Alluvial deposits are generally less than 40 feet in thickness.

The Bull Mountain coal region and vicinity is underlain by a sequence of sedimentary rocks that comprise the Bull Mountain Basin. This sequence of rocks is comprised of an alternating sequence of sandstones, siltstones, shales, carbonates, clinker, and coal approximately 12,000 feet in thickness that range from early Paleozoic to Tertiary in age. The basin is underlain by Precambrian metamorphic basement rocks (Wheaton, 1992). The sedimentary sequence was deposited or formed in a single depositional center of the Powder River Basin but is now isolated or separated from the main basin due to post-depositional tectonics and erosion.

Tertiary age continental rocks of the Tongue River Member of the Fort Union Formation are the principal rock units disturbed by longwall mining at the Bull Mountains Mine No. 1. Rocks of the Tongue River Member consist of interbedded siltstones, sandstones, shales and coals and form the bedrock under the mine area where they extend to depths in the range of about 1100 feet below the base of the Mammoth Coal. **Figure 4-3** illustrates the general geologic relationships in the region. **Figure 4-4** shows a detailed lithologic column for the Bull Mountains (Meridian, 1990). It represents about 1250 feet of the uppermost portion of the Tongue River Member occurring at Bull Mountains. Rocks of the Tongue River Member are situated in a broad (approximately 10 miles) and relatively long (axial trace of approximately 15 miles) north-northwest plunging syncline (less than one degree) that includes the Mammoth Coal. This area includes approximately 150 square miles.

A general description of the shallow stratigraphy of the Tongue River Member includes:

- Overburden rocks include interbedded siltstones, sandstones, shales, clinker, and coal above the Mammoth Coal. These rocks thicken toward the north-northwest or along the plunge of the syncline and range from approximately 200 feet to over 800 feet in thickness. Clinker, a reddish-brown, commonly brecciated pyro-metamorphic rock formed by prehistoric coal fires, occurs throughout the study area and commonly caps ridges or areas of higher elevation.
- Rocks of the Mammoth Coal occur immediately below overburden rocks. This coal seam is the principal economic seam in the area and varies in thickness from eight to ten feet within the permit boundary.
- Underburden rocks are similar to rocks of the overburden and are divided into the upper (immediately below the base of the Mammoth Coal) and deeper overburden.

5.0 CUMULATIVE IMPACT AREA

A cumulative hydrologic impact area (CIA) is defined by ARM 17.24.301(31): '"Cumulative hydrologic impact area" means the area, including, but not limited to, the permit and mine plan area within which impacts to the hydrologic balance resulting from the proposed operation may interact with the impacts of all previous, existing and anticipated mining on surface and ground water systems'. "Anticipated mining" includes the entire projected life through bond release of all permitted operations and all operations required to meet diligent development requirements for leased federal coal for which there is actual mine-development information available. The size and location of a given CIA will depend on the surface water and groundwater system characteristics, the hydrologic resources of concern, and projected impacts from the operations included in the assessment. For this CHIA, a surface water CIA and a groundwater CIA are delineated to assess impacts associated within these distinct hydrologic resource areas.

5.1 SURFACE WATER CUMULATIVE IMPACT AREA

The surface water CIA includes all areas that may see a measurable change in water quantity or water quality due to mining activities at the Bull Mountains Mine. The surface water CIA is presented in **Figure 5-1**.The CIA extends beyond the proposed Amendment No. 3 boundary and includes Rehder Creek to its confluence with Halfbreed Creek, and Fattig Creek to stream monitoring station 52996, both of which flow north to the Musselshell River. The CIA extends southward to include a number of named and unnamed ephemeral watercourses that flow south from the Bull Mountains to the Yellowstone River. CIA boundaries were established to allow evaluation of any potential impacts to streams, springs, and ponds that could reasonably be affected by present and future mining operations on and off the permit area. The CIA boundaries are established downgradient from potentially affected streams and springs, and include all surface water monitoring stations to allow assessment of impacts to stream water quality and quantity. Likewise, the CIA extends southward to include springs and ephemeral stream channels that could potentially be affected by subsidence-related changes in hydrology as Dunn Mountain and the southern portions of the permit area are undermined.

5.2 GROUNDWATER CUMULATIVE IMPACT AREA

The groundwater CIA boundary is based on the anticipated or potential extent of impacts to groundwater affected by mining based on the hydrology of the mine area. Potential impacts to groundwater include changes to water level or water quality such that the resource is no longer available or suitable for established uses.

The groundwater CIA is presented in **Figure 5-2**. This area is drawn to include mining-induced groundwater impacts from drawdown of the Mammoth Coal and underburden aquifers, as well as impacts upon shallow aquifers (alluvium and shallow fractured bedrock) from operations (ponds, conveyors, storage areas including fueling and laydown areas) within the facilities area, and impacts from the Waste Disposal Area (WDA). Water storage areas or ponds, pipelines, conveyors, fuel and other storage areas including the WDA have the potential to affect the shallow groundwater system of Rehder Creek and its tributaries such as PM Draw. Also, any mining-induced water quality impacts are expected to be contained within the CIA.

Results of the new transient flow model (Nicklin, 2013[2]) indicate that drawdown in the upper underburden and Mammoth Coal aquifers immediately after the cessation of mining would extend approximately three miles down gradient of the permit boundary to the northwest and generally extend to the outcrop of the Mammoth Coal in the cross and up gradient directions (**Figure 5-2**).

The groundwater CIA includes a buffer area around the modeled upper underburden five-foot drawdown contour and is also extended around the facilities area. The modeled drawdown for the upper underburden is used to define the CIA instead of the drawdown for the Mammoth Coal because drawdown in the upper underburden has a greater areal extent.

6.0 WATER RESOURCE USES

Historic and current surface and groundwater uses in and adjacent to the mine area include domestic, livestock, wildlife, and industrial uses. Wells located within and immediately adjacent to the CIA were identified from the Montana Bureau of Mines and Geology, Groundwater Information Center (GWIC). Registered surface water and groundwater rights were identified from records at the Montana Department of Natural Resources and Conservation (DNRC). Groundwater users (wells and groundwater rights) are shown in **Table 6-1** and **Figure 6-1**, and surface water users (surface water rights) are shown in **Table 6-2** and **Figure 6-2.**

6.1 DOMESTIC

Domestic use is indicated in GWIC or DNRC records for 33 wells within the groundwater cumulative impact area. Domestic or private wells in the area generally produce water under confined conditions from relatively deep underburden sandstones that are hydrologically separated from the upper underburden aquifer and Mammoth Coal, although a few domestic wells are completed in the upper underburden. Office Supply Well No. 1 (OSW), which supplies water to the mine office facilities, also produces from the deep (355 to 405 feet) and relatively thick (50 feet) underburden sandstones.

6.2 INDUSTRIAL

Three industrial supply wells, currently used for mining operations are completed in carbonate rocks of the Madison Group, at depths greater than 8,700 feet. These wells produce hot (approximately 165°F) and highly mineralized water that is isolated from the shallow aquifers of the Fort Union Formation by thousands of feet of confining rock units. The water contains concentrations of fluoride and radionuclides in excess of drinking water standards for groundwater that make the deep Madison well water unsuitable as potable water. Shallow aquifers disturbed by mining (i.e., overburden, Mammoth Coal and upper underburden) are not expected to have an effect on aquifers of the Madison Group.

Groundwater extraction from the Madison aquifer is expected to be approximately 600 acre-feet per year and will not have a significant drawdown effect on the aquifer. The nearest Madison well off site is approximately 20 miles from the mine and calculations indicate that the radius of influence of the Madison Group wells in use at the mine is limited to several miles (DNRC, 2012).

Industrial water from the Madison wells is stored in Madison Pond No. 1, a lined pond used by the mine for coal processing in the preparation plant, and to control road dust and dust generated during mining. Wastewater generated from the preparation plant and underground dust control is filtered and re-used in a closed-loop system.

6.3 AGRICULTURE

Livestock watering is the dominant water use in the CIA, and surface water, springs, and groundwater wells in the CIA area are used for livestock watering. Water quality in surface water, springs, and shallow wells is variable and may change seasonally with the availability and use of the water source. Deeper wells provide a more consistent and reliable water source.

60 wells that lie within the groundwater CIA are identified for stockwater use in the GWIC and DNRC databases. The completion depths listed for stockwater wells indicate that groundwater resources used for supply include alluvium, overburden, coal, and upper and deep underburden aquifers. There are also 46 groundwater rights listed for stockwater use at springs in the groundwater CIA. These springs are primarily sourced from overburden aquifers with a few sourced by the Mammoth Coal.

Livestock are listed as the use at 30 of the 34 surface water rights within the surface water CIA in the DNRC database. Livestock use of surface water is typically directly from the source or at a stock pond. The remaining four surface water rights are listed for irrigation use. Nearly half of the surface water rights in the surface water CIA are owned by SPE.

6.4 AQUATIC AND WILDLIFE HABITAT

Aquatic plants, macroinvertebrates, and vertebrates are associated with springs and ponds in the permit area. Fish have not been found in any of the ponds or stream reaches, and no threatened or endangered aquatic species or habitat has been identified in the area. Aquatic species are associated predominantly with stock ponds and rely on spring-water inputs for the maintenance of habitats.

7.0 MONITORING PROGRAM

Surface water and groundwater monitoring programs have been implemented at the Bull Mountains Mine No. 1 and are the basis for assessment of mining impacts on water resources. Monitoring has been designed to collect water quantity and quality information pertinent to the evaluation of impacts. The monitoring plan identifies parameters, sampling frequency, geologic units monitored, and site locations. All current monitoring sites are shown on **Figure 7-1** and **Figure 7-2**. A list of currently required analytical parameters is shown in **Table 2-2**. Quality assurance is an essential part of analytical requirements.

In addition to monitoring requirements issued under Mine Permit C1993017, the Bull Mountains Mine No. 1 also monitors MPDES-regulated discharges from the facilities and waste disposal areas, as directed under MPDES Permit No. MT0028983. The Bull Mountains Mine has eight outfalls under the MPDES Permit, of which six discharge to PM Draw and two discharge to Rehder Creek.

As mining proceeds or potential impacts are anticipated, the monitoring plan is revised to accommodate changes, including replacement of monitoring sites or development of new sites. Monitoring is required to continue through the final phase of bond release.

7.1 SURFACE WATER

Surface water monitoring began in 1989 with the original permit applicant, Meridian. Baseline surface water quality and quantity data were collected by Meridian from 1989-1991 as required by ARM 17.24.304. Monitoring resumed in 2003 when BMPII, assumed the surface mining permit from Meridian. Currently Signal Peak Energy operates the mine and collects surface water monitoring data associated with streams, springs, and ponds in accordance with ARM Section 17.24.314 (Permit C1993017, Vol. 3, Section 314, Protection of the Hydrologic Balance).

Streamflow is typically ephemeral in nature, with local spring inputs forming wet areas or short reaches of streamflow before infiltration into the alluvium. Flow from most springs is dependent upon precipitation and recharge of shallow perched aquifers that feed area springs and seeps. Continuous flow is therefore infrequent to rare.

Stream monitoring consists of the collection of water quality parameters and flow measurements at 12 established surface water monitoring stations within and outside of the permit area. Streams are sampled for a variety of field parameters, analytical constituents, peak flows, and instantaneous flows (**Table 7-1**). The stream monitoring network is shown in **Figure 7-1**.

Spring (spring and seep) monitoring consists of collection of water quality parameters and flow measurements at 81 established monitoring stations on and off the permit area. Springs are sampled for a variety of field parameters, analytical constituents, peak flows, and instantaneous flows (**Table 7-1**). The spring monitoring network is shown in **Figure 7-1**.

Pond monitoring consists of collection of field parameters at 16 established stock pond monitoring stations. Measurements are scheduled monthly at 13 ponds and semi-annually at 3 ponds. Parameters associated with pond sampling are field parameters only, as included in **Table 7-1**. The pond monitoring network is shown in **Figure 7-1**.

7.2 GROUNDWATER

Meridian installed the majority of the wells in the original monitoring network at Bull Mountains Mine No. 1 between 1989 through 1991. A number of wells installed by the Montana Bureau of Mines and Geology (MBMG) as early as 1981 were incorporated into the monitoring network that included 110 monitoring wells by 1995. With the exception of MBMG wells and a few wells that were transferred to landowners, the Meridian monitoring wells were abandoned and reclaimed after the Bull Mountains Mine No. 1 closed in 1998.

In 2002 and 2003, BMPII constructed a new monitoring network for the Bull Mountains Mine No. 1. The new monitoring wells were designed and completed to monitor the same stratigraphic interval in the same general location as the former monitoring wells. In some cases, new well construction differed from construction of the former well due to different drilling conditions and other limitations or purposes. BMCM reinstated the frequency and type of groundwater monitoring specified in the Meridian permit document including water level measurements, water chemistry field parameters, and groundwater quality sampling and laboratory analyses. While data from the original set of wells can generally be compared with data from the new wells, differences in well construction or monitoring methods and techniques create problems that prevent comparison of water level and water quality data between the old and new monitoring networks.

The monitoring plan was revised and updated in 2012. Currently, there are 105 groundwater wells which are monitored: 42 alluvial, 28 overburden, 15 Mammoth Coal, and 20 underburden (**Figure 7-2**). The existing groundwater monitoring wells and schedule are shown in **Table 7-2**. As overburden collapses into the void where Mammoth Coal has been removed, future groundwater monitoring wells will be installed in the gob to monitor the quality and quantity of water as the depleted aquifer is recharged.

8.0 BASELINE HYDROLOGIC CONDITIONS

The goals in establishment of baseline hydrologic conditions are to characterize the local hydrology, understand the regional hydrologic balance, and identify any water resource or water use that could be affected by the mining operation.

The hydrologic and geologic data required to evaluate baseline hydrologic conditions, probable hydrologic consequences, and cumulative hydrologic impacts of mining was collected by the original permit applicant, Meridian, from 1989-1991 and submitted with the initial permit application, and are discussed in detail in Sections 17.24.304(1)(e) and (f), respectively, of Mine Permit C1993017.

Baseline hydrologic and geologic data of the permit area and adjacent area of potential hydrologic impact were collected from a number of sources including literature review, hydrogeologic field reconnaissance, static water level measurements, aquifer tests, groundwater and surface water sampling and well and spring inventories. Monitoring data were collected by Meridian, the Louisiana Land and Exploration Company (LL&E), Yellowstone Coal Company, the P.M. Mine, Consolidation Coal Company, the United States Geological Survey (USGS), MBMG, and the Mine Safety and Health Administration (MSHA).

Baseline monitoring in the area was begun by LL&E as early as 1980. MBMG began monitoring the area in 1981 with the installation of eight monitoring wells. During baseline monitoring between 1989 and 1991 by Meridian and MBMG, a total of 3509 flow and water level measurements were taken, 614 water quality samples were collected, 59 aquifer tests were performed, and continuous flow data from three surface water sites and one spring were collected. In addition, narrative descriptions of surface drainage and channel characteristics were included in baseline water quality and quantity assessments.

Although the mining permit was originally issued to Meridian in the fall of 1993, substantial mining and disturbance at the mine site did not occur until mining by SPE began in 2008. Data collected by BMPII. and SPE from 2003 to 2008 may be considered baseline data for the purposes of impact assessment, and in some cases data collected from 2008 to present may also be considered baseline data where it was collected outside the area of mining influence (i.e. Fattig Creek drainage).

8.1 SURFACE WATER BASELINE

Surface water baseline conditions were derived from a network of surface water monitoring stations (springs/seeps, streams, ponds) established during initial permit development and include data predominantly from 1989 through 1991. Data collection resumed in 2003 with the onset of mining activities and continues presently.

8.1.1 Surface Water Regime

The region is drained by tributaries of the Musselshell and Yellowstone Rivers north and south of the permit area, respectively. Tributaries within and in the vicinity of the permit area that drain north to the Musselshell River include Fattig Creek, Rehder Creek, East Parrot Creek and Halfbreed Creek. Tributaries that drain south to the Yellowstone River include Pompey's Pillar Creek, Railroad Creek, and Razor Creek. There are no perennial streams within the surface water cumulative impact area. The nearest perennial stream of consequence is lower Halfbreed Creek which flows into the Musselshell River approximately 18 miles to the north. Tributary streams in the area are generally ephemeral and have

deeply cut valleys that often flood after heavy rains (Woolsey and others, 1917). Some drainages within the project study area contain intermittent reaches, which vary from year to year depending upon precipitation received in the contributing drainages and the amount of spring output contributing to baseflow.

8.1.2 Surface Water Quantity

Baseline water quantity data consists primarily of data collected from 1989 through 1991, and includes flow and/or water level data for streams, springs/seeps, and ponds. Streamflow in the study area are typically ephemeral, with short reaches supporting intermittent streamflow during wet years or periods of prolonged or above average precipitation. Typically streams flow only in response to seasonal snowmelt, precipitation events, or directly below spring inputs from local perched aquifers. The shallow alluvium or colluvium and bedrock outcrops in the study area are generally conducive to natural spring discharges. These springs are an expression of groundwater as geologic units crop out. At these outcrops, surface flow is initiated. The length of the surface expression is dependent on a number of variables, including amount of flow, width, and depth of alluvium/colluvium, and landowner manipulation of the drainage for livestock use.

Landowner manipulation of spring inputs has a dominant effect on surface flow as indicated at the major springs in the permit area including numbers 14325 (Busse Water), 17415 (Litsky), and 16655 (Cold Water). At these locations, embankments have been constructed across the drainages to form ponds which impound water for livestock. These ponds control downstream drainage and in some cases the ponds are large enough to eliminate downstream flow. Ponds are typically located directly below spring issuances or directly atop the spring input and are a reflection of spring water inputs from shallow groundwater movement.

In the absence of immediate precipitation events or spring snowmelt, stream and pond water quantity is generally governed by spring inputs from shallow perched aquifers that respond to seasonal precipitation. In most years, streambeds are dry, except below spring issue points. Sustained streamflows were observed, however, in 1991 when 19.1 inches of precipitation was recorded in Roundup, an amount nearly six inches above the 30-year (1982-2011) annual average of 13.4 inches. Sustained streamflows on Rehder Creek and Fattig Creek were again observed from 2011 through 2013 as a result of well-above average precipitation during the spring of 2011 and 2013. Conditions observed during the baseline periods should therefore be viewed within the context of regional precipitation trends, and at times, represent conditions during a period of above-normal precipitation.

As mining progresses and coal is removed through the longwall mining process, subsidence of overburden has the potential to affect spring flows and, consequently, associated stream flows. Due to ephemeral conditions in potentially affected drainages, the limited streamflow data set precludes detailed analysis and establishment of typical numeric baseline streamflow conditions. Rather, potential impacts from mining activity are more readily evaluated through changes in groundwater discharge from springs and the location of issue points that feed established ponds and stream reaches.

Flowing or ponded baseline conditions were reported for 36 individual springs from 1989 through 1991. **Table 8-1** presents an estimated average flow rate for 30 springs with flows greater than 1.0 gpm during the baseline monitoring period, and represents baseline flow conditions for springs for the climatic conditions observed during the 1989-1991 baseline monitoring timeframe.

8.1.3 Surface Water Quality

Baseline surface water quality data consists primarily of data collected from 1989-1991, and includes field parameters and analytical water quality samples from streams, springs/seeps, and ponds. Precipitation at Roundup, MT during this period was 15.2, 11.6, and 19.1 inches, respectively. The 30-year average annual rainfall at Roundup is 13.4 in.

Baseline (1989-1991) stream water quality data consists of water quality samples (n=10) from eight stream-sampling locations. All samples were collected during runoff events and represent water quality associated with ephemeral stormwater flows; seven of the 10 samples were collected during a single major storm event in June 1991. **Table 8-2** presents summary water quality statistics for analytical water quality samples collected during this time frame. A low number of observations (n=10) and high variability among data results reflects the ephemeral event-driven nature of surface flows in the area. Ephemeral flows are typically high in suspended solids as they occur in response to storm-driven events, resulting in detects of several metals (iron, manganese, aluminum, zinc) associated with suspended sediment. Other, less common metals (cadmium, chromium, mercury, nickel, silver) were detected at very low levels, or were not detected at all in baseline samples. As sampling events were from stormwater events on ephemeral streams, numeric standards in Circular DEQ-7 do not apply (see Section 2.2.1).

Baseline pond water quality data (1991) consists of water quality samples (n=20) from 16 pond-sampling locations. **Table 8-3** presents summary water quality statistics for analytical water quality samples collected during the sampling time frame (05/91-08/91). Baseline pond water quality data was collected from May through July of 1991 during a period of unusually high precipitation and may not reflect typical conditions in the region, which typically are much dryer.

Baseline spring water quality data (1989-1991) consists of water quality samples (n=231) from 16 spring-sampling locations. Spring water quality data is comparable to overburden water quality; sulfate and total dissolved solids (TDS) ranged from 11 mg/L to 3,020 mg/L and 226 mg/L to 6,030 mg/L and averaged 466 mg/L and 1,118 mg/L, respectively. **Table 8-4** presents summary water quality statistics for analytical water quality samples collected during this time frame.

In addition to baseline spring water quality data collected by Bull Mountains Mine No 1, Wheaton and Donato (1991) reported concentrations of sulfate and TDS collected in 1978 from six seepage sites along Halfbreed Creek just west of the permit area. Respective sulfate and TDS concentrations ranged from 370 mg/L to 640 mg/L and 947 mg/L to 1,460 mg/L and averaged 508 mg/L and 1,182 mg/L. Similarly, Wheaton and Donato (1991) reported concentrations of sulfate and TDS from eleven springs in the vicinity of the permit area. Respective sulfate and TDS concentrations ranged from 11 mg/L to 2,400 mg/L and 420 mg/L to 4,170 mg/L and averaged 615 mg/L and 1,592 mg/L.

8.2 GROUNDWATER

Baseline water level and water quality were measured in the alluvium, overburden, Mammoth Coal, and underburden during the baseline period 1989 - 1991. Monitoring continued during ownership by subsequent operators, but most of the monitoring wells used to determine baseline conditions were abandoned when the mine closed in 1998. A new network of 121 monitoring wells was completed in 2002 and 2003 by BMPII and continued to monitor baseline conditions as substantial mining disturbance had not yet occurred.

8.2.1 Groundwater Regime

Groundwater in the mine area occurs in the alluvial, overburden, Mammoth Coal, and underburden aquifers. Groundwater flow is generally toward the north-northwest except in the often dry alluvial aquifer system. Contiguous rock units including the sandstone above the Rock Mesa Coal (lower overburden aquifer), the Mammoth Coal, and the underburden are saturated across much of the study area.

Aquifer tests were performed by the MBMG and Meridian from 1982 through 1991. Aquifer tests results are summarized in **Table 8-5**. These results show a wide range of hydraulic conductivity (geometric mean between 28 and 0.013 feet per day) that decreases with depth. For example, unconsolidated alluvium has a hydraulic conductivity that is four orders of magnitude greater than that of the underburden. Storage coefficients were determined by 11 aquifer pumping tests in bedrock aquifers. These results indicate a wide range of storage coefficients in the overburden and the Mammoth Coal ranging from 1×10^{-3} to 6×10^{-6}. The underburden values were even wider in range, from 1×10^{-1} to 4×10^{-6}. In general, this indicates that groundwater typically occurs under confined conditions in bedrock aquifers.

8.2.2 Alluvial Baseline

Alluvial sediments locally are up to 20 feet in saturated thickness but are generally dry in the permit area except following periods of significant precipitation. Alluvial baseline water quantity was determined by a network of 25 relatively shallow monitoring wells completed in alluvium that occurs in the valley bottoms of the larger ephemeral stream channels. Alluvial material is not a major aquifer in the region due to its limited saturation and areal distribution.

Measurements from baseline alluvial wells indicated that the alluvial aquifer is generally dry in the permit area and becomes partly saturated in Rehder Creek near the northern border of the permit boundary. Alluvial groundwater flow in Rehder Creek is toward the west-northwest (downstream). The alluvium of ephemeral tributaries from the permit area into Rehder Creek is generally dry and becomes partly saturated along short reaches due to spring discharge and during significant seasonal precipitation events.

Alluvial baseline water quality was determined by monitoring 11 wells (**Table 8-6**). Data from these wells indicate that alluvial groundwater in the permit area and vicinity is generally of a magnesium-sulfate or magnesium-bicarbonate composition. Specific Conductance (SC) ranged between 759 μS/cm and 2,360 μS/cm with a mean of 1,625 μS/cm, and sulfate concentrations ranged from 143 mg/L to 1,000 mg/L with a mean of 535 mg/L. Alluvial groundwater ranged between Class I and Class II water (**Table 2-4**). However, most alluvial groundwater quality falls into Class II. Water quality of most alluvial groundwater is suitable for livestock.

8.2.3 Overburden Baseline

Overburden rocks are commonly over 200 feet in thickness and range to over 800 feet in thickness within the permit boundary. Shallow overburden groundwater is typically unconfined, perched, and often moves laterally along sedimentary layers before discharging as springs, seeps, or into alluvium (**Figure 4-3**). Water levels in the perched aquifers and spring flow issuing from them are strongly influenced by seasonal and periodic fluctuations in precipitation. Deeper overburden groundwater occurs in sandstones stratigraphically above the Rock Mesa and the Mammoth Coal seams (**Figure 4-4**).

These sandstones are up to 80 feet in thickness. Flow in these sandstones is generally toward the north-northwest, nearly coincident with the synclinal structural axis.

Overburden baseline groundwater quantity was determined by a network of 26 groundwater wells. Where saturated, overburden groundwater occurs under both confined and unconfined conditions depending upon the proximity to the outcrop. Baseline data indicate that overburden groundwater is associated with alternating perched aquifers and rock units of low permeability and unsaturated rocks that extend to approximately 100 feet in depth. However, deeper overburden rocks are saturated and in hydrologic connection with the underlying strata. 12 of the 26 baseline overburden monitoring wells were completed in sandstones within the lower overburden above the Rock Mesa and the Mammoth Coal seams.

16 wells were used to determine the baseline water quality of the overburden aquifer (**Table 8-7**). Water in the overburden wells is generally of sodium-bicarbonate or sodium-sulfate composition, and is relatively poor in quality due to high sulfate and SC. Overburden baseline SC ranged from 464 μS/cm to 3,330 μS/cm, with an average of 1,644 μS/cm, and sulfate concentrations ranged between 12 mg/L and 1,410 mg/L, with an average of 1,143 mg/L and 457 mg/L. Water sampled from overburden wells ranged from Class I through Class III groundwater, but most wells produce Class II water. Only wells 30-2 and 62721-10W, located east and upgradient of mining, had water classified as Class I groundwater. Locally, baseline water quality within the deeper overburden wells is suitable for livestock.

8.2.4 Mammoth Coal Baseline

The west margin of the Mammoth Coal crops out at the mine portal. Near the western margin, the coal is dry but becomes saturated and eventually becomes confined toward the synclinal axis. Groundwater flow in this unit is toward the north-northwest, following the direction of synclinal plunge. Recharge reaches the Mammoth Coal via exposed outcrops, subcrops, and from infiltration through the overburden.

The geometric mean hydraulic conductivity of the Mammoth Coal is 0.16 ft/day (**Table 8-5**). Although the hydraulic conductivities for the Mammoth Coal are relatively higher than the overburden, they are typically inadequate to provide a reliable source of well water and few production wells are completed in the coal. **Figure 8-1** illustrates the potentiometric surfaces in the Mammoth Coal and in overburden sandstones above the Rock Mesa Coal. Water levels indicate that the Mammoth Coal aquifer is isolated from overlying overburden aquifers.

Mammoth Coal baseline groundwater quantity was determined by a network of 14 groundwater wells. Water levels in most Mammoth Coal wells showed little natural fluctuation and did not vary more than two feet over the period of baseline monitoring, except in one well near the Mammoth coal outcrop which showed larger fluctuations apparently in response to precipitation.

Baseline water quality of the Mammoth Coal aquifer was determined from samples from 10 wells (**Table 8-8**). Generally, sodium and sulfate are the dominant ions in groundwater collected from most Mammoth Coal monitoring wells. SC and sulfate baseline concentrations in the Mammoth Coal tend to be greater than in the overburden. SC ranged from 1,400 μS/cm to 3730 μS/cm with an average of 2,272 μS/cm. Sulfate concentrations ranged from 251 mg/L to 1,690 mg/L, with an average of 798 mg/L.

Mammoth baseline groundwater samples fall into Class I through Class III groundwater. However, water from most Mammoth Coal wells is Class II groundwater. Mammoth Coal groundwater is generally suitable for watering livestock.

8.2.5 Underburden Baseline

In the context of the mine permit, the term underburden refers to rocks below the base of the Mammoth Coal. Generally, the underburden aquifer can be divided into two distinct aquifers: 1) the upper underburden aquifer immediately below the base of the Mammoth Coal that is hydraulically connected to the Mammoth Coal, and 2) the deep underburden sandstones hydraulically isolated from the upper underburden aquifer that typically occur hundreds of feet below the base of the Mammoth Coal.

The upper underburden has very low conductivities with a geometric mean of 0.013 ft/day and does not supply substantive amounts of groundwater to wells. The deep underburden is characterized by a 50-foot thick massive fluvial sandstone at a depth of approximately 350 feet below the Mammoth Coal. The deep underburden provides much of the domestic and livestock well water in the vicinity of the mine, including the office supply well used by the mine. A pump test of the office well completed in these deep sandstones indicated a hydraulic conductivity of 3.8 feet per day, which is two orders of magnitude higher than the conductivities of the upper underburden and the Mammoth Coal (**Table 8-5**).

Underburden baseline quantity was determined from a network of 19 wells. Groundwater in the upper underburden generally occurs under confined conditions and flows north-northwest like the overlying aquifers.

Baseline water quality of the upper underburden was determined by 12 monitoring wells (**Table 8-9**). The baseline water quality of the upper underburden is similar to that of the Mammoth Coal. Sulfate was the dominant anion and sodium tended to be the dominant cation. Underburden groundwater generally fell into Class II and III. Respective SC and sulfate concentrations of the upper underburden aquifer ranged from 1,440 μS/cm to 4,280 μS/cm and 216 mg/L to 2,680 mg/L. Average SC and sulfate concentrations were 2,721 μS/cm and 1,121 mg/L. Upper underburden wells are typically suitable for livestock use, and some are marginally suitable for domestic use. Water quality analysis of a sample from the office well completed in the deeper underburden indicated Class I groundwater, and is suitable for the mine public water supply. Most deeper underburden wells are suitable for domestic and livestock use.

9.0 HYDROLOGIC IMPACT ASSESSMENT

As required by ARM 17.24.314(5), DEQ must provide an assessment of the cumulative hydrologic impacts of the proposed operation and all anticipated mining upon surface and groundwater systems in the cumulative impact area. The assessment must be sufficient to determine if the Bull Mountains Mine No. 1 operation has been designed to prevent material damage to the hydrologic balance outside the permit area. This process takes into account the measures to be taken during and after mining to minimize impacts to the hydrologic balance, and evaluates hydrologic monitoring data with respect to these measures to determine whether impacts to the hydrologic balance have been minimized and material damage prevented. Material damage criteria include Montana water quality standards and water quality criteria to support the approved post-mine land use.

To prevent material damage outside the permit area, action thresholds have also been established for surface water and groundwater inside the permit area in order that potential water quantity or quality impacts are anticipated and mitigated prior to reaching levels that exceed standards or impinge on designated uses (**Table 2-1**).

9.1 MINIMIZATION OF IMPACTS

Montana's Strip and Underground Mine Reclamation Act requires permit holders to employ measures to minimize disturbance to the hydrologic balance. Per ARM 17.24.314(1), the proposed measures must minimize disturbance of the hydrologic balance sufficiently to sustain the approved postmining land use and the performance standards of subchapters 5 through 12 and must provide protection of:

a) the quality of surface and ground water systems, within both the proposed mine plan and adjacent areas, from the adverse effects of the proposed strip or underground mine operations;
b) the rights of present users of surface and ground water; and
c) the quantity of surface and ground water within both the proposed mine plan area and adjacent areas from adverse effects of the proposed mining activities, or to provide alternative sources of water in accordance with ARM 17.24.304(1)(e) and (f) and 17.24.648, where the protection of quantity cannot be ensured.

Among these measures are requirements and performance standards given for a variety of processes and activities. These include requirements and standards for drainage control, pond design and maintenance, sediment control, road design and maintenance, reclamation, permitted discharges to surface waters, and protection of undisturbed drainages. In addition, adherence to Best Technology Currently Available (BTCA) and Best Management Practices (BMPs) in the design and implementation of equipment, devices, systems, methods, and techniques is required for the minimization of hydrologic disturbance. These requirements and performance standards established in ARM 17.24 subchapter 5 through subchapter 12 are incorporated into operation and reclamation plans included throughout the Bull Mountains Mine No. 1 surface mining permit (SMP C1993017), and have been reviewed and approved by DEQ.

9.2 HISTORIC, PRE-LAW MINING

Past coal mining in the area include the P.M. Mine and some historic, small-scale operations along the Mammoth Coal outcrop that utilized room and pillar methods, which resulted in some limited residual

subsidence (USDI, 2011). Existing residual impacts from historic coal mining in the area near the Bull Mountains Mine No.1 are unknown, as water quality data for these historic mining areas is unavailable.

Water quality data from underground coal mines to the north of the CIA (near Roundup, MT), however, is available. Water quality data reported by Reiten and Wheaton (1988) indicate that the average groundwater concentrations of TDS and sulfate at underground coal mines in the Roundup area, sampled between 1910 and 1986, were 1,324 mg/L and 659 mg/L, respectively. Later, Wheaton (1992) again reported concentrations of TDS and sulfate in the groundwater of coal mined areas near Roundup collected between 1986 and 1991. Average TDS and sulfate concentrations were 2,647 mg/L and 1,445 mg/L, respectively.

These data do not represent water quality at the Bull Mountains Mine No. 1, but are presented to illustrate that residual water quality from abandoned mines in the area near Bull Mountains have the potential to influence water quality where historic workings are in close proximity to existing monitoring wells. At this time, it is unknown whether historic workings have influenced water quality in the Bull Mountains area, however no residual impacts from historic mining have been identified.

9.3 ALLUVIAL VALLEY FLOORS

As defined in 82-4-203(3)(a) and (b), MCA, "'Alluvial valley floor' means the unconsolidated stream-laid deposits holding streams where water availability is sufficient for subirrigation or flood irrigation agricultural activities. The term does not include upland areas that are generally overlain by a thin veneer of colluvial deposits composed chiefly of debris from sheet erosion and deposits by unconcentrated runoff or slope wash, together with talus, other mass movement accumulation, and windblown deposits".

The presence of an alluvial valley floor is determined by the presence of geologic, hydrologic, and biologic properties necessary to support agriculture. Alluvial deposits are found in both the Rehder and Fattig Creek valleys, however the alluvial deposits are generally dry and do not provide a source of subirrigation. Historic and current farming also does not depend on surface irrigation. Therefore, no alluvial valley floor has been identified in the area.

9.4 SURFACE FACILITIES AND WASTE DISPOSAL AREA IMPACTS

The facilities and waste disposal area (WDA) of the Bull Mountains Mine No. 1 are located to the northwest of the longwall panels (**Figure 9-1**). The main facilities area lies within PM Draw and an unnamed ephemeral tributary to Rehder Creek, and includes coal processing, storage and loading facilities, the WDA, unpaved roads, the rail loop, equipment fueling and storage areas, shops, the mine portal, and the mine offices. Additional peripheral facilities such as unpaved roads, crib pads, boreholes, power lines, and other improvements are located throughout the permit area and serve to support mine operations.

Within the disturbed area, Bull Mountains Mine No. 1 uses a network of ditches and detention ponds to convey and treat mine water and stormwater runoff. Mine water and stormwater from disturbed areas are detained within ponds, allowing suspended solids to settle out before discharge to ephemeral drainages, Rehder Creek and PM Draw, in accordance with MPDES Permit MT0028983. Solids retained in the ponds are removed to maintain sediment volume in the pond below 60% of the as-built storage volume. Sediments removed from settling ponds are disposed of in the WDA along with coal processing

wastes and mine development wastes. Coal processing wastes are comprised of shales, sandstones, mudstones, and unrecovered coal fines that are removed from mined coal to make it marketable. Coal processing wastes make up more than 90% of the material disposed of in the WDA. Mine development wastes consist of shales, sandstones, mudstones, and poor quality coal that are removed to access economic-quality, or to maintain safety and access to underground workings. Mine development wastes are hauled directly to the WDA from underground without further processing. Mine development wastes makes up less than 10% of the materials in the WDA. Both coal processing waste and underground mine wastes use water from the deep underburden Madison wells (see Section 6.2) for cleaning and processing.

Each MPDES-permitted outfall at the facility is associated with a sediment pond designed to contain the runoff from a 10-year, 24-hour rainfall event. **Table 9-1** provides a description of the discharge point for each outfall. Influent flow to sediment ponds consists mainly of stormwater runoff from the disturbed zones within the facilities area. Sediment ponds are discharged periodically by pumping to retain pond storage capacity once adequate time for settling has occurred so that the discharge will comply with applicable MPDES requirements. Precipitation events in excess of the design capacity of a pond may cause discharges from ponds as flows overtop low lying spillways. Outfalls 001 and 008 are the primary outfalls controlling release of mine-produced water to Rehder Creek and PM Draw.

In addition to stormwater runoff, Outfall 006 is associated with a sediment pond (Pond F) that also receives groundwater discharged from underground mine workings (**Figure 9-1**). Water in this pond is either used for dust control or pumped into a second, lined storage pond for re-use underground. Ponds at outfalls 001, 002, 004, 005, and 008 may occasionally receive underground mine discharge water if water must be pumped from Pond F to other sediment ponds.

9.4.1 Impacts to Surface Water: Surface Facilities and WDA

No permanent effects to the quantity and quality of surface water are anticipated from the facilities and WDA. Flow through disturbed areas is ephemeral, occurring only in response to precipitation, and is managed through sedimentation ponds and regulated under DEQ's MPDES permitting section.

Due to the low precipitation in the area, pond discharges are infrequent. Recent discharges in 2011 and 2013 were the first since 1991. Extended wet spring conditions were widespread across much of Montana in the spring and early summer of 2011 and 2013, and wet-weather discharges were reported at the Bull Mountain Mine No. 1 in both circumstances. During discharges which occurred in 2011 (**Table 9-2**), total recoverable iron, pH, total suspended solids (TSS), and oil and grease were within allowable limits. Settleable solids and pH effluent limitations were exceeded during a July 2011 discharge at Outfall 008, however violations were not issued due to widespread flooding throughout the region, and a 'state of emergency' issued by Montana Governor Schweitzer, in response to the extreme hydrologic conditions.

Discharges at several outfalls occurred again in 2013 (**Table 9-3**). Discharges were the result of a precipitation event in excess of the 10-yr/24-hour event flow, and effluent limitations for iron and TSS are therefore not applicable per ARM 17.24.633(5). SPE did receive a violation, however, due to settleable solids results being in excess of permit effluent limitations at Outfall 008, which controls discharge from the WDA. DEQ conducted a follow-up assessment in response to this discharge by sampling channel sediments at three locations downstream from Outfall 008. At each location, sediments were sampled for a variety of constituents including arsenic, barium, cadmium, chromium,

lead, mercury, selenium, and silver. Toxicity characteristic leaching procedure (TCLP) analyses were conducted, and results compared against EPA solid waste criteria established under the Resource Conservation and Recovery Act (RCRA). Results showed non-detects for all TCLP parameters in all samples at levels well below criteria established by RCRA, indicating that's settleable solids released during these events posed no toxic threat to the environment.

In addition to analytical parameters for which limits are established (**Table 9-3**), several additional water quality parameters (nutrients, metals) are collected, in accordance with MPDES permit requirements, to assist in characterizing effluent quality from disturbed lands within the facilities area. This additional information collected on effluent water quality is used to inform analysis for future MPDES permitting actions.

Due to the use of deep Madison well water for coal processing, the potential for the accumulation of Madison water constituents in coal processing waste emplaced in the WDA exists, however they are not anticipated to approach levels of concern for groundwater or surface waters. Groundwater flow through the WDA is controlled to prevent groundwater flow from the WDA to underlying aquifers, thereby limiting their potential for contamination due to WDA materials. Likewise, surface water runoff is controlled through MPDES-permitted outfalls. As stated earlier, runoff from the WDA is rare and only occurs during significant precipitation events, which would provide significant dilution of any constituent concentrations that may be present in WDA runoff water. Therefore, it is not anticipated that constituents in coal processing wastes will contribute significantly to groundwater or surface water quality conditions.

During the life of the mining operation, ditches and culverts are employed to handle surface runoff within and around the mine facilities area. All ditches and culverts are routinely inspected to ensure that accelerated erosion is not occurring at the outfalls. No long term or permanent water quality impacts are anticipated due to the emplacement of these structures. Ponds are used to retain stormwater runoff from events equivalent to or less than the 10-year 24-hour precipitation event. Ponds are anticipated to alter the duration, volume, timing, and frequency of stormwater runoff through PM Draw downstream of the mine area. This attenuation of runoff has limited potential to affect downstream surface water quantity and, as no surface water rights are held on PM Draw or Rehder Creek downstream of the facilities area (**Figure 6-2**), diminution or withholding of streamflows from ephemeral flow events is not expected to significantly impact downstream surface water users. The nearest downstream water rights are located on perennial reaches of Halfbreed Creek.

Outside the main facilities area, land disturbance from peripheral support facilities has the potential for hydrologic impacts, and may include geomorphic alteration of channels, increases in sediment loading to drainages, and alteration of stream hydrographs. Surface water impacts to ephemeral streams resulting from surface disturbance are assessed through adherence to established and approved design criteria for the installation and maintenance of roads, culverts, and other surface structures, and through the proper placement and usage of BMPs designed to minimize surface impacts to watercourses. Surface water control and treatment plans have been designed to protect the hydrologic balance within the permit area and adjacent areas in accordance with ARM 17.24.314(2)(a) and (b) and 17.24.631 through 17.24.652. A detailed discussion of practices employed to comply with these requirements is provided in Permit C1993017, Vol. 3, Section 314, 3.0 Surface Water and Groundwater Control and Treatment Plan.

Adherence to the surface water control plan is evaluated through monthly inspections by DEQ staff. Where impacts or the potential for impacts is observed, DEQ conducts an assessment of the issue and directs the operator to comply with permit conditions as stated in the approved control and treatment plan. Currently, there is no compelling evidence that surface disturbance has impacted surface water resources off the permit area.

9.4.2 Impacts to Groundwater: Surface Facilities and WDA

The alluvial aquifer with the greatest potential to be affected by operational impacts is in PM Draw since this drainage goes through the principal areas of operations**. Figure 9-2** presents hydrographs for alluvial monitoring wells BMP-26 and BMP-40 in PM Draw and show that the alluvium has been unsaturated except after the significant precipitation in 2011.

The WDA where coal waste is stored is in the drainage of an unnamed tributary just south of Rehder Creek. Potential impacts to the Rehder Creek alluvial aquifer and shallow bedrock may occur due to precipitation, runoff, and infiltration from the WDA. However, impacts are limited by compaction to engineering standards of materials placed in the WDA. **Figure 9-3** presents hydrographs of static water level (SWL) and selected water quality data for Rehder Creek alluvial monitoring well BMP-33 and overburden monitoring well BMP-52 located near the northern boundary of the WDA. Water levels in both wells show a response to the high precipitation event of 2011. Recent water quality data for both of these wells have shown increases in conductivity and TDS, with an increase in sulfate also evident in alluvial well BMP-33. These increases do not appear to be related to the WDA because similar increases also occurred in up gradient Rehder Creek alluvial well BMP-1 (**Figure 9-8**). The abnormally high water levels in the alluvial aquifer due to the significant precipitation in 2011 may be responsible for mobilizing additional ions in shallow groundwater and producing the observed increases in water quality parameters.

After the WDA fill has reached it final elevation and is graded, it will be covered with a minimum of 4 feet of the best available non-toxic and non-combustible material, including subsoil and topsoil as described in the Reclamation Plan. No subdrainage systems will be installed. Toxic, acid-forming and other deleterious materials will be handled and covered in accordance with the Rules 17.24.505(2) and 17.24.204(2). The WDA will be revegetated in accordance with the Reclamation Plan.

9.5 UNDERGROUND MINE IMPACTS

9.5.1 Impacts Due to Subsidence

Subsidence impacts include those hydrologic impacts introduced as a result of surface subsidence cracks or deformation of overlying strata as the coal is mined. Each longwall panel at the Bull Mountains Mine No. 1 consists of a large block of coal, approximately 1,250 feet in width by 15,000 to 23,300 feet in length. Surface depressions or subsidence troughs are expected to form as the overburden is undermined and coal is extracted. Overburden rocks are allowed to flex downward, fracture (creating a Fractured Zone) and collapse or cave into the void (forming a Caved Zone) causing immediate and progressive surface subsidence as the longwall system advances along the length of the panel. Generally, the amount of surface subsidence is less than the thickness of the coal seam and has been predicted to be about 70 percent of the extraction height in the Bull Mountains (Agapito, 1990).

The Mammoth Coal ranges in thickness from 8 to 12 feet in the permit area, so approximately seven to eight feet of surface subsidence is expected. This was confirmed in August 2011 when Panel 2

undermined the communication tower on Dunn Mountain and seven feet of subsidence was recorded. No damage to the towers was recorded; tension on the guy-wires was constantly adjusted as Panel 2 approached and undermined the tower. Linear surface fractures, minor rockslides, and small sink-like depressions (approximately 5 feet in depth) have occurred in some areas of higher overburden. This amount of subsidence including surface fracturing was anticipated as discussed in the protection/mitigation plan that was submitted and approved prior to initiation of longwall mining.

Continued mining as proposed under Amendment No. 3, would create surface subsidence features similar to those experienced to date. Where subsidence features occur within established ephemeral watercourses, the profiles of these drainages may be modified by small ridges held up over barriers, pillars, mains, and by depressions over the longwall panels. Minor damage to roads and fences is anticipated, and minor cracks have been observed in the fall of 2013 along some roads above Panel 3.

State regulations require mine operators to promptly repair damage to private property, and landowners must be provided with a mining schedule at least six months before their property is undermined. The schedule must contain enough information to enable landowners to move cattle to safe areas, and to avoid hazardous areas while mining is taking place.

The main hydrologic issue regarding subsidence at the Bull Mountains Mine No. 1 is the potential for loss or diminution of the quantity and quality of groundwater and surface water, and impacts to wells, springs, ponds, and stream reaches as a result of subsidence-related fracturing of overburden shales and sandstones. The potential exists for the alteration of surface and shallow groundwater flow paths as a result of subsidence-related fracturing.

Near vertical subsidence fractures are expected to be controlled or buffered by thick and relatively soft shales. Subsidence fractures in areas of shallow overburden cover may cause diversion of the shallow groundwater, and some increased lateral drainage from higher overburden units to lower springs also may occur as a result of flow along subsidence fractures. Settling and compression after mining are expected to heal or close most subsidence fractures, thereby returning the shallow groundwater flow directions, including flow to springs, to approximately the premining orientation. Some spring impacts are expected as not all pre-existing hydrologic flow-paths may be reestablished to pre-mine conditions. If flow to the springs is impacted, the permittee is committed to replacing the water resource following methods discussed in Permit C1993017, Vol. 3, Section 314, 5.0, Mitigation Plans.

Portal discharge is possible after reclamation, and would be controlled initially by seals and a piping system as the rubble zone saturates and water levels rise. However, even without a piping system, the temporary effectiveness of the portal seals would probably not allow water levels to raise much beyond the elevation of the portal. Chemical and physical deterioration of the portal seals is expected to limit the operational life of the seals to a relatively short period. Seepage through the fractured shallow bedrock around the portal seals and deterioration of the seals should prevent filling of the mine pool much above the elevation of the portal. Any water flowing through the portal opening will be discharged into PM Draw at an approved MPDES discharge location, and be subject to MPDES regulatory requirements.

To date, only the first three panels of the proposed total of 14 longwall panels have been mined under the current permit. A network of springs and surface water stations are monitored regularly to evaluate the potential for impacts or material damage during or post mining. As longwall mining approaches monitored springs, the frequency of flow monitoring increases from monthly or quarterly to weekly so

that any discernible impacts may be evaluated and mitigated in a timely manner and in accordance with the approved mitigation plan. Thus far, several springs above panels 2 and 3 have been under mined.

Litsky Spring (Station No. 17415), the first known spring to be affected, was undermined in late-March/early-April of 2012. Recent site visits and monitoring data confirm that the pond at Litsky Spring maintains water for livestock and wildlife use, suggesting that flow from the spring has not been impacted as to affect water supply at the site.

Adjacent monitoring wells BMP-60 and BMP-90 (**Figure 9-4**), however, recorded the drop in overburden water levels as the area under Litsky Spring was mined, followed by recharge of monitoring wells as subsidence fractures healed and water levels rebounded. The drop in water level in well BMP60 was more pronounced as it was located over the middle of panel 2, while BMP 90 is located closer to an underground gate road which limits the short-term subsidence observed at this well location. Presently, the water level in well BMP 60 is about 5 feet below historically low levels, while BMP 90 remains about 3 feet above historically low levels. The drop in water level in BMP 60 reflects both loss of water due to undermining and subsidence (estimated elevation loss due to subsidence is estimated at 3 feet). Recent recharge from abnormally high precipitation in 2011 and 2013 confounds comparison of existing well levels to historical (2003 to present). As subsurface strata continues to deform and heal, it is anticipated that water levels will be reestablished at a stratigraphic level equivalent to pre-undermining. Continued monitoring of water levels will inform understanding of short and long-term response of underlying strata and consequent flow paths to undermining and subsequent recovery.

More recent undermining of springs occurred in 2013 when several springs (17115, 17145, 17165, 17185, & 17315) were undermined as the longwall miner advanced through panel 3 (**Figure 7-1**). Springs 17115, 17165 and 17315 are typically dry, precluding any evaluation of impacts from undermining. Spring 17145 was dry in the months prior to undermining; after undermining in March 2013, flow was reported at @ 0.5 gpm (**Figure 9-5a**). Spring 17185 exhibited a brief interruption of flow immediately after undermining in May of 2013, and flow resumed within two weeks and has shown no discernible interruption in flow since recovery (**Figure 9-5b**). In both cases flows were higher after undermining than before undermining; however undermining occurred in the spring during a period of abnormally high precipitation. As present flows are within the range of historic flows recorded at these sits (**Figure 9-5c**), it is unclear whether the flows observed after undermining are a result of increased precipitation and recharge of overburden aquifers, of increased transmissivity due to deformation and fracturing of overburden strata or a combination of factors. In either case, spring flows were not adversely affected in the short term. Continued monitoring of wells and springs will allow additional evaluation of potential impacts as longwall mining advances and additional springs are undermined.

Mitigation of impacts from subsidence generally involves replacement of water supplies lost or diverted by subsidence-related processes with the purpose of maintaining premine land uses. Mitigation plans in the permit include restoring springs, stream reaches, and ponds by opportunistic development of springs where they appear, guzzler emplacements, horizontal wells, vertical wells, pipeline systems, deepening or rehabilitating existing wells, reclamation of stream reaches and function, water treatment where appropriate or necessary, and restoring premine land uses (MDSL, 1993). Detailed monitoring and mitigation plans are provided in Permit C1993017, Vol. 2, Section 313, Appendix 313-2 Spring/Seep Mitigation Plan.

Likewise, the rights of present and future groundwater and surface water owners or users will be protected in accordance with ARM 17.24.314(1)(b) and 17.24.648. ARM 17.24.648 states that "the

permittee will replace the water supply of any owner of interest in real property who obtains all or part of his supply of water for domestic, agricultural, industrial or other legitimate use from a surface or underground source if such supply has been affected by contamination, diminution, or interruption proximately resulting from strip or underground mining operation by the permittee". To protect uses replacement water must be of a quality and quantity sufficient to satisfy premining consumption requirements.

9.5.2 Impacts Due to Dewatering

Groundwater monitoring data, maps and graphs and the groundwater flow model included in the PHC were the chief tools used to assess groundwater impacts to the hydrologic balance within the CIA. Groundwater levels and quality data reported in annual hydrology reports submitted to DEQ each year by SPE were also used in this analysis. This data was used to evaluate water quantity and water quality in the potentially affected aquifers in the groundwater CIA.

9.5.2.1 Groundwater Model

The Amendment No. 3 application included a transient flow model to evaluate the potential effects of mining on groundwater in the area surrounding the mine (Nicklin, 2013[2]). **Figure 9-6** shows the model domain and layering. The groundwater model simulates flow in all aquifers of concern but is focused on the Mammoth Coal and upper underburden, as these aquifers are expected to experience the greatest effects from mining. The groundwater model is calibrated by comparing model results to measured water levels from monitoring wells and adjusting model parameters to achieve the best simulation of groundwater conditions. After calibration the model was run forward in time to predict water levels at the end of mining. In this predictive simulation, the mine tunnels are added to the model according to the proposed mine plan schedule as drains which simulate the dewatering associated with mine development. As mining progresses the material properties of the Mammoth Coal and overburden layers are also modified to simulate the collapse of material into the void left behind by longwall mining, and the subsidence and fracturing that occurs above the mined out areas. The results of this simulation are shown in **Figure 9-7**, which displays the predicted drawdown in the Mammoth Coal and upper underburden at the end of mining. In the Mammoth Coal, the area of the mine workings is completely dewatered, and an area of drawdown extends primarily to the north of the mine. A drawdown cone of depression is formed in the upper underburden, centered on the northern part of the mine workings and extending throughout the life of mine area and to the north. Drawdown to the south, east, and west in both the Mammoth Coal and the upper underburden is limited by the outcrops of the aquifers in those directions.

9.5.2.2 Alluvium

46 alluvial monitoring wells monitor the alluvial aquifer system in the Bull Mountain area (**Figure 9-8**). Historic monitoring data indicates that the alluvium within and near the permit boundary is often dry. Generally, alluvial water levels have increased over time (since 2003) and are responsive to seasonal precipitation events, especially during events in May of 2011.

Rehder Creek drains much of the proposed permit area. **Figure 9-9** shows Rehder Creek alluvial responses in upgradient well BMP-17 and down gradient wells BMP-19 and BMP-1, indicating that all wells responded to increased precipitation in 2007 and 2011. Also notable in **Figure 9-9** is how the degree and duration of saturation increases moving downstream. At upstream well BMP-17 alluvial water is present only after major precipitation events, moving downstream at well BMP-19 a small

amount of water is usually present except during long dry periods, further downstream at well BMP-1 alluvial groundwater is always present.

Portions of the proposed permit area are also drained by Fattig Creek and Railroad Creek, and alluvial wells from these drainages are shown in **Figure 9-10**. Well BMP-77 is completed in the Fattig Creek alluvium and shows a similar increasing trend with response to precipitation events as seen in the Rehder Creek alluvium. Alluvial groundwater quality in Fattig Creek also shows a response to the significant precipitation event of 2011, with increases in SC, TDS, and sulfate. Well BMP-80 is located in the Railroad Creek drainage, and shows the presence of alluvial groundwater only in response to major precipitation events.

Tributaries of Rehder Creek known as the 16 and 17 drainages drain the majority of the current permit area. Water levels and quality in alluvial wells in these drainages are shown in **Figure 9-11**. Alluvial well BMP-62 shows an example of alluvial groundwater influenced by inflow from the shallow overburden aquifer. Alluvial groundwater is present most of the time, with seasonal variations in water level due to snowmelt and increase spring precipitation evident. Water quality at BMP-62 is also much better than at other alluvial wells. The 17 drainage is the only drainage which has been undermined to date. Alluvial monitoring wells BMP-32 in the 16 drainage and BMP-45 in the 17 drainage show that alluvial water quantity and quality are similar in both drainages, indicating that undermining has not affected alluvial water quality or quantity in the 17 drainage.

The alluvial hydrographs discussed above indicate that there is no evidence that mining and associated dewatering of the Mammoth Coal have affected water levels of the alluvial aquifer system. Because the alluvial aquifer is typically a perched aquifer supplied by recent precipitation or snow melt, additional mining is not expected to affect water levels in the alluvial aquifer.

Water quality of the alluvial groundwater generally declined recently, however, based on the alluvial water quality graphs discussed above this appears to be due to significant precipitation in 2011 and the resultant higher alluvial water levels. Currently, there is no evidence that alluvial water quality has been impacted by mining. No exceedances of water quality standards were observed for any of the alluvial monitoring wells. The additional proposed mining is not expected to have any effects on alluvial water quality.

9.5.2.3 Overburden

Overburden water levels are monitored by 33 monitoring wells within the permit boundary and vicinity (**Figure 9-12**). Generally, water levels in shallow overburden (BMP-47, total depth (TD)=40 feet) and relatively deep overburden wells (BMP-4, TD=200 feet) have increased over time (**Figure 9-13**). Shallow well BMP-47 in the Rehder Creek drainage shows an abrupt water level increase of approximately 15 feet due to seasonal precipitation in June 2011. By contrast, deeper well BMP-4 shows a slow but steady increase in water level in the deeper overburden aquifer in an area remote from mining.

Figure 9-13 shows that the water-level response of shallow overburden well BMP-47 is similar to that of nearby Rehder Creek alluvial well BMP-1 (**Figure 9-9**), indicating that both the shallow overburden and alluvium rapidly respond to seasonal precipitation events. Respective well logs show alluvium directly overlying overburden bedrock in Rehder Creek drainage indicating a likely hydraulic connection.

Currently, there is little evidence that longwall mining has had a significant impact upon overburden water levels except in areas affected by subsidence. Water levels in monitoring wells BMP-60 and BMP-

90 in the vicinity of longwall panel 2 have shown declines of approximately nine feet and 18 feet, respectively (**Figure 9-4**). Inspection of the hydrographs for the two wells indicates that water levels in these relatively shallow overburden wells (BMP-60, TD=50 feet; BMP-90, TD=30 feet) were slowly declining from the precipitation of 2011 and then declined abruptly between February 2012 and April 2012 when BMP-60 went dry. **Figure 9-4** indicates that after this period water levels in both wells began to recover and subsequently have had a slow decline, likely due to dry conditions.

The abrupt decline of water levels suggests that the relatively shallow overburden and perched aquifer system in the vicinity of these wells was partially drained via subsidence fractures that healed over the period between February and April 2012 leading to the water level rebound as seen in **Figure 9-4**. Well log data indicates that relatively impermeable gray shale occurs below the respective screened intervals. These rocks may have become fractured, allowing perched groundwater to drain into the mine workings, and then healed due to compression and settling. This data may illustrate that the various perched aquifers within the upper overburden may have become temporarily dewatered by subsidence fractures in the vicinity of BMP-60 and BMP-90 due to mining. Monitoring data will continue to be collected to evaluate the affect upon local overburden dewatered due to subsidence fractures.

Similar temporary overburden dewatering may occur over all longwall mining areas as subsidence occurs, but these effects are expected limited in spatial and temporal extent. No long term effects on overburden water quantity are expected as a result of mining.

Comparison of current and baseline water quality concentrations of TDS, sulfate, bicarbonate, and specific conductance show no significant differences, indicating that mining has not impacted water quality of the overburden aquifer. The water quality of shallow overburden (BMP-43, **Figure 9-13**) and Rehder Creek alluvium (BMP-1, **Figure 9-9**) located just down gradient of mining remains relatively consistent, but shows a decline in water quality during the rise of water levels associated with the 2011 high precipitation event. Deeper overburden water quality at well BMP-4 (**Figure 9-13**) has remained consistent over time.

Elevated arsenic concentrations were reported in 2006 from monitoring well BMP-10, located over longwall panel 4 and up gradient of mining at that time. The initial arsenic concentration (0.051 mg/L) recorded in 2006 was approximately five times the DEQ-7 human health limit of 0.01 mg/L. Arsenic concentrations in this well have rapidly declined (**Figure 9-14**) and are currently below laboratory detection limits. The source of the elevated arsenic concentrations in the overburden aquifer is unknown but its location up gradient indicates that it is not related to mining. A similar pattern of declining concentrations was recorded in this well for iron, which was associated with a less pronounced decline of specific conductance, TDS, sulfate, and bicarbonate (**Figure 9-14**).

Because overburden groundwater does not flow through the mine workings, or come into contact with the mine gob, mining is not expected to affect overburden groundwater quality.

9.5.2.4 Mammoth Coal

17 groundwater monitoring wells monitor water levels of the Mammoth Coal aquifer in and outside of the permit boundary (**Figure 9-15**). Water level data associated with a number of wells, especially those within the permit boundary, indicate that longwall mining and the development of gate roads has lowered water levels and created a cone-of-depression in the Mammoth Coal that radiates outward from panels 3 and 4 as mining continues. **Figure 9-16** indicates that drawdown or the radius of influence

is greater east of mining because of confined conditions within the coal; unconfined conditions prevail west and south of mining where the radius of influence is limited.

Hydrographs show that the respective water levels in BMP-37, BMP-11, and BMP-8 have been lowered approximately 30, 25, and 18 feet respectively (**Figure 9-17**). Mammoth Coal drawdown is not observed three miles east of BMP-8 toward BMP-14 and BMP-21 (**Figure 9-18**), where water levels have remained stable or increased slightly during the same general period (2004-2011). Similarly, drawdown rapidly decreases west of BMP-37 as water levels in BMP-30 have shown a general increasing trend since 2003 as seen in the hydrograph of BMP-30 (**Figure 9-18**). Mammoth Coal wells to the south of BMP-11 are typically dry.

Water levels in the Mammoth Coal north of the permit boundary in wells BMP-3 and BMP-5 generally declined from 2003-2010, which is likely attributable to mining related drawdown (**Figure 9-19**). Water levels in both of these wells increased following the high precipitation of 2011, with BMP-3 water levels rising 15 feet due to the hydraulic connection of the Mammoth Coal and alluvium near this location. Since 2011 water levels in BMP-3 have declined to approximately the same level as 2012 and BMP-5 water levels have declined approximately two feet below 2010 levels. The high precipitation of 2011 may have acted to temporarily interrupt mining related drawdown at BMP-3 and BMP-5, but does not appear to have altered the long term trend of drawdown north of the mine.

The water level observations in Mammoth Coal monitoring wells are generally consistent with the expected pattern of decreasing drawdown radiating outward in all directions from the dewatered mine area. Current Mammoth drawdown illustrated in **Figure 9-16** (calculated drawdown 2004-2011) lies within the predicted drawdown of the groundwater flow model described in the PHC. Hydrologic impacts of longwall mining activity upon the Mammoth Coal are limited by the extent of the coal to the south and west. The amount and extent of drawdown in the Mammoth Coal is expected to increase as mining progresses, particularly to the north of the active mine area. Following the completion of mining, water levels will begin to recover, and are expected to reach a post-mine equilibrium within 50 years.

Currently, there is no evidence that mining has affected the water quality of the Mammoth Coal aquifer. Comparison of SC, TDS, sulfate, and bicarbonate concentrations in Mammoth Coal wells over time indicate that there are no persistent trends associated with mining. **Figure 9-17**, **Figure 9-18, and Figure 9-19** indicate that water quality data have generally been consistent over time regardless of changes in water level. Water quality of BMP-37, BMP-11, and BMP-8 are generally unchanged through time despite being in the immediate vicinity of active longwall mining. The average specific conductivity of water produced by Mammoth Coal wells is higher relative to the alluvial and overburden aquifers due to relatively greater concentrations of sulfate and sodium. Approximately one-half of the Mammoth Coal wells produce Class II water and one-half produce Class III water. This data is consistent with Mammoth Coal baseline water quality (Class II to Class III). No exceedances of DEQ-7 standards were observed in any of the Mammoth Coal wells.

Because mine dewatering produces groundwater flow towards the mine working during mining, no water quality affects are expected during mining. After mining is completed, some of the mine gob will become saturated. Groundwater quality in the mine gob is expected to be degraded relative to natural water quality, however, due to the small quantity of gob influenced water and the slow water movement in the Mammoth Coal this poor quality water is not expected to migrate outside the permit boundaries within 50 years after mining.

9.5.2.5 Underburden

The underburden aquifer in the area is monitored by 25 monitoring wells (**Figure 9-20**). The drawdown map (**Figure 9-21**) of the upper underburden aquifer within the permit area show water level declines similar to and development of a cone-of-depression nearly coincident with the drawdown observed in the overlying Mammoth Coal aquifer. This indicates the upper underburden aquifer has also been affected by mining and that a hydraulic connection exists in some areas between the Mammoth Coal and upper underburden aquifers where the potentiometric heads are similar.

Comparing the hydrographs for upper underburden wells BMP-12, and BMP-9 in **Figure 9-22** to the hydrographs for co-located Mammoth Coal wells BMP-11, and BMP-8 (respectively) in **Figure 9-17** shows that while drawdown has occurred at both locations in both aquifers, the timing and magnitude of drawdown can vary. This is likely due to the variable geology of the underburden, where the water bearing units tend to be discontinuous and separated by lower permeability rocks. Although no underburden well is co-located with Mammoth Coal well BMP-37 (**Figure 9-17)**, underburden well BMP-44 (**Figure 9-22**), located approximately one mile north shows a similar water level response to mining. **Figure 9-23** shows underburden wells located to the east (BMP-83 and BMP-15) and west (BMP-31) of the mine area which have not been affected by mine drawdown. The two wells east of the mine are in similar locations as Mammoth Coal wells BMP-21 and BMP-14 (**Figure 9-18**) and show similar water level trends. Underburden well BMP-31 is co-located with Mammoth Coal well BMP-30, but the underburden well shows water level fluctuations not observed in the Mammoth Coal well indicating a hydraulic separation between the hydrologic units at this location. The water level fluctuations in the underburden well do not appear to be related to mining and recent water levels have been similar to those first observed in 2003.

Underburden wells north of the mine show different water level responses depending on local geologic factors (**Figure 9-24**). Underburden well BMP-38 shows no effects of mining related drawdown, and the well mimics the water level response of the alluvial aquifer observed in co-located well BMP-33 (**Figure 9-3**) indicating that the underburden is hydraulically connected to the alluvium near this location. As illustrated in **Figure 9-24** water levels in underburden well BMP-6 show a general decreasing trend since 2007, but recovered in response to the high precipitation in 2011. The decrease in water level in BMP-6 is similar to the response seen in Mammoth Coal well BMP-5 (**Figure 9-19**) and is likely related to mine drawdown.

Due to the hydraulic connections between the Mammoth Coal and the upper underburden, the effects of mining on upper underburden water quantity are expected to be similar to those described for the Mammoth Coal.

By contrast, the relatively deep sandstones of the lower underburden aquifer are hydraulically isolated from the Mammoth Coal and upper underburden aquifers. Aquifer test data (Hydrometrics, 2009) associated with the Office Supply Well (OSW) confirm that confined conditions exist in these relatively deep sandstones (355-405 feet) and that the nearest domestic well, a distance of approximately 4,200 feet from the OSW, will not be adversely impacted by continuously pumping the OSW at approximately 6 gpm. During a pump test, observation well 62614-100-UB (BMP-121), located 3,346 feet from OSW, recorded 1.4 feet of drawdown. Projected drawdown shows 3.3 feet of drawdown in monitoring well BMP-121 and three feet of drawdown in the nearest private well after 20 years of continuous pumping. These relatively deep sandstones are the source of domestic use and are isolated from the effects of mining.

Baseline water quality of the upper underburden aquifer is similar to water quality observed between 2003 and 2011. Currently there is no evidence that mining has affected the water quality of the upper underburden aquifer. Water quality graphs show no persistent trends or changes in the water quality of the underburden aquifer even in areas where the potentiometric surface of the upper underburden has been affected by mining (**Figure 9-22**). Consistent water quality has been recorded in a number of other underburden wells indicating they have remained unaffected by mining. BMP-15 (**Figure 9-23**), located down gradient just outside the eastern Amendment 3 boundary; BMP-31 (**Figure 9-23**), located down gradient along the western permit boundary; and BMP-6 (**Figure 9-24**), located immediately down gradient just north of the Amendment boundary show consistent water quality from 2003 to the present.

Approximately one-half of the underburden wells exhibit Class II water and the rest have Class III water consistent with baseline SC and water quality. Based upon monitoring well information, there is no evidence of any mining related impacts to upper underburden or to the relatively deep upper underburden water quality in the vicinity of the Bull Mountains Mine No. 1 and no exceedances of DEQ-7 water quality standards have been reported in the wells.

Similar to the Mammoth Coal, water quality in the upper underburden aquifer may be locally affected by poor quality water from the mine gob after mining is completed and water levels in the mine area recover. No water quality effects on the deeper underburden aquifer are expected due to the hydraulic separation between this aquifer and the mine.

10.0 MATERIAL DAMAGE

As defined by Montana statue, "material damage means, with respect to protection of the hydrologic balance, degradation or reduction by coal mining and reclamation operations of the quality or quantity of water outside the permit area in a manner or to an extent that land uses or beneficial uses of water are adversely affected, water quality standards are violated, or water rights are impacted. Violation of a water quality standard, whether or not an existing water use is affected, is 'material damage'" (82-4-203, MCA). Observation of changes to the hydrologic balance observed with current mining provides a framework within which continued and future impacts can be anticipated. It is possible to make quantitative and qualitative projections regarding the severity and extent of impacts expected with proposed mining and to evaluate the likelihood that impacts will extend outside the permit area **(Table 2-1**).

10.1 CUMULATIVE IMPACT OF HISTORIC AND CURRENT MINING

Currently there is no evidence that the quantity and quality of surface waters has been impacted by mining activities. Surface streamflow in the area is ephemeral and driven by storm events and extended periods of wet weather that act to recharge perched aquifers. Perched aquifers, in turn, supply spring flow and dry up during extended periods of below normal precipitation. Spring-flow may be impacted through subsidence processes related to undermining of the overburden aquifers, potentially interrupting, and/or altering subsurface flow-paths. Potential impacts to identified surface water users in the surface water CIA are shown in **Table 6-2**.

Springs and seeps are monitored regularly in order to assess impacts from mining. Where flows from springs and seeps are impacted, water quantity and water rights have the potential to be impacted. Impacts to water rights are assessed and evaluated with respect to regional and local impacts to spring systems that feed surface water resources. To date, several springs under panels 2 and 3 have been undermined. While some springs (17145, 17185) have shown a temporary alteration or interruption of flows or adjacent well-water levels as anticipated, weekly monitoring of spring flows prior to and after undermining have shown no adverse long-term effects.

As stated in Section 9.0, surface water runoff is controlled through a series of ponds and diversion structures in the facilities and WDA, and regulated through DEQ's MPDES program. Discharges to surface waters are very infrequent with the first discharges in 20 years occurring during extreme wet periods in 2011 and 2013. Water management controls on peripheral facilities areas (permit lands not including the main facilities and WDA) include structures to control runoff from mine roads, pads, and other land surface disturbances, and are managed through the implementation of BMPs. BMPs typically include a variety of design considerations (culvert sizing, berming, placement of structures, etc.) and are described in detail in Permit C1993017, Vol. 3, Section 314, 3.0, Surface Water and Groundwater Control and Treatment Plan. Evaluation of impacts relating to surface water runoff and management are therefore evaluated with respect to adherence to approved design plans and permit conditions in controlling and managing surface runoff. No significant impacts to surface water resources have been observed to date regarding implementation and management of surface water controls, including MPDES-permitted discharges and surface BMPs.

Current monitoring indicates mining has affected groundwater quantity by producing an area of drawdown around the dewatered mine workings. This area of drawdown is expected to increase and

expand as mining progresses and then recover after mining is completed. Potential impacts to identified groundwater users in the groundwater CIA are shown in **Table 6-1**.

The most significant drawdown and the greatest radius of influence have been recorded in the Mammoth Coal (drawdown of approximately 30 feet in BMP-37) consistent with the predictions made in the PHC. Significant drawdown (approximately 20 feet in BMP-44) has also been recorded in the upper underburden that generally mimics the drawdown pattern or radius of influence of the overlying coal indicating that the upper underburden and coal aquifers are hydraulically connected.

The flow model prediction in the PHC indicates groundwater associated with the Mammoth Coal and upper underburden aquifers will recover to near pre-mining levels approximately 50 years after the cessation of mining. After the conclusion of mining, the gate roads may remain intact or may collapse, thus each of these scenarios was tested using the groundwater model. If the gate roads collapse, groundwater levels in the northern part of the mine area and north of the permit area will return to near pre-mine levels. If the gate roads remain intact, a mine pool will form in the northern part of the mine workings resulting in post-mine water levels higher than pre-mine near the north permit boundary. In either scenario, some residual drawdown will persist in the southern part of the mine area indefinitely due to the change in aquifer properties from coal to gob.

By contrast, very little drawdown has been recorded in the overburden aquifer except directly over panel 2 (BMP-60 and BMP-90) during active mining. Extensive overburden drawdown is expected over the mined area as mining advances consistent with predictions in the PHC as overburden subsidence fractures provide a series of transmissive conduits into the mineralized gob of the Caved Zone. Drawdown in the overburden is not expected outside of the subsidence area due to the generally perched and discontinuous nature of the overburden aquifers. Drawdown of the alluvial aquifer system is not expected as these sediments are often dry and become partially saturated due to significant precipitation events.

Currently, there is no evidence that local and off permit groundwater quality of any of the hydrologic units has been degraded or impacted by mining. Groundwater quality of shallow and deep aquifers (alluvium, overburden, coal, and underburden) is monitored regularly by a network of 105 monitoring wells to alert DEQ about the potential for material damage during or post mining.

A decline of groundwater quality is expected as longwall mining and subsidence continue to produce additional panels of collapsed and mineralized rubble in the Caved Zone (gob). Vertically transmissive and mineralized fractures may intercept and direct shallow groundwater into the Caved Zone affecting local overburden groundwater levels, spring discharge, and surface drainage that may ultimately increase mine discharge. This prediction is consistent with the PHC: “A general increase in total dissolved solids, sodium, and sulfate concentration is anticipated in the groundwater that flows through the gob and potentially in the highly fractured zones immediately above the mined out area” (Page 314-5-47). As described in Section 6.2.3 of the PHC, Madison well water used in the underground mine workings is expected to constitute less than 0.1 percent of the total water in the mine gob voids. Because of this, the use of Madison well water in the underground mine workings is not expected to have any measurable impact on the quality of mine gob water. The eventual groundwater quality within the mined-out area or Caved Zone may become similar to the groundwater quality within abandoned coal mines near Roundup, MT where the average TDS, sulfate, and specific conductance concentrations are 2,042 mg/L, 1,106 mg/L and 3,038 μS/cm, respectively. However, the groundwater quality within the

Caved Zone may exceed these concentrations since the groundwater in the abandoned mines near Roundup does not come into contact with mineralized gob.

10.2 MATERIAL DAMAGE ASSESSMENT

10.2.1 Surface Water

Evaluation of material damage to surface waters includes an assessment of potential impacts to surface waters and the monitored response of surface water systems to potential impacts. Material damage criteria established in Section 2.0 include water quality standards, beneficial use criteria for the support of livestock, and impact to water rights.

Thus far, impacts to surface waters have been minimal; potential impacts include impacts to surface waters from water management and control within the facilities area and WDA, the effects of surface infrastructure (roads, culverts, pads) on surface waters outside the facilities and WD, and the effects of undermining and subsidence on springs and seeps.

Impacts from surface water runoff both within the facilities area and WDA are evaluated through compliance with narrative water quality standards (for ephemeral streams) and MPDES permit requirements. Adherence with general operational provisions of the narrative surface water quality standards (ARM 17.30.635 through 17.30.637) constitutes compliance with water quality standards for ephemeral streams. On-site management of surface water is detailed in the Permit C1993017, Vol. 3, Section 314, 3.0, Surface Water and Groundwater Control and Treatment Plan, and includes a variety of surface water controls that meet the requirements of the narrative surface water quality standards contained in ARM 17.30.645 through 647. Adherence and compliance with the Surface Water and Groundwater Control and Treatment Plan is assessed during monthly mine inspections by department personnel, and through departmental management and oversight of permitted activity. No significant issues regarding compliance with this plan have been noted to date, and no material damage has been observed in regards to surface water runoff from disturbed areas within the permit area. With the exception of a wet-weather exceedance for settleable solids and pH during 2011 and 2013 (see Section 9.4.1), MPDES discharges to date have been very infrequent and have not violated MPDES permit conditions.

As underground mining thus far has progressed only through Panel 3, potential impacts to surface waters have been confined to springs within panels 2 and 3 and to the capture of stormwater runoff within the mine permit area. As described in Section 9.5.1, impacts due to subsidence have been limited, buffered by recent recharge of overburden aquifers, and have had no impact on the quality and quantity of surface water resources (springs) in the permit area. Accordingly, because the current mining methods are proposed to extend throughout the expanded permit area, significant, irremediable impacts to the quality and quantity of surface water resources are not expected from continued underground mining.

Due to the fact that only the first three longwall panels have been undermined, surface water impacts are limited in their potential extent. To date, no material damage to surface waters is evident. Narrative standards for surface waters have not been violated or exceeded, and the quantity of surface waters (springs and ephemeral runoff) has not been impacted due to mining activity, and surface water rights have not been impacted. Accordingly, because current mining activities are proposed throughout the expanded permit area, disturbance of the hydrologic balance on and off the permit area and material

damage to surface waters outside the permit area are not expected from continued underground mining.

10.2.2 Groundwater

Currently, there is no evidence of material damage and no material damage is predicted with mining proposed in Amendment 3. There is no evidence from monitoring data to suggest a change in predictions made in the PHC with regard to potential impacts to water quality and levels. Comparison of baseline and recent groundwater quality data show no significant changes. No water quality standards, numeric or narrative, have been exceeded and beneficial uses (domestic and livestock) have not been impacted.

Mining is not expected to affect the alluvial aquifer beyond the permit boundary. The alluvial section within the boundary is generally dry. Groundwater levels in the overburden, Mammoth Coal and upper underburden near the western permit boundary have been lowered as a result of mining and drawdown in these aquifers will continue as mining advances. Mining proposed in Amendment 3 will result in continued drawdown to the east, south and north of the mine but is expected to remain largely within the mine permit boundary and drawdown will not affect most groundwater users. Mining related drawdown in these aquifers may affect a few domestic wells completed in the upper underburden north of the permit area. Since most domestic and stock wells produce from relatively deep sandstones (deep underburden aquifer) that are hydraulically isolated from mining by a relatively thick section of alternating shales and siltstones, no impact to these deeper wells is expected. SPE is committed to replacing any water supplies affected by mine related drawdown with a comparable permanent supply.

Post mining groundwater quality within the mined-out area (Caved Zone) is expected to degrade after coming into contact with fresh rock surfaces exposed in subsidence fractures and mineralized rubble or gob. Oxidizing conditions are anticipated until after mining is complete and resaturation of the collapsed material has occurred. These conditions may result in increased sulfide oxidation, cation exchange, leaching, and weathering, which together may cause an increase in the concentrations of calcium, magnesium, sulfate and sodium ions. Due to the buffering capacity of the alkaline mineralogy of the overburden and shallow underburden, development of acidic conditions in water present in the gob is extremely unlikely. As explained above at 9.5.2, any degradation of groundwater quality is not expected to render groundwaters unsuitable for current or anticipated use. Accordingly, because current mining methods are proposed throughout the expanded permit area, material damage to the quality or quantity of groundwater resources outside the proposed permit area is not expected from continued underground mining. Although presently there is no evidence of a general increase in any water quality parameters that can be attributed to mining, continued monitoring will provide additional insights of the potential effects on groundwater quality predicted to accrue over time as mining progresses.

10.3 CONCLUSION

SPE's Bull Mountains Mine No. 1 has supplied sufficient information for the completion of this CHIA and finding. Although DEQ analysis identified some surface water users and water rights holders outside the permit area that may experience a temporary impact to their water resources, the Bull Mountains Mine permit commits to replacing water supplies that have been affected by mining with water of similar quality and quantity.

At this time, DEQ finds that the operational and reclamation plans for the Bull Mountains Mine No. 1 have been designed to minimize impacts to the hydrologic balance within the permit area and to prevent material damage outside of the permit area.

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BEFORE THE BOARD OF ENVIRONMENTAL REVIEW
OF THE STATE OF MONTANA

IN THE MATTER OF: THE NOTICE OF APPEAL AND REQUEST FOR HEARING BY MONTANA ENVIRONMENTAL INFORMATION CENTER REGARDING DEQ 'S APPROVAL OF COAL MINE PERMIT NO. C1993 017 ISSUED TO SIGNAL PEAK ENERGY LLC FOR BULL MOUNTAIN MINE NO. 1 IN ROUNDUP, MT.	**CASE NO. BER 2013-07 SM** **DEQ'S RESPONSES TO MEIC'S FIRST AND SECOND DISCOVERY REQUESTS**

The State of Montana, Department of Environmental Quality ("DEQ" or "the Department"), Appellee in this matter, responds to Montana Environmental Information Center's ("MEIC's"), First Set of Requests for Admission, Interrogatories, and Requests for Production served on January 28, 2014, and MEIC's Second Set of Interrogatories, served on January 31, 2014.

For the purposes of this response DEQ uses the abbreviations and acronyms set forth in as definitions to MEIC's requests except as listed below:

"MSUMRA" means the Montana Surface and Underground Mine Reclamation Act codified at §§ 82-4-201 through 254, MCA, along with its implementing rules in the Administrative Code of Montana ("ARM") 17.24.301 through 17.24.1826.

"Nicklin Groundwater Model" or "Groundwater Model" refers to the document entitled "Groundwater Model for Bull Mountains Mine No. 1" Appendix 314-6 of SPE's Response to Third Deficiency Notice submitted August 16, 2013.

"PHC" refers to the document entitled "Comprehensive Hydrologic Evaluation and Analysis of Probable Hydrologic Consequences," Appendix 314-5 of SPE's Response to Third Deficiency Notice submitted August 16, 2013.

"RFA No." refers to a specific Request for Admission propounded by MEIC.

"RFP No." refers to a specific Request for Production of Documents propounded by MEIC.

"Written Findings" means the Written Findings prepared by Montana Department of Environmental Quality, Industrial and Energy Minerals Bureau, Coal Program for Amendment and Mine Plan Revision No. 3, Bull Mountain Coal Mining Inc. SMP C1993017, October 2013.

MEIC'S FIRST DISCOVERY REQUESTS TO DEQ

REQUEST FOR ADMISSION NO. 1: Admit that DEQ may not approve Signal Peak Energy LLC's application for its Amendment 3 expansion unless DEQ prepares a cumulative hydrologic impact assessment that determines that the mine has been designed to prevent material damage to the hydrologic balance outside of the permit area.

RESPONSE: DEQ objects to RFA No. 1 to the extent that it calls upon DEQ to make a legal conclusion based on "no special knowledge [of DEQ] that would enable [DEQ] to answer the request with any more certainty than [MEIC] or the court through judicial notice." *See Disability Rights Council of Greater Wash. v. Wash. Metro. Area Transit Auth.*, 234 F.R.D. 1, 2-3; 2006 U.S. Dist. LEXIS 8360, (D.D.C. Memorandum Op., March 6, 2006). Without waiving that objection, DEQ admits that approval of the SPE Amendment No. 3 application was subject to all

applicable requirements of MSUMRA. DEQ further admits that it prepared the CHIA to satisfy the requirements of MSUMRA, which among other things, provides:

> (6) The department may not approve an application submitted pursuant to ARM 17.24.401(1) unless the application affirmatively demonstrates and the department's written findings confirm, on the basis of information set forth in the application or information otherwise available that is compiled by the department, that:
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> . . .
>
> (c) the hydrologic consequences and cumulative hydrologic impacts will not result in material damage to the hydrologic balance outside the permit area;

ARM 17.24.405.

REQUEST FOR ADMISSION NO. 2: Admit that in the CHIA DEQ established material damage criteria to determine whether Signal Peak Energy's proposed coal mining operation is designed to prevent material damage to the hydrologic balance outside the permit area, as required by § 82-4-227(3)(a), MCA.

RESPONSE: DEQ objects to RFA No. 2 to the extent that it requires DEQ to state a legal conclusion which is outside the scope of M. R. Civ. P. Rule 36, as § 82-4-227(3), MCA, is a statute that speaks for itself. DEQ further objects to RFA No. 2 to the extent that it calls upon DEQ to make a legal conclusion based on "no special knowledge [of DEQ] that would enable [DEQ] to answer the request with any more certainty than [MEIC] or the court through judicial notice." DEQ also objects to RFA No. 2 to the extent that the CHIA, as a part of the Written Findings required of the Department when it approves or denies a permit in accordance with ARM 17.24.405, speaks for itself. Without waiving these objections, DEQ admits that it prepared the CHIA to satisfy the requirements of MSUMRA, which among other things, requires that:

> (6) The department may not approve an application submitted pursuant to ARM 17.24.401(1) unless the application affirmatively demonstrates and the department's written findings confirm, on the basis of information set forth in the application or information otherwise available that is compiled by the department, that:
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> . . .
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> (c) the hydrologic consequences and cumulative hydrologic impacts will not result in material damage to the hydrologic balance outside the permit area;

ARM 17.24.405. DEQ further admits that with regard to criteria for material damage in general, section 2.1 of the CHIA states:

> Following the definition of material damage in 82-4-203(31), Montana Code Annotated (MCA), material damage criteria are established for the evaluation of both groundwater and surface water quality and quantity, and are used to determine whether water quality standards and beneficial uses of water, including water rights, outside the permit boundary have been or are expected to be impacted by mining activities. The interruption or diminution of a surface water or groundwater supply to the extent that an existing use is precluded is considered to be material damage. When material damage occurs mitigation is required; mitigation would include dependable, long-term replacement of a resource acceptable for the designated use [ARM 17.24.314(1)(c) and 17.24.648] or treatment to return water quality to state standards. Material damage criteria include applicable numeric and narrative water quality standards, and criteria established to protect existing beneficial uses of water.

CHIA, p. 2-1 (citations in brackets in original).

REQUEST FOR ADMISSION NO. 3: Admit that under § 82-4-203(31), MCA, material damage to the hydrologic balance includes "[v]iolation of a water quality standard, whether or not an existing use is affected."

RESPONSE: DEQ objects to RFA No. 3 because it neither elicits a statement of fact, nor a statement applying law to a fact, and therefore falls outside the scope of M. R. Civ. P. Rule 36. DEQ further objects to RFA No. 3 to the extent that it requires DEQ characterize § 82-4-227(3), MCA, is a statute that speaks for itself. Also, DEQ objects to RFA No. 3 to the extent that it

calls upon DEQ to make a legal conclusion based on "no special knowledge [of DEQ] that would enable [DEQ] to answer the request with any more certainty than [MEIC] or the court through judicial notice."

REQUEST ADMISSION NO. 4: Admit that DEQ included violation of water quality standards, whether or not existing uses are affected, as a material damage criteria in its CHIA for Signal Peak Energy's application.

RESPONSE: DEQ objects to RFA No. 4 to the extent that it requires statement of legal conclusion, which calls upon DEQ to make a statement based on "no special knowledge [of DEQ] that would enable [DEQ] to answer the request with any more certainty than [MEIC] or the court through judicial notice." DEQ further objects to RFA No. 4 to the extent that it requires DEQ to characterize the CHIA, a document that speaks for itself. Without waiving these objections, DEQ admits that the CHIA quotes the definition of "material damage" as follows:

> "Material damage" means, with respect to the protection of the hydrologic balance, degradation or reduction by coal mining and reclamation operations of the quality or quantity of water outside of the permit area in a manner or to an extent that land uses or beneficial uses of water are adversely affected, water quality standards are violated, or water rights are impacted. Violation of a water quality standard, whether or not an existing water use is affected, is material damage. [82-4-203(31), MCA].

CHIA, n.1 (citation in brackets in original).

REQUEST FOR ADMISSION NO. 5: Admit that in its CHIA DEQ determined that the proposed mining under Signal Peak Energy's application and DEQ's permit would not cause material damage to the hydrologic balance with regard to ground water because "degradation of groundwater quality is not expected to render groundwaters unsuitable to current or anticipated use." CHIA at 10-4.

RESPONSE: DEQ objects to RFA No. 5 to the extent that it requires DEQ to characterize the CHIA, a document that speaks for itself. DEQ further objects to RFA No. 5 to the extent that it calls upon DEQ to make a legal conclusion based on "no special knowledge [of DEQ] that would enable [DEQ] to answer the request with any more certainty than [MEIC] or the court through judicial notice." Without waiving these objections, DEQ admits that the following language appears on page 10-4 of the CHIA "degradation of groundwater quality is not expected to render groundwaters unsuitable *for* current or anticipated use."

REQUEST FOR ADMISSION NO. 6: Admit that groundwater within the proposed mine area is anticipated to degrade after mining.

RESPONSE: DEQ objects to RFA No. 6 to the extent that it requires DEQ to speculate on the anticipated condition of groundwater at the Signal Peak mine after mining, beyond what is stated in Written Findings, the PHC, or the CHIA. DEQ further objects to RFA No. 6 to the extent that it requires DEQ to characterize the Written Findings, the PHC, or the CHIA, documents that speak for themselves. DEQ also objects to RFA No. 6 because "within the proposed mine area" mischaracterizes the CHIA and is imprecise and does not elicit "simple and concise statements of fact that can be denied or admitted with an absolute minimum of explanation or qualification" appropriate to M. R. Civ. P. Rule 36. *See Duchesneau v. Cornell Univ.*, 2010 U.S. Dist. LEXIS 111546 at *2, 2010 WL 4117753 (E.D. Pa. Oct. 19, 2010)(internal quotation omitted). Without waiving these objections, DEQ admits that the CHIA states:

> Because mine dewatering produces groundwater flow towards the mine working during mining, no water quality affects are expected during mining. After mining is completed, some of the mine gob will become saturated. Groundwater quality in the mine gob is expected to be degraded relative to natural water quality, however, due to the small quantity of gob influenced water and the slow water movement in the Mammoth Coal this poor quality water is not expected to migrate outside the permit boundaries within 50 years after mining. CHIA, p. 9-11.

. . .

> A decline of groundwater quality is expected as longwall mining and subsidence continue to produce additional panels of collapsed and mineralized rubble in the Caved Zone (gob). CHIA, p. 10-2

. . .

> Post mining groundwater quality within the mined-out area (Caved Zone) is expected to degrade after coming into contact with fresh rock surfaces exposed in subsidence fractures and mineralized rubble or gob. Oxidizing conditions are anticipated until after mining is complete and resaturation of the collapsed material has occurred. These conditions may result in increased sulfide oxidation, cation exchange, leaching, and weathering, which together may cause an increase in the concentrations of calcium, magnesium, sulfate and sodium ions. Due to the buffering capacity of the alkaline mineralogy of the overburden and shallow underburden, development of acidic conditions in water present in the gob is extremely unlikely. As explained above at 9.5.2, any degradation of groundwater quality is not expected to render groundwaters unsuitable for current or anticipated use. Accordingly, because current mining methods are proposed throughout the expanded permit area, material damage to the quality or quantity of groundwater resources outside the proposed permit area is not expected from continued underground mining. Although presently there is no evidence of a general increase in any water quality parameters that can be attributed to mining, continued monitoring will provide additional insights of the potential effects on groundwater quality predicted to accrue over time as mining progresses. CHIA, p. 10-4.

REQUEST FOR ADMISSION NO. 7: Admit that low quality groundwater within the mine is anticipated to migrate away from the mine after mining ceases.

RESPONSE: DEQ objects to RFA No. 7 to the extent that it requires DEQ to speculate on movement of groundwater at the Signal Peak mine after mining, beyond what is stated in Written Findings, the PHC, or the CHIA. DEQ further objects to RFA No. 7 to the extent that it requires DEQ to characterize the Written Findings, the PHC, or the CHIA, documents that speak for themselves. DEQ also objects to RFA No. 7 because: 1) the words "low quality groundwater" do not occur in the PHC, the Groundwater Model, or the CHIA and therefore RFA No. 7

mischaracterizes those documents; and 2) "mine" does not specify whether it applies to the permit area, all mine workings, or caved areas and therefore does not permit a response through "simple and concise statements of fact that can be denied or admitted with an absolute minimum of explanation or qualification" appropriate to M. R. Civ. P. Rule 36. Likewise, the term "low quality groundwater" is insufficiently precise to permit a response through "simple and concise statements of fact that can be denied or admitted with an absolute minimum of explanation or qualification" appropriate to M. R. Civ. P. Rule 36. Without waiving these objections, DEQ admits that the CHIA states:

> Because mine dewatering produces groundwater flow towards the mine working during mining, no water quality affects are expected during mining. After mining is completed, some of the mine gob will become saturated. Groundwater quality in the mine gob is expected to be degraded relative to natural water quality, however, due to the small quantity of gob influenced water and the slow water movement in the Mammoth Coal this poor quality water is not expected to migrate outside the permit boundaries within 50 years after mining.

CHIA, p. 9-11.

REQUEST FOR ADMISSION NO. 8: Admit that the particle tracking analysis conducted by Nicklin Earth & Water, Inc. as part of the Groundwater Model for the mine indicated that if the mine gate roads do not collapse, within 50 years lower quality water from the mine area would begin to migrate beyond the mine boundary. Nicklin Earth & Water, Inc., Groundwater Model Bull Mountains Mine No. 1 at 314-6-25 to -26 & Fig. 14M (March 2013), prepared for Signal Peak Energy, included in application as Appendix 314-6.

RESPONSE: DEQ objects to RFA No. 8 to the extent that it requires DEQ to characterize the PHC, the Nicklin Groundwater Model, or the CHIA, documents that speak for themselves. DEQ further objects to RFA No. 8 because the term "low quality water" does not occur in the PHC, the Groundwater Model or the CHIA and therefore RFA No. 8 and mischaracterizes those

documents. Also, the term "mine area" does not specify whether it applies to the permit area, all mine workings, or caved areas. For these reasons RFA No. 8, does not permit a response through "simple and concise statements of fact that can be denied or admitted with an absolute minimum of explanation or qualification" appropriate to M. R. Civ. P. Rule 36. Without waiving these objections, DEQ denies that either the Groundwater Model or the CHIA "indicate[] that if the mine gate roads do not collapse, within 50 years lower quality water from the mine area would begin to migrate beyond the mine boundary." RFA No. 8 oversimplifies and mischaracterizes the PHC, the Groundwater Model, and the use of the results of the Groundwater Model in the CHIA, as the particle tracking analysis of Groundwater Model says nothing about the quality of groundwater that may migrate out of the life of mine boundary after mining ceases. Also, RFA No. 8 ignores the assumptions and mathematical equations of the Groundwater Model concerning advective movement of theoretical groundwater particles in the vicinity of the gate roads after mining and other considerations explained in the PHC and the CHIA. Without waiving these objections, DEQ admits that the CHIA addresses migration of "poor quality water" as follows:

> Because mine dewatering produces groundwater flow towards the mine working during mining, no water quality affects are expected during mining. After mining is completed, some of the mine gob will become saturated. Groundwater quality in the mine gob is expected to be degraded relative to natural water quality, however, due to the small quantity of gob influenced water and the slow water movement in the Mammoth Coal this poor quality water is not expected to migrate outside the permit boundaries within 50 years after mining.

CHIA, p. 9-11. The 50-year prediction must be understood within the context of the explanations and limitations set forth elsewhere in PHC and the Groundwater Model. DEQ further admits that the Environmental Assessment prepared for the SPE Amendment No. 3 addresses "lower quality water" as follows:

> Because the particle tracking model uses conservative assumptions which increase particle transport rates, the actual distance of movement of lower quality water from the mine pool should be less than these estimates. Particle tracking also does not consider dilution or attenuation of lower quality groundwater which would occur during transport away from the mine. Because of these factors, no degradation of groundwater quality outside the permit area is expected to occur after mining.

SPE Amendment No. 3 Environmental Assessment, p. 8.

REQUEST FOR ADMISSION NO. 9: Admit that Figure 14 of the Groundwater Model shows groundwater particles migrating beyond the mine boundary at numerous locations within 50 years in the scenario in which mine gate roads remain intact.

RESPONSE: DEQ assumes that by "Figure 14 of the Groundwater Model" MEIC refers to Figure 14M of Appendix 314-6 of the PHC. DEQ objects to RFA No. 9 to the extent that it requires DEQ to characterize the PHC, the Nicklin Groundwater Model, or the CHIA, and Figure 14M of the Groundwater Model, documents that speak for themselves. Without waiving this objection, DEQ qualifiedly admits that the figure identified in RFA No. 9 depicts particles migrating beyond the mine permit boundary in no more than 6 of 30 locations. DEQ qualifies its admission to RFA No. 9 because Figure 14M must be understood within the context of the explanations and limitations set forth elsewhere in the Groundwater Model.

REQUEST FOR ADMISSION NO. 10: Admit that even if the gate roads do collapse, lower quality will still migrate beyond the mine boundary, though it may take more than 50 years.

RESPONSE: DEQ objects to RFA No. 10 to the extent that it requires DEQ to speculate on movement of groundwater at the Signal Peak mine after mining, beyond what is stated in the PHC, the Nicklin Groundwater Model, or the CHIA. DEQ further objects to RFA No. 10 to the extent that it requires DEQ to characterize the PHC, the Nicklin Groundwater Model, or the CHIA, documents that speak for themselves. DEQ also objects to RFA No. 10 because it is

vague as the term "lower quality" renders the RFP No. 10 ambiguous and confusing. Assuming that by "lower quality" MEIC means "lower quality water," that term does not occur in the Groundwater Model or the CHIA and therefore RFA No. 10 mischaracterizes those documents and does not permit a response through "simple and concise statements of fact that can be denied or admitted with an absolute minimum of explanation or qualification" appropriate to M. R. Civ. P. Rule 36. Without waiving these objections, and assuming that by "lower quality" MEIC means "lower quality water," DEQ denies RFA No. 10, because it mischaracterizes and oversimplifies the Groundwater Model as the particle tracking analysis of Groundwater Model which states:

> The particle tracking results for Scenario 2 (see Figure 14M – lower frame) shows that with the same limiting/conservative assumptions described heretofore, that it is possible that some flow from the mine gob may flow just outside the permit boundary.

Groundwater Model, p. 314-6-24. Furthermore, the particle tracking analysis results reported in the Groundwater Model say nothing about the quality of groundwater that may migrate outside of the permit boundary after mining ceases. PHC, p. 314-5-58. Without waiving these objections, DEQ admits that the CHIA addresses lateral migration of "poor quality water" as follows:

> Because mine dewatering produces groundwater flow towards the mine working during mining, no water quality affects are expected during mining. After mining is completed, some of the mine gob will become saturated. Groundwater quality in the mine gob is expected to be degraded relative to natural water quality, however, due to the small quantity of gob influenced water and the slow water movement in the Mammoth Coal this poor quality water is not expected to migrate outside the permit boundaries within 50 years after mining.

CHIA, 9-11. The 50-year prediction must be understood within the context of the explanations and limitations set forth elsewhere in PHC and the Groundwater Model. DEQ further admits that

the Environmental Assessment prepared for the SPE Amendment No. 3 addresses "lower quality water" as follows:

> Because the particle tracking model uses conservative assumptions which increase particle transport rates, the actual distance of movement of lower quality water from the mine pool should be less than these estimates. Particle tracking also does not consider dilution or attenuation of lower quality groundwater which would occur during transport away from the mine. Because of these factors, no degradation of groundwater quality outside the permit area is expected to occur after mining.

SPE Amendment No. 3 Environmental Assessment, p. 8. Also, DEQ denies any inference that the PHC, the Groundwater Model, or the CHIA can be reasonably interpreted to forecast significant lowering of the quality of groundwater outside the permit area in comparison to natural conditions.

REQUEST FOR ADMISSION NO. 11: Admit that the particle tracking analysis conducted by Nicklin Earth & Water, Inc. as part of the Groundwater Model for the mine did not evaluate the impacts of adsorption, desorption, or dilution of pollution in lower quality groundwater migrating from the mine.

RESPONSE: DEQ objects to RFA No. 11 to the extent that it requires DEQ to characterize the PHC, the Nicklin Groundwater Model, or the CHIA, documents that speak for themselves. Without waiving these objections, DEQ admits that the CHIA addresses lateral migration of "poor quality water" as follows:

> Because mine dewatering produces groundwater flow towards the mine working during mining, no water quality affects are expected during mining. After mining is completed, some of the mine gob will become saturated. Groundwater quality in the mine gob is expected to be degraded relative to natural water quality, however, due to the small quantity of gob influenced water and the slow water movement in the Mammoth Coal this poor quality water is not expected to migrate outside the permit boundaries within 50 years after mining.

CHIA, p. 9-11. The 50-year prediction must be understood within the context of the explanations and limitations set forth elsewhere in PHC and the Groundwater Model. DEQ also admits that the PHC describes the limitations on the particle tracking analysis used in the Groundwater Model as follows:

> There are several other factors that need to be considered in the cases of both Scenarios 1 and 2 and these are the following:
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> - Particle tracking simply tracks the predicted groundwater flow direction and the travel distance that particle travels over time.
>
> - Particle tracking does not account for adsorption and desorption of analytes of concern. In effect, transport velocities of reactive inorganics are normally substantially less than predictions made based upon particle tracking.
>
> - There are other factors as well that are not accounted for in particle tracking including the effects of groundwater mixing, dilution from other contributions, etc.

PHC, p. 314-5-58, 314-5-59. DEQ further admits that the Environmental Assessment prepared for the SPE Amendment No. 3 addresses "lower quality water" as follows:

> Because the particle tracking model uses conservative assumptions which increase particle transport rates, the actual distance of movement of lower quality water from the mine pool should be less than these estimates. Particle tracking also does not consider dilution or attenuation of lower quality groundwater which would occur during transport away from the mine. Because of these factors, no degradation of groundwater quality outside the permit area is expected to occur after mining.

SPE Amendment No. 3 Environmental Assessment, p. 8.

REQUEST FOR ADMISSION NO. 12: Admit that no other analysis related to the current permit evaluated the impacts of adsorption, desorption, or dilution of pollution in lower quality groundwater migrating from the mine.

RESPONSE: DEQ objects to RFA No. 12 to the extent that it requires DEQ to characterize the PHC, the Nicklin Groundwater Model, or the CHIA, documents that speak for themselves. Without waiving these objections, DEQ denies RFA No. 12, as DEQ states in the Environmental Assessment prepared for the SPE Amendment No. 3;

> Because the particle tracking model uses conservative assumptions which increase particle transport rates, the actual distance of movement of lower quality water from the mine pool should be less than these estimates. Particle tracking also does not consider dilution or attenuation of lower quality groundwater which would occur during transport away from the mine. Because of these factors, no degradation of groundwater quality outside the permit area is expected to occur after mining.

SPE Amendment No. 3 Environmental Assessment, p. 8. Otherwise DEQ admits that the CHIA does not rely on groundwater modeling that quantitatively accounts for the impacts of adsorption, desorption, or dilution of pollution in the post-mining hydrologic regime.

REQUEST FOR ADMISSION NO. 13: Admit that neither the Groundwater Model prepared by Nicklin Earth & Water, Inc. nor the Comprehensive Hydrologic Evaluation and Analysis of Probable Hydrologic Consequences for the Bull Mountains Mine No. 1, prepared by Nicklin Earth & Water Inc. for Signal Peak Energy analyzed the potential impacts to groundwater outside the permit area that may occur beyond fifty years in the future.

RESPONSE: In its answer, DEQ assumes that the by document identified in RFA No. 13, MEIC refers to the PHC. DEQ objects to RFA No. 13 to the extent that it requires DEQ to characterize the PHC, the Nicklin Groundwater Model, or the CHIA, documents that speak for themselves. Without waiving these objections, DEQ denies RFA No. 13 because it mischaracterizes the PHC and the Groundwater Model, as the PHC specifically states

> In summary, any groundwater quality degradation that occurs is likely to be associated with desaturation/saturation of the mining gob during and following mining activity. Such degradation is predicted to remain within, or very near the mine workings and

> permit boundaries, for the next 50 years assuming that the mine gate roads remain intact (Scenario 2). If the gate roads collapse (Scenario 1), then any potential migration of degraded groundwater will be much slower. Otherwise, it is unlikely that there will be a diminution of groundwater quality outside the LOM boundary that could adversely affect domestic, agricultural or other legitimate uses of groundwater. It is considered highly likely that water use classifications will remain the same after mining as it was before mining for areas outside the LOM.

PHC, p. 314-5-50. Furthermore, the term "beyond fifty years in the future" and similar references to a fifty-year time frame used in the PHC, the Groundwater Model, and the CHIA refer to a professional judgment by Nicklin Earth and Water, that was accepted by DEQ, to set reasonable temporal limits for the Groundwater Model. DEQ further denies any inference that limiting of the Groundwater Model time frame to fifty years limited the overall analyses in the PHC or the CHIA to a similar time frame.

REQUEST FOR ADMISSION NO. 14: Admit that no other analysis related to the current permit evaluated impacts to groundwater outside the permit area that may occur beyond fifty years in the future.

RESPONSE: DEQ objects to RFA No. 14 to the extent that it requires DEQ to characterize the SPE Amendment No. 3 Application, the PHC, the Nicklin Groundwater Model, or the CHIA, documents that speak for themselves. Without waiving this objection, DEQ admits that it approved Amendment No. 3 on the basis of the information contained in the application, including the PHC, the Nicklin Groundwater Model, annual groundwater monitoring reports and the literature identified in DEQ response to informal discovery, DEQ letter to Shiloh Hernandez dated January 2, 2014. All of this information has been provided to MEIC. DEQ denies RFA No. 14 to the extent that it infers that the determination that the proposed mine is designed to protect the hydrologic balance and prevent material damage outside the permit area is not

supported by analysis of all the information contained in the permit application and annual groundwater monitoring reports.

REQUEST FOR ADMISSION NO. 15: Admit that the comprehensive hydrologic impact assessment required by § 82-4-227(3)(a), MCA, does not expressly establish any temporal limits for the analysis of material damage.

RESPONSE: DEQ objects to RFA No. 15 because it neither elicits a statement of fact, nor a statement applying law to a fact, and therefore falls outside the scope of M. R. Civ. P. Rule 36. DEQ further objects to RFA No. 15 to the extent that it calls upon DEQ to make a legal conclusion based "no special knowledge [of DEQ] that would enable [DEQ] to answer the request with any more certainty than [MEIC] or the court through judicial notice." Also, DEQ objects to RFA No. 15 to the extent that it requires DEQ to characterize the CHIA, a document that speaks for itself. Finally, DEQ objects to RFA No. 15 to the extent that it does not permit a response through "simple and concise statements of fact that can be denied or admitted with an absolute minimum of explanation or qualification" appropriate to M. R. Civ. P. Rule 36. Without waiving these objections, DEQ admits that § 82-4-227(3)(a), MCA, does not include the words "time," "temporal," or any word pertaining to a measure of time. DEQ denies RFA No. 15 to the extent that it purports to establish an inference that the assessment required by § 82-4-227(3)(a), MCA, is erroneous because one of the analyses that the assessment relies on is cast in terms of time.

REQUEST FOR ADMISSION NO. 16: Admit that § 82-4-227(3)(a), MCA, does not expressly provide an exception for material damage outside the permit area that will only begin to manifest itself fifty years after the cessation of mining operations.

RESPONSE: DEQ objects to RFA No. 16 because it neither elicits a statement of fact, nor a statement applying law to a fact, and therefore falls outside the scope of M. R. Civ. P. Rule 36.

DEQ further objects to RFA No. 16 to the extent that it calls upon DEQ to make a legal conclusion based "no special knowledge [of DEQ] that would enable [DEQ] to answer the request with any more certainty than [MEIC] or the court through judicial notice." Also, DEQ objects to RFA No. 16 to the extent that it requires DEQ to characterize the § 82-4-227(3)(a), MCA, a statute that speaks for itself.

REQUEST FOR ADMISSION NO. 17: Admit that after mining, groundwater quality within the mine will degrade from a Class II designation to a Class III.

RESPONSE: DEQ objects to RFA No. 17 to the extent that it requires DEQ to speculate on the quality of groundwater at the Signal Peak mine after mining, beyond what is stated in the PHC, the Nicklin Groundwater Model, or the CHIA. DEQ further objects to RFA No. 17 to the extent that it requires DEQ to characterize the PHC, the Nicklin Groundwater Model, or the CHIA, documents that speak for themselves. DEQ also objects to RFA No. 17 because it is vague as "within the mine" does not specify whether it applies to the permit area, all mine workings, or caved areas, and therefore does not permit a response through "simple and concise statements of fact that can be denied or admitted with an absolute minimum of explanation or qualification" appropriate to M. R. Civ. P. Rule 36. Without waiving these objections, DEQ denies RFA No. 17 because it oversimplifies and mischaracterizes the information contained in the Amendment No. 3 application, the PHC, the Nicklin Groundwater Model, baseline information, and use of the results of the Groundwater Model in the CHIA. Specifically, and assuming that RFA No. 17 refers to the quality of groundwater either in the Mammoth Coal or caved areas, the request ignores that water quality in the Mammoth Coal is naturally either Class II or III with SC from 1400-3730 µS/cm in baseline samples. *See* CHIA, § 9.5.2.4; table 8-8. Otherwise, DEQ admits that the CHIA states:

> Because mine dewatering produces groundwater flow towards the mine working during mining, no water quality affects are expected during mining. After mining is completed, some of the mine gob will become saturated. Groundwater quality in the mine gob is expected to be degraded relative to natural water quality, however, due to the small quantity of gob influenced water and the slow water movement in the Mammoth Coal this poor quality water is not expected to migrate outside the permit boundaries within 50 years after mining.

CHIA, p. 9-11. DEQ further admits that the PHC states,

> Presently, the pre-mine mean groundwater water quality (Table 5 (314A)) exceeds sulfate and total dissolved solids standards for livestock (Attachment G). The groundwater generally classifies as either Class II or Class III groundwater. This will be the case after mining. However, there is potential that some of this groundwater will change from a Class II to a Class III designation. On this basis, post-mining groundwater quality will fall within either the Class II or Class III designation of the State (Table 4 (314A)). The groundwater for either classification would also be suitable for livestock watering (See Attachment G).

PHC, Appendix 314-5, p. 314-5-52 (references in original).

REQUEST FOR ADMISSION NO. 18: Admit that degradation of water quality from Class II to Class III water quality constitutes a degradation of high quality waters, pursuant to § 75-5-103(13).

RESPONSE: DEQ objects to RFA No. 18 because it neither elicits a statement of fact, nor a statement applying law to a fact, and therefore falls outside the scope of M. R. Civ. P. Rule 36. Furthermore, RFA No. 18 calls upon DEQ to make a legal conclusion based "no special knowledge [of DEQ] that would enable [DEQ] to answer the request with any more certainty than [MEIC] or the court through judicial notice." DEQ further objects to RFA No. 18 to the extent that it requires DEQ to characterize § 75-5-103(13), MCA, a statute that speaks for itself.

REQUEST FOR ADMISSION NO. 19: Admit that the existing waste disposal area at the mine contains coal processing wastes and underground mine wastes.

RESPONSE: DEQ admits, based on information in its possession provided by SPE, that facilities at the Signal Peak Bull Mountains No. 1 mine include a waste disposal area that contains coal processing waste and underground mine wastes.

REQUEST FOR ADMISSION NO. 20: Admit that water is also collected in the waste disposal area.

RESPONSE: DEQ denies RFA No. 20. Based on information in its possession provided by SPE, the waste disposal area at the Bull Mountains No. 1 Mine is not an impoundment and is not designed to collect water. Run off from the waste disposal area is directed to a sedimentation pond (Sedimentation Pond WDA No. 1) located downstream of the waste disposal area.

REQUEST FOR ADMISSION NO. 21: Admit that DEQ's 1993 approval of the mine required dewatering of at least 90% of the 10-year, 24-hour storage of the waste disposal area within 10 days, pursuant to ARM 17.24.505(5)(b).

RESPONSE: DEQ objects to RFA No. 21 because it does not permit a meaningful answer. In 1993 as it does today, ARM 17.24.505(5)(b) applies to temporary impoundments. ARM 17.24.505(5)(b) does not apply to the waste disposal area which is not a temporary waste impoundment. Also, ARM 17.24.505(5)(b) does not apply to the sediment pond located below the waste disposal area (Sedimentation Pond WDA No. 1) which is not a waste impoundment.

REQUEST FOR ADMISSION NO. 22: Admit that the CHIA did not consider potential impacts to surface waters from discharges of water from the waste disposal area pursuant to the 10-day dewatering requirement of ARM 17.24.505(5)(b).

RESPONSE: DEQ objects to RFA No. 22 to the extent that it requires DEQ to characterize the CHIA, a document that speaks for itself. Otherwise, DEQ objects to RFA No. 22 because it does not permit a meaningful answer. ARM 17.24.505(5)(b) does not apply to the waste disposal area which is not a temporary waste impoundment. Also, ARM 17.24.505(5)(b) does not apply to the

sediment pond located below the waste disposal area (Sedimentation Pond WDA No. 1) which is not a waste impoundment.

INTERROGATORY NO. 1: Please state how long, in years, DEQ anticipates that low quality water from the mine will continue to migrate away from the mine into downgradient portions of the Mammoth Coal aquifer.

ANSWER: DEQ objects to Interrogatory No. 1 because it is based on a mischaracterization of the Amendment No. 3 application, the PHC, the Groundwater Model, and the CHIA, i.e., that "low quality water from the mine will continue to migrate away from the mine into downgradient portions of the Mammoth Coal aquifer." DEQ further objects to Interrogatory No. 1 because it the information requested is not reasonably calculated to lead to the discovery of admissible evidence. M. R. Civ. P. Rule 26(b)(1). DEQ agreed to accommodate MEIC's request to try this administrative through summary judgment briefing without a hearing on the record. *See* Order Adopting Joint Stipulated Procedural Schedule, ¶ 2. In this appeal, MEIC charges that DEQ's approval of the SPE Amendment No. 3 violates the requirements of MSUMRA. The issuance of the permit is supported by the Written Findings, information provided in the application including the PHC, and other information available to DEQ. All information, analyses, determination and conclusions by DEQ regarding impacts from activities described in the Amendment No. 3 application on water quality are set forth in those documents. These documents speak for themselves and specifically address the likelihood that groundwater with significantly higher TDS than normal condition will transport outside the life of mine boundary. To the extent that Interrogatory No. 1 calls on DEQ to speculate beyond the information, analyses, determinations, and conclusions set forth in the documents described in this Answer, DEQ is unable to do so.

INTERROGATORY NO. 2: Please state what volume of water from the Madison wells has been used in the mine in the past ten years.

ANSWER: DEQ cannot answer Interrogatory No. 2 because it does not possess the necessary information.

INTERROGATORY NO. 3: Please state whether, regardless of whether the mine gate roads remain intact, groundwater from within the mine will migrate to downgradient to areas beyond the mine permit area at some point in the future.

ANSWER: DEQ objects to Interrogatory No. 3 because the information requested is not reasonably calculated to lead to the discovery of admissible evidence. M. R. Civ. P. Rule 26(b)(1). DEQ agreed to accommodate MEIC's request to try this administrative through summary judgment briefing without a hearing on the record. *See* Order Adopting Joint Stipulated Procedural Schedule, ¶ 2. In this appeal, MEIC charges that DEQ's approval of the SPE Amendment No. 3 violates the requirements of MSUMRA. The issuance of the permit is supported by Written Findings, information provided in the application including the PHC, and other information available to DEQ. All information, analyses, determination and conclusions by DEQ regarding impacts from activities described in the Amendment No. 3 application on water quality are set forth in those documents. These documents speak for themselves and specifically address the likelihood that groundwater from mined areas will migrate beyond the life of mine boundary. *See, e.g.* Response to RFA No. 9. To the extent that Interrogatory No. 3 calls on DEQ to speculate beyond the information, analyses, determinations, and conclusions set forth in the documents described in this Answer, DEQ is unable to do so.

INTERROGATORY NO. 4: Please state when, in DEQ's estimation, water in the mine void will cease to have elevated levels of total dissolved solids, sulfate, and specific conductance.

ANSWER: DEQ objects to Interrogatory No. 4 because it the information requested is not reasonably calculated to lead to the discovery of admissible evidence. M. R. Civ. P. Rule 26(b)(1). DEQ agreed to accommodate MEIC's request to try this administrative through summary judgment briefing without a hearing on the record. *See* Order Adopting Joint Stipulated Procedural Schedule, ¶ 2. In this appeal, MEIC charges that DEQ's approval of the SPE Amendment No. 3 violates the requirements of MSUMRA. The issuance of the permit is supported by Written Findings, information provided in the application including the PHC, and other information available to DEQ. All information, analyses, determinations and conclusions by DEQ regarding impacts from activities described in the Amendment No. 3 application on water quality are set forth in those documents. These documents speak for themselves and specifically address the likelihood that groundwater quality will be impacted by mining activities described in the Amendment No. 3 application. To the extent that Interrogatory No. 3. calls on DEQ to speculate beyond the information, analyses, determinations, and conclusions set forth in the documents described in this Answer, DEQ is unable to do so.

INTERROGATORY NO. 5: Please state whether DEQ is requiring Signal Peak Energy to comply with the dewatering provisions of ARM 17.24.505(5)(b).

ANSWER: DEQ is unable to answer Interrogatory No. 5 because DEQ is unaware of any action or activity at the Bull Mountains No. 1 mine to which ARM 17.24.505(5)(b) would apply.

INTERROGATORY NO. 6: Please identify each exceedances of limits from the mine's water discharge permit that has occurred at the mine in the last five years.

ANSWER: During the last 5 years (January 1, 2009 through December 31, 2013), discharges from the facility have exceeded MPDES permit MT0028983 effluent limitations five times:

- In June 2011, a maximum pH of 9.74 was measured at Outfall 008 during a precipitation-driven discharge. The maximum effluent limitation for this parameter is 9.0. A violation was not issued to the facility due to extreme precipitation and state of emergency declaration.
- In July 2011, a settleable solids concentration of 0.7 ml/L was measured at Outfall 008 during a precipitation-driven discharge. The daily maximum effluent limitation for this parameter is 0.5 ml/L. A violation was not issued to the facility due to extreme precipitation and state of emergency declaration.
- In May 2013, a settleable solids concentration of 6 ml/L was measured at Outfall 008 during a precipitation-driven discharge. The effluent limitation for this parameter is 0.5 ml/L. A violation was issued to the facility.
- In December 2013, a total suspended solids concentration of 134 mg/L was measured at Outfall 002 during a "dry weather" discharge. The daily maximum effluent limitation for this parameter is 70 mg/L. A violation was issued to the facility.
- In December 2013, a total iron concentration of 3.8 mg/L was measured at Outfall 002 during a "dry weather" discharge. While the maximum daily effluent limitation for this parameter (7.0 mg/L) was not exceeded, the average monthly effluent limitation of 3.5 mg/L was due to there being only one discharge/measurement for the month. A violation was issued to the facility.

INTERROGATORY NO. 7: Please identify all chemicals used at the mine for coal processing.

ANSWER: DEQ cannot answer Interrogatory No. 7 because it does not possess the information necessary to form an answer.

REQUEST FOR PRODUCTION NO. 1: Please provide a copy of the study cited in the EA as "Reiten and Wheaton, 1989."

RESPONSE: A copy of the requested article was made available to MEIC along with the materials provided in response to RFP No. 6.

REQUEST FOR PRODUCTION NO. 2: Please provide a copy of the study cited in the EA as "Wheaton and Van Voast, 1989."

RESPONSE: DEQ is unable to comply with RFP No. 2. DEQ does not have a copy of "Wheaton and Van Voast, 1989," nor does it appear that a copy of the document is available from any source that DEQ is aware of. On information and belief, it appears that, "Wheaton and Van Voast, 1989" refers to a draft of "Memoir 63: Hydrologic Assessment of Abandoned Coal Mines in the Bull Mountains near Roundup, Montana."

REQUEST FOR PRODUCTION NO. 3: Please provide a complete copy of John Wheaton, "Memoir 63: Hydrologic Assessment of Abandoned Coal Mines in the Bull Mountains Near Roundup, Montana," Mont. Bureau of Mines and Geology (1992).

RESPONSE: DEQ has already provided a copy of the study referenced in RFP No. 3 in the same condition as it exists in DEQ's custody (pages 26 and 27 are missing).

REQUEST FOR PRODUCTION NO. 4: Please provide copies of any may serve as a basis for denying requests for admission 12 or 14.

RESPONSE: Assuming by RFP No. 4, MEIC means "copies of any *documents*," those documents have already been provided to MEIC as explained in DEQ's responses to RFA Nos. 12 and 14.

MEIC SECOND DISCOVERY REQUESTS

INTERROGATORY NO. 8: Please enumerate and describe in detailed narrative each defense that DEQ may present in this matter.

ANSWER: DEQ agreed to accommodate MEIC's request to try this administrative through summary judgment briefing. *See* Order Adopting Joint Stipulated Procedural Schedule, ¶ 2.

MEIC bears the burden of proof and persuasion on all issues identified in the Notice of Appeal based on issues of undisputed fact. To the extent that MEIC's briefing to the Board raises a substantial question based on issues of undisputed fact that as to the issues on appeal, DEQ will argue and provide supporting evidence to the Board that: 1) the determination that the proposed mine expansion was designed to prevent material damage to the hydrologic balance outside the permit area accords with the requirements of MSUMRA and employed the correct legal standards; and 2) the information provided by SPE in its application for Amendment No. 3 met the requirements of MSUMRA and is sufficient to support DEQ's determination that the proposed mine expansion was designed to prevent material damage to the hydrologic balance in accordance with the requirements of MSUMRA.

REQUEST FOR PRODUCTION NO. 5: Please provide any documents that have not yet been disclosed that DEQ may use to support any defense enumerated in.

RESPONSE: DEQ objects to RFP No. 5 because the sentence is incomplete and requires DEQ to infer the intent of the request. Assuming that RFP No. 5 seeks disclosure of any documents relevant to DEQ's Answer to Interrogatory 8, DEQ is not aware of any document that it intends to rely upon that has not already been provided to MEIC or will be provided as a part of this Response.

REQUEST FOR PRODUCTION NO. 6: Please provide copies of all communications between DEQ and SPE that have occurred regarding this matter since November 18, 2013. If you claim any privilege for any such documents, provide a privilege log for such items, stating the name of the document, the date it was prepared, the author, and describe the document sufficiently to allow the hearing examiner to make a ruling on the claimed privilege.

RESPONSE: DEQ has already made the documents requested in RFP No. 6 dated between November 18, 2013, and December 13, 2013, through informal discovery. Documents dated

from December 13, 2014, through January 29, 2014, were made available to MEIC in electronic format on a CD-ROM disc on February 26, 2014, as attachments to an electronic mail message from the undersigned legal counsel to Shiloh Hernandez.

This Completes DEQ's response to MEIC's First and Second Discovery Requests.

VERIFICATION FOR INTERROGATORIES AND REQUESTS FOR PRODUCTION

STATE OF MONTANA)
) ss.
County of Lewis & Clark)

I, Chris A. Yde, being first duly sworn, state that I am the Supervisor of the Industrial and Energy Minerals Bureau, Coal and Uranium Section, Montana Department of Environmental Quality, and I am authorized to answer the foregoing Interrogatories and Requests for Production and to make this verification. I have read the foregoing Answers to Interrogatories and Responses to Requests for Production, and the information provided in them is true and correct to the best of my knowledge and belief.

Chris A. Yde

Subscribed and sworn to before me by Chris A. Yde, this 26th day of February, 2014.

Signature of Notary

(seal)

JOYCE L. WITTENBERG
NOTARY PUBLIC for the
State of Montana
Residing at Helena, Montana
My Commission Expires
May 21, 2015

As the attorney for the Department of Environmental Quality, I am signing these Responses to Requests for Admission, Answers to Interrogatories, and Responses to Requests for Production and certify this response in accordance with M. R. Civ. P. Rule 26(g)(1).

STATE OF MONTANA, DEPARTMENT OF ENVIRONMENTAL QUALITY

By: _____
Dana David
Special Assistant Attorney General
Attorney for the Department

CERTIFICATE OF SERVICE

The undersigned certifies that on February 27, 2014, he caused the original or a copy of the foregoing DEQ Responses to MEIC First and Second Discovery Requests delivered or transmitted to the persons named below as follows:

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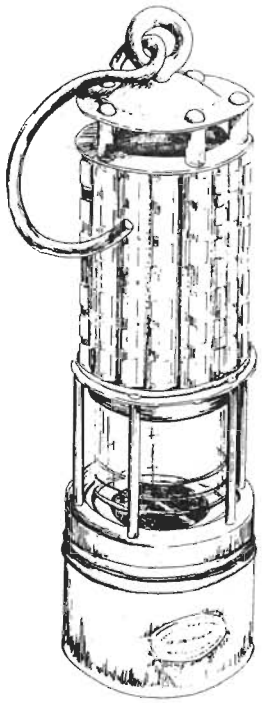
PROPERTY OF BILLINGS D.E.Q.

Final Environmental Impact Statement

MERIDIAN MINERALS COMPANY

BULL MOUNTAINS MINE NO. 1

MUSSELSHELL AND YELLOWSTONE COUNTIES, MONTANA



Prepared by

Montana Department of State Lands

November 1992

DEPARTMENT OF STATE LANDS

STAN STEPHENS, GOVERNOR

CAPITOL STATION

STATE OF MONTANA

(406) 444-2074

1625 ELEVENTH AVENUE
HELENA, MONTANA 59620

November 28, 1992

TO ALL INTERESTED PARTIES:

The enclosed environmental impact statement (EIS) has been prepared by the Montana Department of State Lands (DSL) and is available for public review. The EIS analyzes the impacts on the quality of the human environment that would result should DSL grant a permit to mine coal and Meridian Minerals Company (Meridian) subsequently develop the proposed Bull Mountains Mine No. 1 underground coal mine.

A draft EIS was released by DSL for public review and comment on August 31, 1992. Eighty-four comment letters were received during the 35 day comment period which ended October 5, 1992. In addition, local residents and interested parties were afforded the opportunity to comment during three public hearings on September 22, 1992, in Huntley, Montana, September 23, 1992, in Billings, Montana and September 24, 1992, in Roundup, Montana.

While not containing any major changes from the draft EIS, the final EIS contains corrections and clarifications of the original text. The letters and oral comments of the public as well as the responses from DSL have been included in an appendix, Appendix F. Alternative 1, approval of the applicant's proposal with conditions, has been selected as DSL's preferred alternative.

After publication of this EIS, DSL must make a decision whether to approve or disapprove Meridian's application for a permit to mine coal. DSL can make this decision no sooner than 15 days after release of the final EIS to the public.

Further information, including additional copies of the final EIS, may be obtained by contacting DSL at the address above.

Sincerely,

Bonnie Lovelace

Bonnie Lovelace, Chief
Coal and Uranium Bureau
Reclamation Division

Final

Environmental Impact Statement

MERIDIAN MINERALS COMPANY'S

Proposed Development
of the

BULL MOUNTAINS MINE NO. 1

and

ASSOCIATED SUPPORT FACILITIES

MUSSELSHELL AND YELLOWSTONE COUNTIES, MONTANA

November 28, 1992

Dennis D. Casey, Commissioner
Department of State Lands

PROPERTY OF BILLINGS D.E.Q.

COVER SHEET

Proposed actions: Approval or disapproval of 1) a Montana 5-year *permit to mine coal*, and 2) a Montana *land use agreement* being requested by Meridian Minerals Company for the construction and operation of the Bull Mountains Mine No. 1 and its associated support facilities.

Type of statement: Final environmental impact statement (EIS)

Lead agency: State of Montana,
Department of State Lands (Montana DSL)

For further information:

Bonnie Lovelace, Chief, Coal and Uranium Bureau
Attn: Mike DaSilva
Montana Department of State Lands
Capitol Station
Helena, Montana 59620
(406) 444-2074

Abstract:

Meridian Minerals Company proposes to construct and operate the Bull Mountains Mine No. 1, an underground coal mine located in Musselshell and Yellowstone counties, about 35 miles northeast of Billings and 16 miles southeast of Roundup, Montana. Support facilities for the proposed mine would be located throughout Musselshell and Yellowstone counties.

The proposed Project has five elements: 1) the mine and its facilities; 2) a temporary upgrade of the existing Montana Rail Link rail loadout near Huntley; 3) a proposed 33-mile rail spur from the Burlington Northern mainline south of Broadview; 4) a 17-mile upgrade and extension of the Fergus Electric Cooperative power transmission line from the city of Roundup; and 5) limited wetland enhancement activities outside the life-of-mine area.

The Bull Mountains Mine No. 1 and its support facilities (the Project), would occupy about 12,115 acres, and could eventually disturb about 8,250 of those acres. The proposed mine would be in operation for about 44 years and would eventually recover 100 million tons of clean coal using both longwall and room-and-pillar mining methods. During full production, about 300 people would be employed by Meridian.

The specific action requested is to approve a 5-year permit. MSUMRA requires Montana DSL to analyze the life-of-mine proposal, however, permits are granted for 5-year periods. Meridian's current permit application is only for the area proposed to be reviewed in the first 5 years of the mine life. The 5-year permit would encompass about 4,217 acres, of which about 4,023 are privately owned, 40 are owned by the State of Montana, and about 154 are federally owned. Of the mineral ownership in the 5-year permit area, about 3,096 acres are privately owned, 40 acres are owned by the State of Montana, and about 980 acres are federally owned.

PREFACE

An EIS is not usually read like a book, from the first page to the end. The best way to go about reading an EIS depends on your interests. You may be more interested in impacts, while others might have more interest in the details of the proposed plan or opportunities made available for public involvement in the environmental assessment process. Many readers probably just want to know what is being proposed and how it will affect them.

The following paragraphs outline information contained in the chapters and appendices so that readers may find the parts of interest without having to read the entire document.

The **Summary** is a short, simple discussion to provide the reader and the decision makers with a sketch of the more important aspects of the EIS. The reader can obtain additional, more detailed information from the actual text of the EIS.

Chapter I is the first section of the EIS. It introduces the reader to the Project, the agencies involved, the major issues associated with the Project, and the underlying purpose of, and need for the EIS.

Chapter II identifies the pertinent components of the primary alternatives analyzed in Chapter IV and presents conditions for additional mitigation. All other alternatives, considered but not analyzed, are identified along with the rationale for not including them in the analysis. This chapter also provides a comparative analysis of the environmental impacts of the primary alternatives to provide a clear basis of choice among options for the decision maker and the public.

Chapter III describes the current condition of resources that are expected to be affected by the alternatives under analysis in Chapter IV.

Chapter IV is the most important section of the EIS. Here is the discussion of expected impacts to the human environment, both with and without the Project.

Chapter V lists the agencies consulted during the preparation of the EIS and describes opportunities made available for public participation. It also discusses issues brought up by the public and considered but not analyzed in Chapter IV, along with the reason for not including them in the Chapter IV analysis.

Chapter VI lists interdisciplinary team members responsible for preparation of the EIS.

Chapter VII lists references cited in the EIS.

Chapter VIII is a glossary of technical or unusual terms or acronyms used in the EIS.

Appendix A provides a complete, concise description of the Project as proposed by the applicant including proposed mitigations.

Appendix B is a description of the various projects, in progress or expected to occur in the reasonably foreseeable future, that were considered in the cumulative analysis.

Appendix C explains the different aspects of room-and-pillar and longwall mining.

Appendix D discusses the role various State and Federal agencies have in evaluating the merits of, and in approving or regulating the proposed Project. It also lists agencies having jurisdiction over the Project along with the statutes that give them authority.

Appendix E is a compilation of technical material used in the development of the EIS.

Appendix F is a compilation of comments on the draft EIS and responses to those comments.

SUMMARY

This environmental impact statement (EIS) identifies and analyzes probable impacts to the human environment that would result should Montana Department of State Lands (Montana DSL) grant a permit for, and Meridian Minerals Company (Meridian) subsequently develop, the proposed Bull Mountains Mine No. 1 and associated facilities (the Project). This EIS also analyses the probable cumulative impacts that would result from the proposed Project in combination with other projects and activities proposed for the area in the reasonably foreseeable future. The other projects and activities included in the cumulative analysis were: the PM Mine, Meridian's coal test pit, the Huntley loadout facility, the Huntley sugar beet loading site, Fergus Electric Cooperative activities, the proposed women's correctional facility, the Cenex hydrosulphurization project, Billings Generation, Inc.'s cogeneration project, U.S. Highway 87 improvements, Sealey's sawmill, Gebhart's post plant and sawmill, and activities of the Burlington Northern Railroad.

Before Montana DSL could issue a permit to mine coal, Meridian's permit application package (PAP) would have to meet all applicable State and Federal laws and regulations.

Brief description of the proposal

Meridian proposes to develop the Bull Mountains Mine No. 1 as an underground coal mine using primarily longwall mining methods with some room-and-pillar mining. The proposed Project is in the Bull Mountains about 16 miles south of Roundup, Montana and about 35 miles northeast of Billings, Montana. The proposal is to develop the mine to an eventual peak production of 3.3 million tons of clean coal per year. For the first 2 years, Meridian proposes to produce from about 0.5 million to 1.1 million tons of clean coal per year which would be transported by truck to a temporary rail loading facility at Huntley, Montana. Truck hauling would cease when Meridian finished a 33-mile rail spur from south of Broadview, Montana to the mine site.

The proposed Project would occupy a total area of about 12,115 acres, have a life of about 44 years, and would disturb about 8,250 acres. Livestock grazing and wildlife habitat are the primary current uses of the proposed Project area.

The Montana Strip and Underground Mine and Reclamation Act (MSUMRA) requires Montana DSL to analyze the life-of-mine proposal, however permits are granted for 5-year periods. Meridian's current permit application is only for the area proposed to be reviewed in the first 5 years of mine life. The 5-year permit would encompass about 4,217 acres, of which about 4,023 are privately owned, 40 are owned by the State of Montana, and about 154 are federally owned. Of the mineral ownership in the 5-year permit area, about 3,096 acres are privately owned, 40 acres are owned by the State of Montana, and about 980 acres are federally owned.

Purpose and need for a State action

Meridian has submitted a PAP to Montana DSL. Under the provisions of MSUMRA, Montana DSL has to approve or deny Meridian a permit to mine coal. This EIS analyzes the probable environmental consequences of development that would result from Montana DSL's action.

Actions available to Montana DSL would be to approve the proposed mining plan with any conditions needed to bring the proposed Project into compliance with all applicable laws and regulations (Alternative 1, approval of the proposed mining plan, with conditions), or deny Meridian a permit to mine coal because the proposed Project could not comply with the applicable laws and regulations including MSUMRA (Alternative 2, the disapproval alternative).

Comparison of alternatives

This EIS addresses: (1) site-specific impacts to the human environment that could result from development of the proposed Project and (2) cumulative impacts to the human environment that could result from development of the proposed Project in conjunction with other projects or activities occurring or expected to occur in the area in the reasonably foreseeable future.

Under Alternative 1 (the preferred alternative), Montana DSL's analysis found that:

- There would be an irretrievable loss of topographical diversity in the waste disposal area.
- There would be an irretrievable loss of vegetative and soil productivity on the area of the rail spur that would not be recontoured and revegetated (non-State-owned parcels).
- There would be an irretrievable loss of vegetative productivity along the rail corridor, within the surface facility complex and Huntley loadout until reclamation was successful.
- There could be a major impact to public safety, traffic flow, and the integrity/stability of County roads along the haul routes for the period of time coal would be trucked to Huntley.
- There would be major and beneficial impacts to public sector fiscal conditions in Musselshell County over the short term and major and negative impacts over the long term. There would also be moderate and beneficial impacts to employment, personal income, and population in Musselshell County over the short term, and moderate and negative impacts over the long term.
- There would be a major impact to visual and aesthetic resources from operation of the temporary coal loadout in Huntley for the 2 years of operation. The waste disposal area (WDA) and cuts-and-fills and structures would constitute an irretrievable commitment of visual/aesthetic resources. The WDA would also constitute an irreversable commitment of visual/aesthetic resources.
- There would be an irretrievable loss of agricultural productivity and development potential along the rail spur.
- There could be permanent, irretrievable, and potentially significant impacts to cultural resources from mining-related disturbances.

Under Alternative 2, the Montana DSL's analysis found that:

- There would be negligible impacts to air quality, geology, topography, soils, hydrology, wildlife, cultural, recreation, and land use.
- There would be negligible to minor impacts to vegetation, transportation, and noise.
- There would be moderate to major impacts to socioeconomics and visual resource/aesthetics.
- There would be a loss of some beneficial impacts to socioeconomic and cultural resources.

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CHAPTER I

INTRODUCTION

A. PURPOSE AND NEED FOR AN ENVIRONMENTAL IMPACT STATEMENT

Montana Department of State Lands (DSL) (the Agency) received a complete permit application package (PAP) from Meridian Minerals Company (Meridian) of Denver, Colorado. The PAP includes a proposed life-of-mine mining plan and information necessary to obtain a State permit to conduct coal mining and reclamation operations at Meridian's proposed Bull Mountains Mine No. 1 in Musselshell and Yellowstone counties, Montana (see Figure I-1).

Meridian has submitted the PAP pursuant to the Montana Strip and Underground Mine Reclamation Act (MSUMRA) of 1973 as amended. MSUMRA requires the responsible officials at Montana DSL to approve, conditionally approve, or disapprove the permit application submitted by Meridian, and, if appropriate, issue a 5-year permit for the Bull Mountains Mine No. 1.

Montana DSL has determined that approval or disapproval of Meridian's permit application constitutes a major action that could significantly affect the quality of the human environment and, that pursuant to Section 75-1-201 of the Montana Environmental Policy Act (MEPA), an environmental impact statement (EIS) should be prepared.

B. THE APPLICANT'S PROPOSAL

Meridian proposes to develop the Bull Mountains Mine No. 1, an underground coal mine located in Musselshell and Yellowstone counties, about 35 miles northeast of Billings and 16 miles southeast of Roundup, Montana (see Figure I-2).

Support facilities for the proposed mine would be located throughout Musselshell and Yellowstone counties. The proposed Project has five elements: 1) the mine and its facilities; 2) a temporary upgrade of the existing Montana Rail Link rail loadout near Huntley; 3) a proposed 33-mile rail spur from the Burlington Northern mainline south of Broadview; 4) a 17-mile upgrade and extension of the Fergus Electric Cooperative power transmission line from the city of Roundup; and 5) limited wetland enhancement activities outside the mine area. The Bull Mountains Mine No. 1 and its support facilities (the Project), would occupy about 12,115 acres, and could eventually disturb about 8,250 of those acres.

The proposed mining operation would convert the existing PM Coal Mine and portions of the adjacent coal test pit site into a full-scale underground mining facility. The life-of-mine area for the proposed mine would contain a total of 10,859 acres of private, State, and Federal lands, 40 percent of which overlies State and Federal coal estate (see Figure I-3). About 871 acres of the life-of-mine area would be occupied by a surface facility complex to service the mining operation. Another 6,170 acres of the life-of-mine area could experience some surface subsidence caused by proposed underground

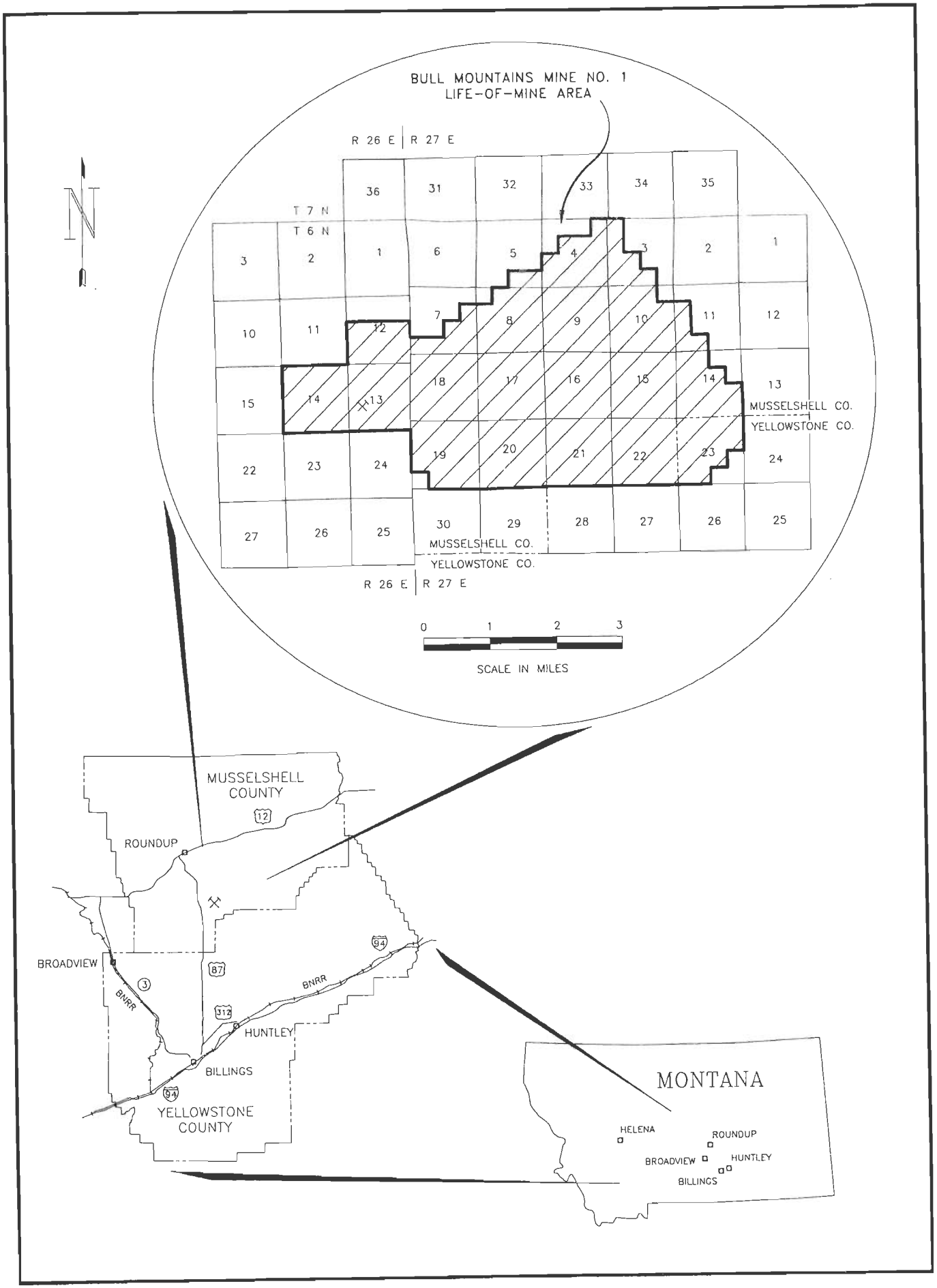


Figure I-1 General location of the proposed Bull Mountains Mine No. 1

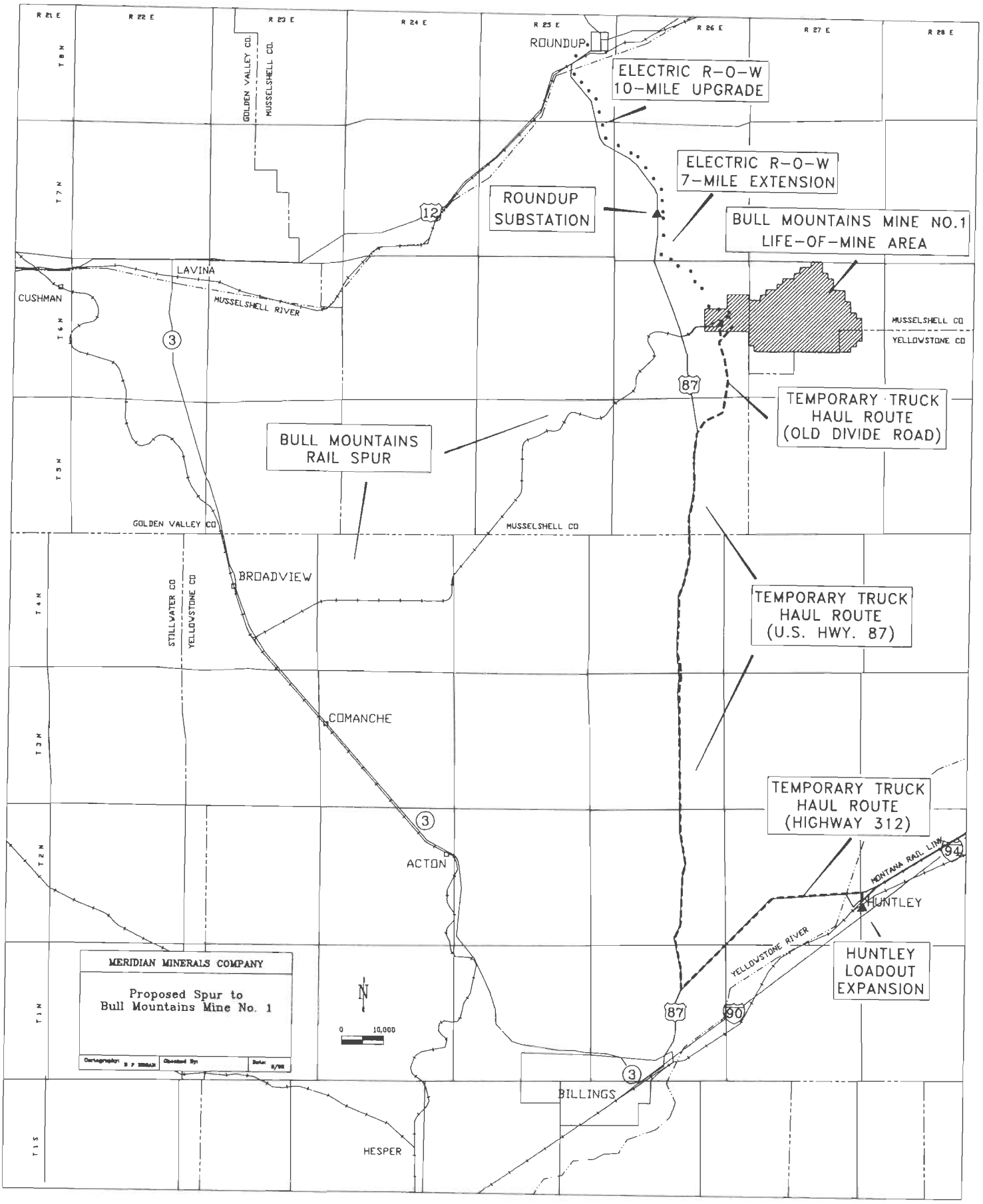
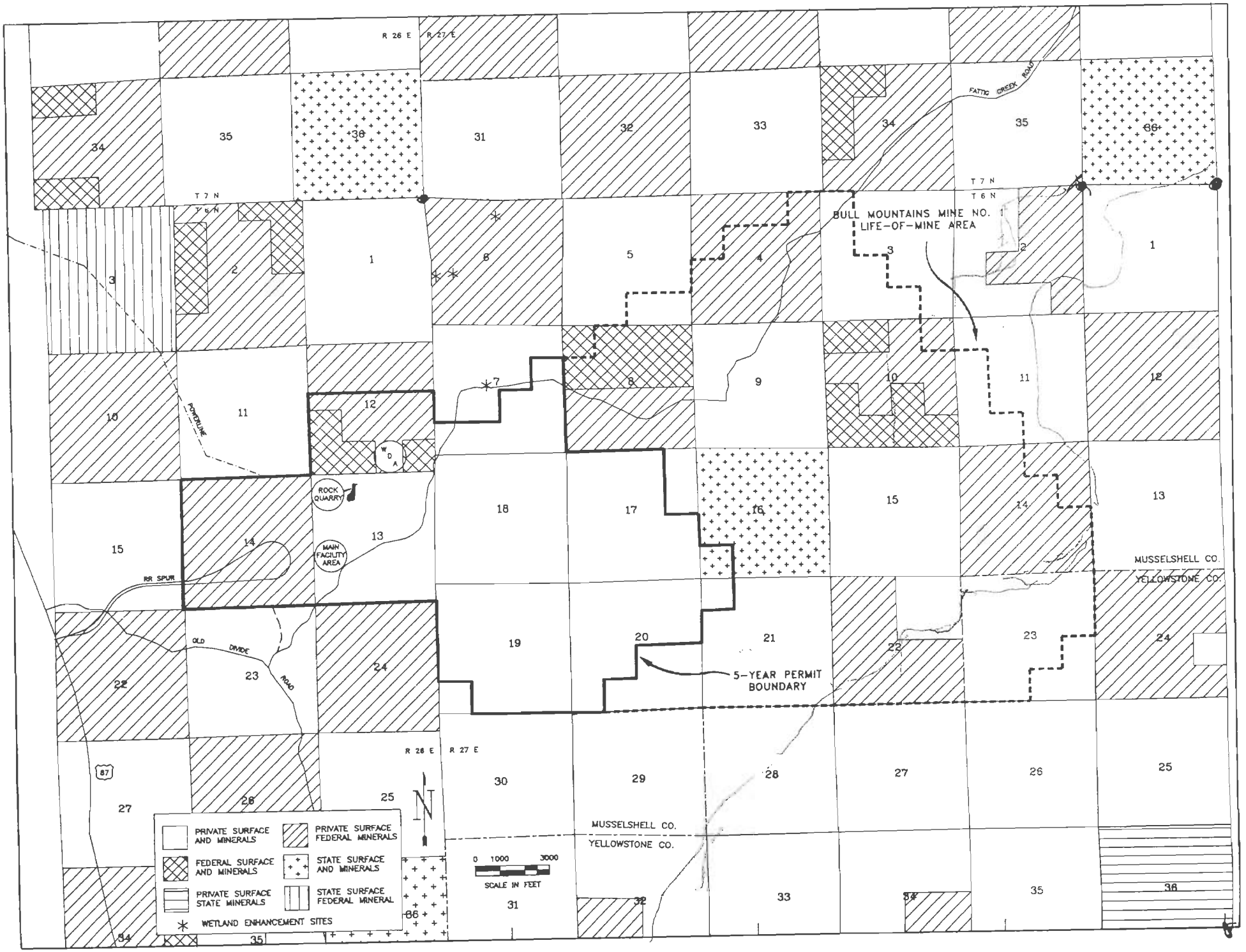


Figure I-2 Specific location of Project elements

Figure I-3

Surface and mineral ownership of the area



mining activities, or be disturbed by exploratory drilling, hydrologic mitigation activities, ventilation shaft installation, or associated temporary road construction. Table I-1 provides life-of-mine acreages for the proposed mine and its various support facilities. It compares the total acreage requirement for each component with that portion that would be disturbed by Project activities. New disturbance acreages have been separated from those acreages that were already disturbed by previous activities. MSUMRA requires Montana DSL to analyze the life-of-mine proposal, however permits are granted for 5-year periods. Meridian's current permit application is only for the area proposed to be reviewed in the first 5 years of mine life. The 5-year permit would encompass approximately 4,217 acres, of which about 4,023 are privately owned, 40 are owned by the State of Montana, and about 154 are federally owned. Of the mineral ownership in the 5-year permit area, about 3,096 acres are privately owned, 40 acres are owned by the State of Montana, and approximately 980 acres are federally owned. None of the Federal coal would be mined.

The proposed mine would be in operation for about 44 years from premining construction and development through bond release after final reclamation (mine life). Meridian proposes to eventually recover 100 million tons of clean coal from the mine using both longwall and room-and-pillar methods. The majority of the production, varying from 0.5 to 3.3 million tons of clean coal per year, would be shipped to both domestic and foreign consumers. In addition, the mine would continue to supply the small, local market currently served by the PM Mine. During the first 2 to 3 years of limited operation while the proposed rail spur is under construction, coal would be hauled by truck about 41 miles over County and State roadways from the proposed mine to the upgraded loadout near Huntley. The Huntley loadout would be operational for no more than 24 consecutive months after coal was first deposited at the site. After completion of the proposed 33-mile rail spur, full-scale operations would begin and coal would be loaded directly onto trains at the mine. Table I-2 identifies the duration of each of the phases of the proposed 44-year operation. A total of 450 people eventually could be employed by Meridian in some capacity. About 88 of these jobs would be temporary, associated with various construction activities (Table I-3).

Specific details of Meridian's proposal are included in Appendix A. Specific details of the existing PM Mine facility and coal test pit are included in Appendix B.

TABLE I-1

Acreage Data for the Proposed Bull Mountains Mine No. 1

	PROJECT	DISTURBED SURFACE			SURFACE OWNERSHIP			MINERAL OWNERSHIP #		
	TOTALS	TOTAL	NEW	EXISTING	PRIVATE	STATE	FEDERAL	PRIVATE	STATE	FEDERAL
Life-of-mine area*	10,859	7,041	6,930	111	9,739	640	480	6,513	640	3,706
-Facilities	871	871	770	101	770	0	101	328	0	543
-Coal removal	7,562	6,170	6,160	10	6,613	640	309	5,047	640	1,875
-Buffer	2,426	0	0	0	2,356	0	70	1,138	0	1,288
Rail spur area**	1,165	1,165	1,150	15	1,054	111	0	N/A	N/A	N/A
-Right-of-way	1,160	1,160	1,150	10	1,049	111	0	N/A	N/A	N/A
-Road reloc.	5	5	0	5	5	0	0	N/A	N/A	N/A
Powerline easement**	63	16	6	10	56	7	0	N/A	N/A	N/A
-Upgrade	36	3	0	3	36	0	0	N/A	N/A	N/A
-Extension	27	13	6	7	20	7	0	N/A	N/A	N/A
Wetland enhancement**	22	22	16	6	22	0	0	N/A	N/A	N/A
Huntley loadout	6	6	0	6	6	0	0	6	0	0
COLUMN TOTALS	12,115	8,250	8,102	148	10,877	758	480	6,519	640	3,706

* = Includes rail spur and powerline acreages inside life-of-mine area.
** = Includes only land outside the life-of-mine area.
= Totals refer to mineral ownership of those components pertinent to agency permitting, not of the total Project.

TABLE I-2

Scheduling Data for the Proposed Bull Mountains Mine No. 1

Activity	Time Requirement
Facility construction/development w/limited mining	2 to 3 years *
Full-scale mining	30 years
Reclamation	1 year
Bond release (minimum time period for total release)	10 years
Total	43 to 44 years

* The Huntley loadout would be operational for no more than 24 consecutive months after coal was first deposited at the site.

TABLE I-3

Employment Data for the Proposed Bull Mountains Mine No. 1

	Mining-Related				
	Admin	Oper.	Total	Const.	Total
Bull Mountains Mine	60	240	300	38	338
Rail Spur	N/A	N/A	N/A	26	26
Powerline Upgd/Exten	N/A	N/A	N/A	12	12
Huntley Loadout	3	9	12	12	24
Huntley Truck Haul	5	45	50	N/A	50
TOTAL EMPLOYEES:	68	294	362	88	450

C. ROLES OF STATE AND FEDERAL AGENCIES IN PROJECT APPROVAL

A number of agencies would be involved in issuance of permits or other approvals before Meridian would be allowed to begin construction and operation of the Project. The primary State and Federal authorizing actions include:

- A Montana *permit to mine coal* from Montana DSL prior to beginning any active coal-mining operations within the proposed life-of-mine area or at Huntley;
- A Montana *land use agreement* from Montana DSL prior to beginning railroad construction across State lands;
- A Federal *land use permit* from Bureau of Land Management (BLM) prior to constructing portions of the proposed surface facility complex on Federal lands; and
- A Federal *certificate of public convenience and necessity* or *an exemption from prior approval requirements* from the U.S. Interstate Commerce Commission (ICC) prior to constructing and operating a rail line that is actively involved in interstate commerce.

In addition, there are several State and Federal authorizing actions that are not necessary for Meridian to begin construction and operation activities at the mine but would be required in the future before full development of the life-of-mine area could occur. They include:

- Successive, 5-year amendments of the Montana *permit to mine coal* from Montana DSL prior to extending active coal-mining operations throughout the life-of-mine area.
- A Montana *coal lease* from Montana DSL prior to removing any State coal reserves.
- A Federal *coal lease* from BLM prior to removing any Federal coal reserves;
- A Federal *mining plan approval* from the Assistant Secretary of the Interior for Lands and Minerals Management, through the Office of Surface Mining (OSM), prior to beginning active coal-mining operations in Federal coal reserves;
- A Federal *permit to mine coal* from OSM prior to beginning any active coal mining operations or rail spur construction on Federal lands within the proposed life-of-mine area.

Detailed discussions of the role these and a number of other State and Federal agencies have in Project approval are included in Appendix D.

Copies of Meridian's PAP can be reviewed by the public at the following Montana DSL offices: Helena, Montana (1625 Eleventh Avenue) and Billings, Montana (Airport Industrial Park).

D. THE ENVIRONMENTAL IMPACT STATEMENT

As required by MEPA directives, this EIS identifies and analyzes the probable impacts to the quality of the human environment that would result should Meridian receive all necessary permits and approvals and subsequently construct and operate the Project. The EIS provides decision makers with information upon which to base a final decision that is fully informed and considers all factors relevant to the proposal. Preparation of the EIS helps assure that the proposed operation is well planned, that the major environmental impacts of the proposed action are analyzed, and that concerns of agencies, organizations, and citizens are considered.

This EIS has been prepared by Montana DSL (the Agency), the responsible agency under MEPA.

Evaluation of the applicant's proposal, including its reasonable alternatives, has been conducted by interdisciplinary review with representatives from a variety of State and Federal agencies concerned with the proposal. Interdisciplinary participation has been provided by a private consultant working under the direction of Montana DSL.

This EIS is not a decision document. It is the result of a comprehensive process used to document the effects of the applicant's proposal and its reasonable alternatives. The decisions regarding the applicant's proposal will be released in a Decision Document prepared by the responsible State Official. The Montana DSL decision will relate only to Meridian's ability to comply with MSUMRA. Decisions by other jurisdictions to issue or not issue approvals related to the applicant's proposal may be aided by the disclosure of impacts available in this analysis. Other agencies may adopt the EIS or portions thereof for their own use, however, they retain the right to require further environmental information or analysis.

E. SCOPE OF THE EIS ANALYSIS

MEPA defines the scope of an EIS as "...the range of reasonable alternatives, mitigation, issues, and potential impacts to be considered..." The agency is directed to "prepare EISs that are analytic rather than encyclopedic," to "discuss the impacts of a proposed action in a level of detail that is proportionate to their significance," and "only include enough discussion to show why more study is not warranted."

- Environmental issues associated with leasing and subsequent development of Federal coal in the United States have been evaluated by the U.S. Department of the Interior (DOI) in the final EIS on the Proposed Federal Coal Leasing Program (U.S. Department of the Interior 1975), the final EIS on the Federal Coal Management Program (U.S. Department of the Interior 1979), and the final EIS on the Federal Coal Management Program Supplement (U.S. Department of the Interior 1985).

- Environmental issues associated with leasing and subsequent development of Federal coal in the Powder River Basin have been evaluated by BLM in the final EIS on Powder River Basin Coal (Bureau of Land Management 1981) and the final EIS on the Economic, Social, and Cultural Supplement to the Powder River Basin Coal analysis (Bureau of Land Management 1990a).

- Environmental issues associated with preliminary coal leasing (e.g., application of the unsuitability criteria) and other land use decisions for Federal lands in the Billings Resource Area, were evaluated by BLM in the final EIS on the Billings Resource Management Plan (Bureau of Land Management 1984). Issues associated with potential leasing and/or the exchange and subsequent development of Federal coal resources in a large portion of the Bull Mountains area were evaluated by BLM in the final EIS on the Bull Mountains Exchange (Bureau of Land Management 1990b).

The Agency prepared this EIS to specifically analyze the probable site-specific and cumulative impacts to the human environment from proposed underground coal mining operations of the Project:

- Site-specific analyses address the direct and indirect impacts that would result from developing the proposed Project and reclamation operations, both on and off the specific areas targeted for disturbance, over the life of the Project.

- The cumulative segments of the analyses address the collective impacts that would result from developing the proposed Project in conjunction with other past, present, and reasonably foreseeable future actions (see Appendix B) in the Roundup/Broadview/Billings/Huntley area.

In order to perform these analyses, certain assumptions were made about items associated with the Project. A complete list of these assumptions has been included in Chapter IV. These assumptions are for the purpose of these analyses only and are not intended to be the final projection of future activities that may or may not materialize in the area over the 44-year mine life. Specific details of the proposed Project as well as those support operations associated with the mine are included in Appendix A.

F. ISSUES RELATING TO THE PROPOSED ACTION

Numerous impact topics regarding the proposed Project were identified by the public during the scoping activities for this EIS. (See Chapter V for a complete discussion of the public participation process.) These topics were evaluated during the impact analysis portion of the EIS process to the extent that they were relevant and would have significant impact. In addition, the Agency supplemented the public's list with additional topics identified by both the EIS interdisciplinary team and Agency management. The impact topics analyzed by the Agency in Chapter IV of the EIS include:

- Air quality: Impacts from construction, operation, and reclamation activities at the mine, along the rail spur right-of-way, and at Huntley; and from the temporary truck haul to Huntley.

- Geologic resources: Impacts to stability of slopes and sandstone cliffs in the life-of-mine area.

- Topography: Impacts to the topographic character of the life-of-mine area and along the rail spur right-of-way.

- Soils: Impacts to productivity of soil materials.
- Hydrology: Impacts to water quality and quantity in the life-of-mine area and at Huntley.
- Vegetation: Impacts to productivity and stability of vegetation communities and to wetlands in and around the life-of-mine area, along the rail spur right-of-way and powerline easement, and at Huntley.
- Wildlife: Impacts to mule deer, elk, antelope, cavity- and tree-nesting birds, sharp-tailed grouse, and turkey.
- Transportation: Impacts to public safety and traffic flow from increases in worker, coal-haul truck, and coal-train traffic.
- Noise: Impacts from construction, operation, and reclamation activities at the mine, along the rail spur right-of-way, and at Huntley, and from the temporary truck haul to Huntley.
- Socioeconomics: Impacts to employment, personal income, population, public sector fiscal conditions, public services, housing, educational and health-care facilities, and social well-being.
- Recreation: Impacts to outdoor recreation opportunities in the Bull Mountains area and in Huntley.
- Land use: Impacts to land uses in the life-of-mine area, along the rail spur right-of-way, and at Huntley.
- Visual resources/aesthetics: Impacts to aesthetics in the Bull Mountains area and at Huntley.
- Cultural resources: Impacts to both known and unknown prehistoric, historic, and Native American (traditional) sites.

G. PUBLIC ISSUES CONSIDERED BUT ELIMINATED

Several additional impact topics were identified by the public during scoping activities for this EIS, but are not being addressed for a variety of reasons. A list of these topics, along with the Agency's rationale for dismissing them from the analyses, is included in Chapter V.

CHAPTER II

ALTERNATIVES

This EIS evaluates 2 prospective actions that constitute the range of reasonable alternative decisions available to the Montana Department of State Lands (Montana DSL), regarding Meridian Minerals Company's (Meridian's) plan of operation for its proposed Bull Mountains Mine No. 1 and associated support facilities (the Project).

A. DESCRIPTION OF THE ALTERNATIVES ANALYZED

1. Alternative 1 (the preferred alternative): Approval of the Applicant's Proposal, With Conditions

Under this alternative, Montana DSL (the Agency) would approve the applicant's plan of operation for the proposed Project (summarized in Appendix A), subject to certain conditions identified by the Agency. These conditions (listed below) are necessary to bring the proposal into compliance with the minimum requirements of the Montana Strip and Underground Mine Reclamation Act (MSUMRA) of 1973 as amended and all other applicable State and Federal laws, such as the Endangered Species Act, National Historic Preservation Act and associated regulations, Archeological Resources Protection Act, Montana Antiquities Act, American Indian Religious Freedom Act, Montana Human Skeletal Remains and Burial Site Protection Act, Montana Clean Air Act, and Federal Water Pollution Control Act as amended (i.e., the Clean Water Act). (See Appendix D for a discussion of the role that State and Federal agencies have in Project approval).

For the Project, the Agency's conditions of approval would include but not be limited to the following:

- Condition No. 1.--The operator shall submit a detailed evaluation of the life-of-mine area to the Agency identifying steep slope areas that have a high probability for disruption of subsurface deposits due to mining-related subsidence. This evaluation shall be submitted at least 2 years prior to disturbance. In coordination with the Montana State Historic Preservation Officer (SHPO), the Agency will identify additional cultural resource inventory, evaluation, and mitigation measures that may be required.

- Condition No. 2.--The operator shall mitigate anticipated mining and mining-related impacts (including those associated with rail spur development) to prehistoric, historic, or Native American (traditional) resources found to be eligible for nomination to the National Register of Historic Places. The operator shall submit a mitigation/data recovery plan to the Agency for approval, in coordination with Montana SHPO, at least 2 years prior to disturbance. The approved mitigation/data recovery plan must be successfully completed prior to disturbing the site(s).

- Condition No. 3.--If, during mining, construction and reclamation operations, previously undiscovered prehistoric, historic, or traditional resources are discovered, the operator shall ensure that the resources are not disturbed and shall notify the Agency of their nature and location. The operator shall take such necessary actions as are required by the Agency to protect the resource, in coordination with Montana SHPO.

- Condition No. 4.--Meridian shall obtain a Federal permit prior to use of the Federal portions of the Waste Disposal Area (WDA).

- Condition No. 5--Pave Fattig Creek Road, keep it constantly damp, or treat it with a palliative to prevent dust from being generated in the vicinity of the residences near the intersection of Fattig Creek, PM Mine, and Old Divide roads.

- Condition No. 6--Construct a wooden fence between the park at Huntley and the railroad tracks to keep children away from the unit train cars.

- Condition No. 7--Redesign the loadout access route using Highway 312 and eastern Northern Avenue to remove coal-hauling trucks from Heath Street.

- Condition No. 8--Post and enforce a 15 MPH speed limit for trucks on Northern Avenue.

- Condition No. 9--Prohibit truck drivers from using "jake" brakes east of the river bridge on Highway 312 and anywhere on Northern Avenue or in the loadout facility.

- Condition No. 10--Seek authorization from the appropriate Federal agency to use flashing lights instead of the standard audible back-up alarm on vehicles and equipment operating in the loadout area.

- Condition No. 11--Operate the Huntley loadout for no more than 24 consecutive months from the date coal is first deposited on the site.

- Condition No. 12--As a weed control measure, steam clean all used machinery before use at the loadout.

- Condition No. 13--Tarp all trailers hauling coal on public roadways.

- Condition No. 14--Assign and stencil identifying numbers and a phone number on coal trucks for easy identification by the public to accommodate citizen complaints or communications.

2. Alternative 2: Disapproval of the Applicant's Proposal

Under this alternative, Montana DSL would disapprove the applicant's plan of operation for the proposed Project (summarized in Appendix A) because (1) it did not meet the requirements of all

applicable State laws, or (2) the proposal imposed, or had the potential to impose, unacceptable impacts on the human environment.

For the purposes of this EIS, the "no action" alternative is considered to be equivalent to disapproval of the applicant's proposal.

B. OTHER ALTERNATIVES CONSIDERED

The following alternatives were considered during the preparation of this EIS but were eliminated from detailed analysis:

- Alternate mine locations were presented in the BLM land exchange EIS.

- The alternative to approve the applicant's proposal without additional conditions was evaluated and determined to be inappropriate. MSUMRA requires Montana DSL to approve, conditionally approve, or disapprove the permit application submitted by Meridian. However, if additional conditions are necessary for the application to be acceptable under the applicable regulations, approving it without those conditions would not be a reasonable alternative.

- Alternatives to the development of coal resources are inappropriate in the present analysis because Meridian owns or holds active leases for the majority of the coal resources at the Bull Mountains Mine No. 1 mine site. Therefore, these alternatives were not analyzed further.

- Alternatives that would require the use of room-and-pillar mining methods throughout the mine, rather than the proposed combination of room-and-pillar and longwall methods, were determined to be unreasonable due to the increased costs and decreased levels of coal recovery that would result. Environmental impacts associated with room-and-pillar methods were determined to be comparable to those associated with longwall methods over the long term. (See Appendix C for a discussion of the methods and equipment associated with the underground mining of coal.)

- An alternative was evaluated that would permit longwall mining but selectively restrict or deny it where cover depths were less than some critical value or where there were sensitive surface resources. Accepted longwall mining techniques dictate that panels cannot be arbitrarily moved. Since this alternative would not be compatible with its longwall mining panel layout sequence, the alternative was deemed impractical.

- Alternatives that would require the use of "backstowing" techniques to dispose of the waste in mined-out portions of the mine, rather than develop a head-of-hollow fill for mine waste disposal (the proposed WDA) were evaluated. They were eliminated from further analysis because although theoretically possible, backstowing would be economically impractical and generally incompatible with the planned caving and subsidence associated with the longwall method of coal removal. (See Appendix C for

a discussion of the methods and equipment associated with the underground mining of coal.)

- Three alternatives to the applicant's proposed location for the 33-mile rail spur were evaluated. Two alternatives would rebuild portions of the old Milwaukee Railroad right-of-way between Roundup and the Burlington Northern mainline near Cushman. One would involve new construction to the north along Rehder and Halfbreed creeks to Riverside and the Milwaukee right-of-way; the other would involve new construction overland to the west to Harper Coulee, northwest to Goulding Creek, and then north to the Milwaukee right-of-way. One alternative would involve new construction overland to the southeast near Shepherd and then south to the mainline east of Huntley and south of the Yellowstone River.

  These alternatives were determined not to be reasonable for a variety of reasons, including the increased cost of construction, the potential for increased impacts to sensitive areas with wetland and wildlife habitat values, and increases in engineering complexity. All involve a longer rail spur, increasing the levels of surface disturbance, the amount and cost of construction material, the amount and cost of right-of-way, and the number of landowners affected. Details of the Agency's evaluation of these routes is available for review in Montana DSL files in Helena.

- Two routing adjustments were made for portions of Meridian's preferred proposal for the 33-mile rail spur. These adjustments were evaluated and determined to be unreasonable due to landowner concern with the disruption of farming and ranching operations and the need to avoid sensitive wetlands and farmlands as much as possible.

- A total of 11 alternatives to temporary use of the existing coal loadout facility at Huntley was evaluated. The sites were located within 4 general areas: the Broadview/Comanche/Acton area, Lavina/Cushman/Belmont area, Roundup area, and Billings/Huntley area (specifically, in the Billings/Huntley area, the Coors Warehouse property east of Huntley and an area near the intersection of Highway 312 and the Burlington Northern mainline west of Billings). The process followed by Meridian for selection of the Huntley loadout site included consideration of:

  - Power availability;
  - Water availability;
  - Total capital for development;
  - Whether there was adequate space for storage of 115 railroad cars, and total length of siding;
  - Track availability, with low usage;

- Previous disturbance to the site;
- Existing truck traffic;
- Service and spare parts availability;
- Mileage to location from mine;
- Operating cost and/or distance for railroad using cost estimates;
- Road conditions and operating costs; and
- Emergency services

Meridian's physical and cost comparison of all the sites is presented in Table II-1. Meridian's second choice, Mossmain, was eliminated because of a concern about disturbance to wetlands along track frontage. Mossmain was also the farthest site from the mine. Subsequent to Meridian's choice of the Huntley site in January 1991, a review team of personnel from Meridian, Montana DSL, and GeoResearch, Inc. conducted an analysis of 11 potential coal loadout sites to verify Meridian's initial analysis. This verification focused more attention on existing and surrounding land uses and the consequences of an adjacent industrial loadout site in any given vicinity.

The increased costs and environmental impacts that would be associated with the required upgrade of County and State roadways, as well as the purchase and construction of a new short-term facility, were determined to be excessive and unreasonable when compared to the use of the existing paved roadways and loadout facilities at Huntley. Details of the Agency evaluation of these sites is available for review in Montana DSL files in Helena.

- Alternative methods of permanent coal transportation from the mine, including the use of either conveyors or trucks to eliminate the need for rail spur construction and operation were evaluated. The Agency determined both methods to be unreasonable due to concern over cost, maintenance, and environmental degradation issues. Both methods would require the construction and use of a second, large, coal-handling facility over the 33-year period of coal removal from the proposed mine, complicating site selection problems already associated with the temporary truck haul and loadout.

  The considerable costs of trucking would not only make the economics of mine development questionable, but would require local communities to accommodate the large amount of haul-truck traffic that would be required at full production for the entire mine life. The conveyor, while eliminating noise and nuisance problems associated with both trains and trucks, would encounter problems with engineering complexity and system reliability as well as all of the route selection and environmental protection problems of the rail spur proposal.

TABLE II-1
Meridian's Comparison of Alternative Loadout Sites

	LOADOUT										
	Roundup	Lavina	Cushman	Belmont	Broadview	Commanche	Acton	Billings	Mossmain	Huntley	Coors
POWER AVAILABILITY	1-1/2 miles	1 mile	2 miles	7 miles	3 phases here	single phase	single phase	at different locations	1-1/2 miles would need work + transformers	3 phase power available	3 phase power available
WATER AVAILABILITY Drillers	From Musselshell River	From Musselshell River	From Musselshell River	1700' vertical	1500' vertical	1000' vertical	Water not good to 1000', use cisterns	City or Yellowstone River	Yellowstone Aquifer	Shallow 85' gravel	Shallow 85' gravel
WELL CAPACITY (Geologists)	Limited by pump size	Limited by pump size	Limited by pump size	<100 GPM	<100 GPM	<100 GPM	Requires treatement <100 GPM	Limited by line size or pump size	Limited by pump size	Limited by: 1. Pump size 2. Line size City water availability	Limited by: 1. Pump size 2. Line size City water availability
STORAGE, TRACK (siding)	Build 31 miles track	Build 10 miles track	adequate siding	No siding	.4+.55E .2+.25N siding	750' dead end north	1000' dead end south	Any amount needed heavy traffic	2 tracks	South side 115 cars, north side 29 cars	South 15 cars
STORAGE, STOCKPILE	No disturbed area	No disturbed area	No disturbed area	No disturbed area	No storage available area	No disturbed area	No disturbed area	No storage available	Limited disturbed area	30,000 tons of beets	N/A
TRACK USED	Low	Low	Low	Low	Low	Low	Low	High	High	M/L High storage	M/L High
PREVIOUS DISTURBANCE AREAS	None	None	2 acres	None	6 acres but cannot be accessed in center of tracks	3 acres	1-1/2 acres	None available	10 acres stockpile across Frontage Road	8 acres	N/A
EXISTING TRAFFIC	Low	Low	Low	Low	Medium, 3 elevators	Low	Low	Medium	Low	Beet trucks since 1929 at 4000 TPD which is our design tonnage. All-weather roads	
1) REPAIR 2) SERVICE AVAILABILITY*	1) Good 2) Good	1) Fair 2) Fair	1) Poor 2) Poor	1) Poor 2) Poor	1) Good 2) Good	1) Billings 2) Broadview	1) Billings 2) Broadview	1) Good 2) Good	1) Fair 2) Fair	1) Good 2) Good	1) Good 2) Good

TABLE II-1 (Continued)

	LOADOUT										
	Roundup	Lavina	Cushman	Belmont	Broadview	Commanche	Acton	Billings	Mossmain	Huntley	Coors
MILEAGE** from mine	15.5+1.3 16.8	38.1+1.3 39.4	47.5+2.8 50.3	38.7+6.8 45.5	13.3+23.0 36.3	13.3+25.2 38.5	22.5+12.8 35.3	34.4+1.3 35.7	50.8+1.3 52.1	39.8+1.3 41.1	40.6+1.3 41.9
ROAD CONDITIONS	Low traffic volumes	Low traffic volumes	Rebuild bridge	Replace cattle crossing, good road needs upgrade & widening	Needs improve-ment, large construction project	Very rough, large construc-tion project	Very rough County road, needs work	Heavy existing traffic	All paved - 3 stops	Good roads, traffic medium	Good roads, traffic medium
OPER. MILES FOR R.R. to Laurel	74.1	52.5	42.5	40.5	31.5	24.5	20.5	12.5	2.5	24.5	26.0
WEATHER CONDITIONS, WIND DIRECTION	No adverse problems	Must be to East of town	No houses close	No houses close	Majority of population in major wind direction	No houses close	Houses & bar to East in main directdion of wind	Bad location air quality	No houses close	Prevailing wind good	Prevailing wind good
EMERGENCY SERVICES Fire Ambulance Hospital	Roundup	Billings	Billings	Billings	Broadview Billings Billings	Broadview Billings Billings	Broadview Billings Billings	Billings & Laurel Billings Billings	Billings & Laurel Laurel Billings	Shepherd, Huntley & Worden Worden Billings	Shepherd, Huntley & Worden Worden Billings
TOTAL ESTIMATED CAPITAL Track Highway Stockpile Generator	6,500,000 150,000 – 50,000 50,000	3,173,000 3,000 150,000 – 50,000 50,000	435,000 150,000 300,000 50,000 50,000	1,000,000 150,000 500,000 50,000 50,000	170,000 150,000 1,500,000 20,000 20,000	870,800 150,000 1,260,000 50,000 50,000	740,000 150,000 640,000 50,000 50,000	200,000 150000 80,000 20,000 20,000	200,000 150,000 80,000 20,000 20,000	0 150,000 80,000 15,000 15,000	740,000 150,000 80,000 20,000 20,000
CAPITAL SUMMARY	6,700,000	3,423,000	985,000	1,750,000	1,860,000	2,205,000	1,467,000	400,000	330,000	135,000	890,000

NOTES:

* (e.g., Mechanical, electrical)

** First number is paved road - Second number is unimproved road - Bottom number is total truck miles

C. COMPARISON OF ALTERNATIVES

Table IV-5 provides a complete listing, by discipline, of all impact comparisons from the Chapter IV analysis. Table II-2 provides a selected listing of those comparisons that include more important impacts. Summaries of the comparisons follow:

- Alternative 1 (approval of the applicant's proposal, with conditions): Under this alternative, major and significant impacts could occur to certain aspects of vegetation, transportation, and visual/ aesthetic resources.

  Certain aspects of transportation, socioeconomic, and cultural resources may sustain moderate to major impacts, some of which may have the potential to become significant.

  Certain aspects of topography, soils, vegetation, land use, visual/aesthetics, and cultural resources could be irretrievably lost. Certain aspects of visual/aesthetic resources could also be irreversably lost.

- Alternative 2 (disapproval of the applicant's proposal): Under this alternative, major and significant negative impacts could occur to certain aspects of socioeconomic resources. For other resources in the area, impacts would continue at existing levels. Incremental impacts resulting from mining and development of the Project would not occur.

TABLE II-2

Summary of Important Impacts by Alternative for Bull Mountains Mine No. 1

IMPACT TOPIC	ALTERNATIVE 1	ALTERNATIVE 2
TOPOGRAPHY		
Impacts to the topography of surface facility complex.	Moderate to major over short term and minor to negligible over long term. Irretrievable loss of topographical diversity due to WDA.	Negligible impacts.
SOILS		
Impacts to soil productivity in areas of mining-related surface disturbance.	Moderate to major over short term and minor over long term. Productivity losses under track ballast would be irretrievable.	Negligible impacts.
HYDROLOGY		
Impacts to ground and surface water supplies in and around the life-of-mine area from mining and mining-related subsidence.	Minor to moderate over the short and long terms.	Negligible impacts.
VEGETATION		
Impacts to wetlands in/around life-of-mine area.	Moderate over the short term and minor over the long term.	Minor impacts
Impacts to vegetative productivity and stability along powerline and rail corridors.	Moderate to major over short term depending on revegetation success and weed invasion and negligible over long term. Irretrievable loss of productivity until reclamation succeeded.	Negligible to minor impacts.
Impacts to vegetative productivity and stability within the surface facility complex and Huntley loadout.	Moderate over short term and negligible over long term. Irretrievable loss of productivity until reclamation succeeded.	Negligible impacts.
WILDLIFE		
Impacts to wildlife productivity within the life-of-mine area from mining-related subsidence.	Minor to moderate over the short term and negligible over the long term.	Negligible impacts.

TABLE II-2 (Continued)

IMPACT TOPIC	ALTERNATIVE 1	ALTERNATIVE 2
TRANSPORTATION		
Impacts to traffic flow and public safety along public highways from mining-related traffic.	Moderate and potentially significant in first 2 to 3 years. Negligible over long term.	Minor impacts.
Impacts to the integrity/stability of County and State roads from coal trucks.	Major and significant over short term and minor to moderate over long term.	Minor impacts.
SOCIOECONOMICS		
Impacts to educational facilities.	Moderate and potentially significant over short term and negligible over long term.	Minor impacts.
Impacts to social well-being in Bull Mountains area.	Moderate and potentially significant over short term and minor long term.	Moderately negative impacts for those favoring the Project and moderately positive impacts for those opposing it.
Impacts to social well-being in the Huntley area.	Moderate and potentially significant over short term and moderately positive over long term.	Moderately negative impacts for those favoring the Project and moderately positive impacts for those opposing it.
Impacts to public sector fiscal conditions.	Major and beneficial to Musselshell County and minor and beneficial to Yellowstone County over short term. Over long term, major and negative to Musselshell County and minor and negative to Yellowstone County.	In foregone benefits, major and negative to Musselshell County and minor and negative to Yellowstone County.
Impacts to employment, personal income, and population.	Moderate and beneficial to Musselshell County over short term. Moderate and negative to Musselshell County over long term.	In foregone benefits, moderate and negative to Musselshell County and minor and negative to Yellowstone County.
LAND USE		
Impacts to land use along the rail spur from construction and train traffic.	Moderate over short and long terms. Loss of agricultural productivity and other development would be irretrievable.	Negligible impacts.

TABLE II-2 (Continued)

IMPACT TOPIC	ALTERNATIVE 1	ALTERNATIVE 2
VISUAL RESOURCE/AESTHETICS		
Impacts to visuals/aesthetics in the Bull Mountains area.	Minor to moderate over short and long terms. WDA would constitute an irretrievable and irreversable commitment of visual/aesthetic resources.	Negligible impacts.
Impacts to visual/aesthetics in the Bull Mountains area from the rail spur.	Minor to moderate over short and long terms. Cuts-and-fills and structures would constitute an irretrievable and irreversable commitment of visual/aesthetic resources.	Negligible impacts.
Impacts to visual/aesthetics from Huntley loadout.	Major and significant over short term and negligible over long term.	Negligible to moderate.
CULTURAL RESOURCES		
Impacts to prehistoric and historic resources.	Impacts minor and permanent. Data recovery could be beneficial.	Negligible impacts.
Impacts to Native American resources.	Impacts minor, permanent, and potentially significant. Several potentially sensitive areas may be irretrievably disturbed.	Negligible impacts.

CHAPTER III

DESCRIPTION OF THE AFFECTED ENVIRONMENT

A. CLIMATE AND AIR QUALITY

1. Regional Climate

Climate in southcentral Montana is classified as Middle Latitude Steppe. This semiarid region is characterized by low rainfall, low humidity, clear skies, and relatively large annual and diurnal temperature ranges.

Average annual precipitation for the region is about 14 inches with about one-third falling during May and June. The period of least precipitation is November through February. Heavy snows, from 6 inches to 1 foot, are not uncommon during the winter. Snow seldom accumulates to great depths because of thawing from strong west-to-southwest downslope winds called Chinooks. Thunderstorms occur on about 30 days during a typical year, mainly from May through September. These storms are frequently accompanied by strong, gusty winds and occasional hail. Destructive hailstorms are infrequent. Upslope fog and low clouds, accompanied by east and northeast winds, are common during the colder two-thirds of the year with an occasional occurrence during the warmest months. A summary of climatological data, including means and extremes, for Billings, Montana is presented in Table E-1, Appendix E. These data are representative for the region.

Three important meteorological factors influence the dispersion of pollutants in the atmosphere: mixing height, wind speed, and wind direction. Mixing height is the height above ground within which rising warm air from the surface will mix by convection. The degree to which pollutants are diluted in this mixed layer is determined by local atmospheric conditions, terrain configuration, and source location. Mixing heights vary diurnally and with season. Mixing is strongest during the summer afternoons and weakest during the winter mornings (see Table III-1).

Wind speed has an important effect on area ventilation and the dilution of pollutant concentrations from individual sources. Light winds, in conjunction with large source emissions, may lead to an accumulation of pollutants that can move to downwind areas. With the average 8-to-12 mile per hour (MPH), prevailing westerly wind in central Montana, downwind is usually to the east.

TABLE III-1

Diurnal and Seasonal Variation
of Mixing Heights (Feet) Over Southcentral Montana

Season	Morning	Afternoon
Winter	800-1,300	2,600-3,280
Spring	1,300-1,800	7,900-8,200
Summer	980-1,300	9,200-9,800
Autumn	980-1,300	5,250-5,900
Annual	1,150-1,300	6,500-6,890

Source: Holzworth (1972)

2. Local Winds

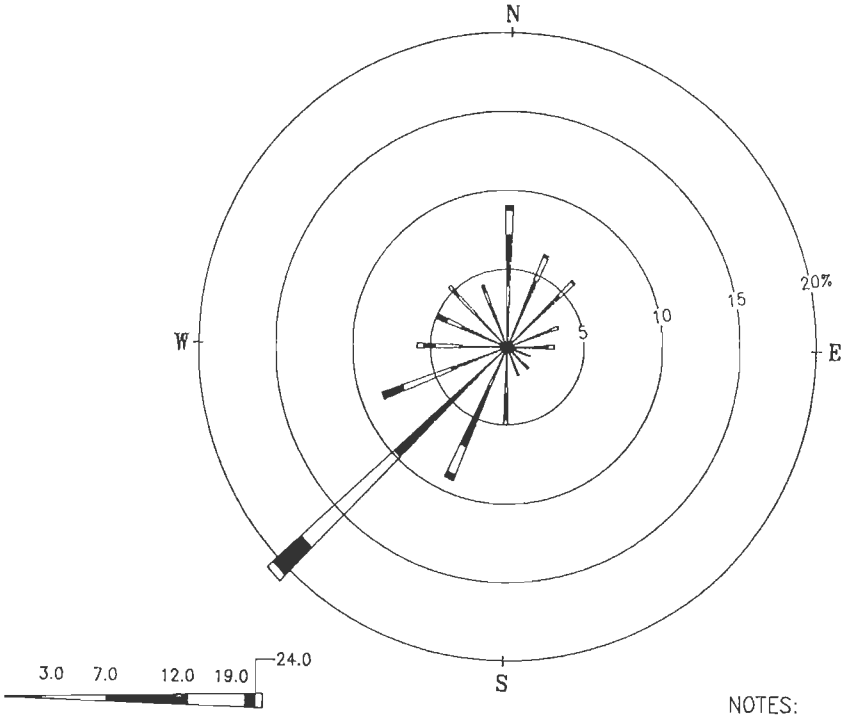
Because Billings and Huntley are located in the same southwest- to northeast-oriented river valley, they have similar prevailing wind conditions. Therefore, data from Billings may be used for Huntley. The annual wind rose for Billings, shown in Figure III-1, indicates a prevailing wind from the southwest.

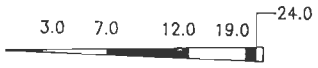
The 1990 wind rose for the Bull Mountains area (see Figure III-1), indicates that the wind directions are more uniformly distributed with the prevailing wind from the west-northwest.

3. Air Quality

Air quality is described by the concentration of various pollutants and their interactions in the atmosphere. Pollution effects on receptors establish the extent to which that quality is degraded. Measurement of pollutants is expressed in parts per million (ppm) or micrograms per cubic meter ($\mu g/m^3$). Both long-term climatic factors and short-term weather fluctuations are considered part of the air quality resource because they control dispersion and affect concentrations. Physical effects of air quality depend on the characteristics of the receptors and the type, amount, and duration of exposure. Air quality standards specify upper limits of pollutant concentrations and durations of exposure. Air pollutant concentrations within the standards are generally not considered to be detrimental to public health and welfare.

The relative importance of pollutant concentrations can be determined by comparison with an appropriate national and/or state ambient air quality standard. An area is designated by the Environmental Protection Agency (EPA) as being in attainment for a pollutant if ambient concentrations of that pollutant are below the National Ambient Air Quality Standards (NAAQS). An area is not in attainment if violations of NAAQS for that pollutant occur. Areas where insufficient data are available





WIND SPEED CLASS BOUNDARIES
(MILES/HOUR)

CALM WIND 2.50%

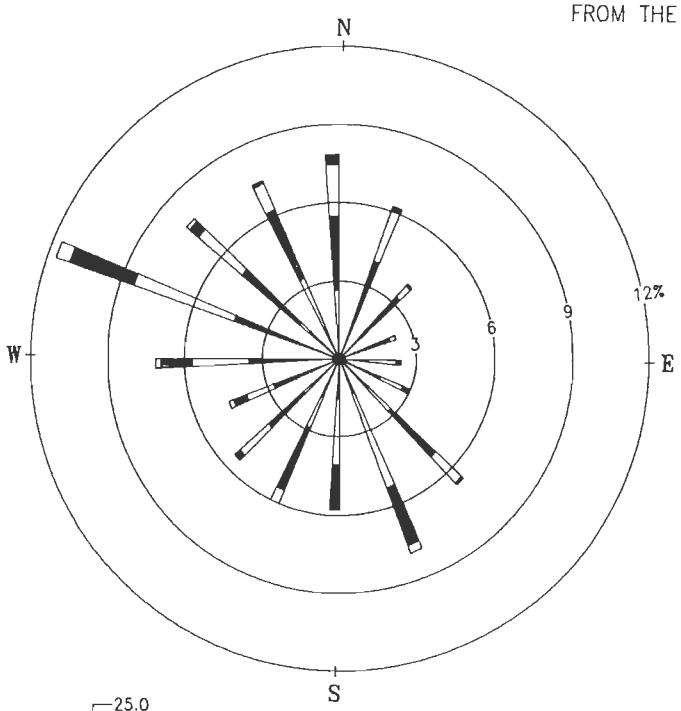
WIND ROSE

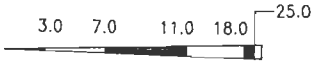
Billings, MT
PERIOD: 1985–1989

NOTES:
DIAGRAM OF THE FREQUENCY OF OCCURRENCE FOR EACH WIND DIRECTION. WIND DIRECTION IS THE DIRECTION FROM WHICH THE WIND IS BLOWING.

BILLINGS EXAMPLE–WIND IS BLOWING FROM THE NORTH 9.0% OF THE TIME.

BULL MTNS. EXAMPLE–WIND IS BLOWING FROM THE NORTH 8.1% OF THE TIME.





WIND SPEED CLASS BOUNDARIES
(MILES/HOUR)

CALM WIND 3.70%

WIND ROSE

Bull Mountains
PERIOD: 1990

Figure III-1 Wind roses, Billings, Montana, and Bull Mountains, Montana

to make an attainment status designation are listed as unclassified and are treated as being in attainment for regulatory purposes.

The Federal Prevention of Significant Deterioration (PSD) program, enacted by Congress, is implemented in large part through the use of "increments" and area classification that effectively define "significant deterioration" for individual pollutants. The Clean Air Act's (CAA) area classification scheme for PSD establishes 3 classes of geographic areas and applies increments of different stringency to each class. The CAA established Class I for areas of special national concern where the need to prevent significant deterioration in air quality is greatest. Consequently, the most restrictive increments apply in Class I areas. Class I areas include all international parks as well as national parks, national wilderness areas, and national memorial parks exceeding certain sizes. Less restrictive increments apply in areas designated as Class II or Class III. Class II areas are all PSD areas that are designated as in attainment or unclassifiable with respect to the NAAQS and are not classified in the CAA as Class I. Most of southcentral Montana, including the proposed Project area, is classified as a Class II area under the Federal PSD regulations. The Class III area designation would permit more deterioration in air quality in specific areas designated by the states for higher levels of industrial development and emissions growth. There are as yet no Class III areas in Montana.

Montana air quality standards have been established for the following pollutants: ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter smaller than 10 micrometers in diameter (PM_{10}), lead (Pb), hydrogen sulfide (H_2S), Foliar fluoride, settled particulate (dust-fall), and visibility. Montana ambient air quality standards are presented in Table III-2.

All of the areas involved in the proposed Project are considered in attainment of all the National and Montana ambient air quality standards.

The PSD maximum allowable increases in pollutant concentration over the baseline in a Class II area are as follows (40 CFR 52.21):

TABLE III-2

Montana Ambient Air Quality Standards

Pollutant	Montana Standard
Particulate Matter (PM_{10})	50 $\mu g/m^3$ expected annual average
	150 $\mu g/m^3$ expected 24-hr average*
Sulfur Dioxide	0.02 ppm annual average
	0.10 ppm 24-hr average*
	0.50 ppm 1-hr average**
Carbon Monoxide	9 ppm 8-hr average*
	23 ppm hourly average**
Nitrogen Dioxide	0.05 ppm annual average
	0.30 ppm hourly average*
Photochemical Oxidants (ozone)	0.10 hourly average*
Lead	1.5 $\mu g/m^3$ 90-day average
Foliar Fluoride	35 $\mu g/g$ grazing season average
	50 $\mu g/g$ monthly average
Hydrogen Sulfide	0.05 ppm hourly average*
Settled Particulate (Dust-fall)	10 gm/m^2 30-day average
Visibility	Particle scattering coefficient of $3x10^5$ per meter annual average***

Notes: PM_{10} = particulate matter with an aerodynamic diameter less than 10 microns.
$\mu g/m^3$ = micrograms pollutant per cubic meter of sampled air.
ppm = parts pollutant per million parts of sampled air.
* = Not to be exceeded more than once per year.
** = Not to be exceeded more than 18 times per year.
*** = Applies to PSD mandatory Class I areas.

Source: Montana Air Quality Bureau 1991.

Pollutant	Maximum Allowable Increase ($\mu g/m^3$)
• Particulate Matter (TSP)	
annual geometric mean	19
24-hour maximum	37
• Sulfur Dioxide	
Annual arithmetic mean	20
24-hour maximum	91
3-hour maximum	512
• Nitrogen Dioxide	
Annual arithmetic mean	25

Baseline PSD concentrations have not been established for the proposed Project area, which is within the Billings Intrastate Air Quality Control Region (AQCR Number 140) (CFR 40:81.88). Primary existing sources of air pollution in the area are as follows:

- Asphalt plants (particulates);
- Gravel crushers (particulates);
- Home heating devices or equipment (particulates, CO);
- Motor vehicles (CO, NO_x, hydrocarbons, re-entrained particulates);
- Agricultural activities (particulates);
- Wind erosion (particulates);
- Open burning (particulates); and
- Mining operations (particulates).

In addition, Yellowstone County has the following pollution sources:

- Three oil refineries (SO_x, H_2S, NO_x, hydrocarbons, particulates)
- Coal-fired power plant (SO_2, NO_x, particulates)
- Sulfur plant (SO_x, SO_3)
- Grain processing (particulates)
- Sugar beet processing plant

PM_{10} monitoring data, obtained during 1989 and 1990 near the proposed mine site, show the maximum 24-hour concentration was 53 $\mu g/m^3$. The annual average concentration for this area was approximately 9 $\mu g/m^3$. In the Huntley area, the maximum 24-hour PM_{10} concentration was about 41 $\mu g/m^3$ with an annual average of about 14 $\mu g/m^3$.

B. GEOLOGY

The Bull Mountains lie within that portion of the Bull Mountains basin defined by sedimentary rocks of the Fort Union Formation deposited during the later portion of the tertiary period. The sandstones, siltstones, shales, and coal beds of the Fort Union are divided between the Tullock member, the Lebo Shale, and the upper member, the Tongue River (see Figure III-2). It is the Tongue River member that contains the coal seam of commercial interest for the proposed underground mine.

Stratigraphically, the highly dissected terrain, underlain by discontinuous sandstones, siltstones, and shales and relatively thin coal seams, is found in the Bull Mountains area and throughout eastern Montana. At the surface, exposed sandstone cliffs and steep slopes in portions of the life-of-mine area naturally weather and erode, resulting in toppling of rock and sloughing of surface materials on slopes. Structurally, the proposed life-of-mine area is underlain by a northwest-plunging syncline, or fold in rock layers where the layers dip (1 to 2 degrees) inward towards an axis.

1. Mineral Resources

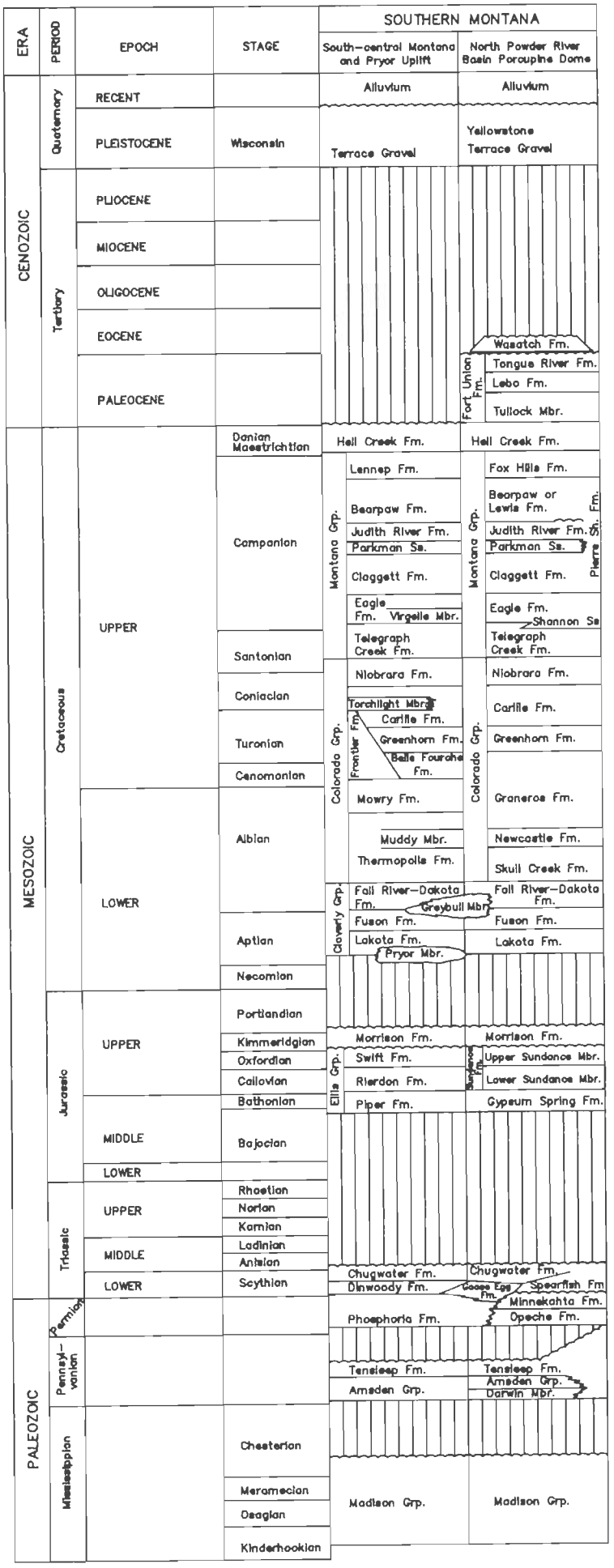
The Mammoth Coal seam is of primary interest for the proposed mine. This seam is found within the Tongue River member of the Fort Union Formation. The Mammoth Coal ranges from 8 to 15 feet thick, thinnest in the west and thickening towards the east. Locally, some outcrops have burned as a result of natural causes, baking overlying sandstones and shales into a rock called clinker. Clinker beds up to 90 feet thick characterize higher elevations in portions of the area. The Mammoth Coal reserves contain a low amount of ash that averages 10.2 percent; a low 0.87 percent of sulfur; a high 42.12 percent of fixed carbon; a low 17.65 percent of moisture; an average 29.68 percent of volatile matter; and a moderate 9640 BTU/lb (British Thermal Units, the energy contained in 1 pound of coal). About 218 million tons of in-place coal reserves have been identified within the proposed life-of-mine area in 14 different seams, including the Mammoth.

Sand and gravel resources can be found throughout Musselshell and Yellowstone counties. Oil and gas resources may be present in the area. While there has been exploration for oil and gas in the past, there are no known plans to develop those resources at this time.

2. Paleontological Resources

Paleontological resources are the physical remains, impressions, or traces of plants or animals from a former geological age. They include casts, molds, and trace fossils such as burrows or tracks. Fossil localities typically include surface outcrops, areas where subsurface deposits are exposed, and special environments favoring preservation, such as caves, peat bogs, and tar pits. Paleontological resources are important mainly for their potential to provide scientific information on the evolutionary history of plants and animals and their environments.

Shales and sandstones of the Fort Union Formation are known to contain abundant plant fossils including evidence of fern, moss, cycad, conifer, palm, water lily, birch, hazel, hickory, viburnum, and various angiosperms (Brown 1952; Perry 1975; Spindel 1975; Reynolds and Robertson 1978; Windmayer 1977). The animal fossils are much more limited and include turtles, mollusks, and insects.



Source: Montana Bureau of Mines and Geology 1980.

Figure III-2 Stratigraphy of the Bull Mountains

Paleontological materials associated with the Fort Union Formation are not considered to contain high research potential (National Research Council 1987). The Fort Union Formation in the Bull Mountains area could be expected to contain some plant remains and mollusks but no paleontological localities have been documented.

C. TOPOGRAPHY

While the proposed life-of-mine area lies in mountainous terrain, the Huntley loadout is located in a relatively flat alluvial area adjacent to the Yellowstone River. The proposed rail spur corridor is located in mountainous terrain as it approaches the life-of-mine area but shifts to flat-to-rolling agricultural land as it terminates south of Broadview.

Elevations in the proposed life-of-mine area range between 3,700 and 4,750 feet above mean sea level. The average elevation in the vicinity of the proposed surface facility complex is about 3,900 feet above mean sea level. Topography of the area is characterized by gently sloping valleys bounded by ridges capped by frequent sandstone and clinker mesas. Surface slopes can reach as high as 15 percent in the area proposed for surface facilities and up to 45 percent in the vicinity of Dunn Mountain and other mesas and ridges.

Elevations in the vicinity of the proposed rail spur corridor range between about 3,700 and 4,200 feet above mean sea level. Higher elevations are experienced in the eastern end, about 5 miles from the proposed surface facility complex. Lowest elevations are encountered at the western end of the corridor, south of Broadview. Surface slopes in the vicinity of the corridor are similar to those in the life-of-mine area until the corridor exits the foothills near the Musselshell-Yellowstone county line. From this area through its southwesterly extent, the proposed corridor is characterized by flat-to-rolling agricultural land.

The powerline corridor, proposed for upgrade activities, follows Rehder and Halfbreed Creek drainages (see Figure III-3) and U.S. Highway 87 in a northerly direction towards Roundup. Powerline corridor elevations range from about 3,900 feet above mean sea level at its upper reaches, near the proposed surface facility complex, to about 3,300 feet in the vicinity of the Musselshell River. Grass-covered side drainages between hills provide a rolling character to the area.

The 6-acre Huntley loadout site is located on a flat alluvial area in Huntley, adjacent to the Burlington Northern railroad tracks. The area is adjacent to a grain elevator and has had previous surface disturbance.

D. SOILS

Detailed soils information has been compiled for the life-of-mine area, railroad and powerline corridors, and Huntley loadout. Mining and ancillary facilities would be located in Musselshell and Yellowstone counties and, while there is a published soils survey for Yellowstone County (Meshnick 1972), a survey has not been published for Musselshell County. Individual surveys were conducted for all proposed facilities and other mine-related disturbance areas in Musselshell County (Soil Conservation Service 1970-1989).

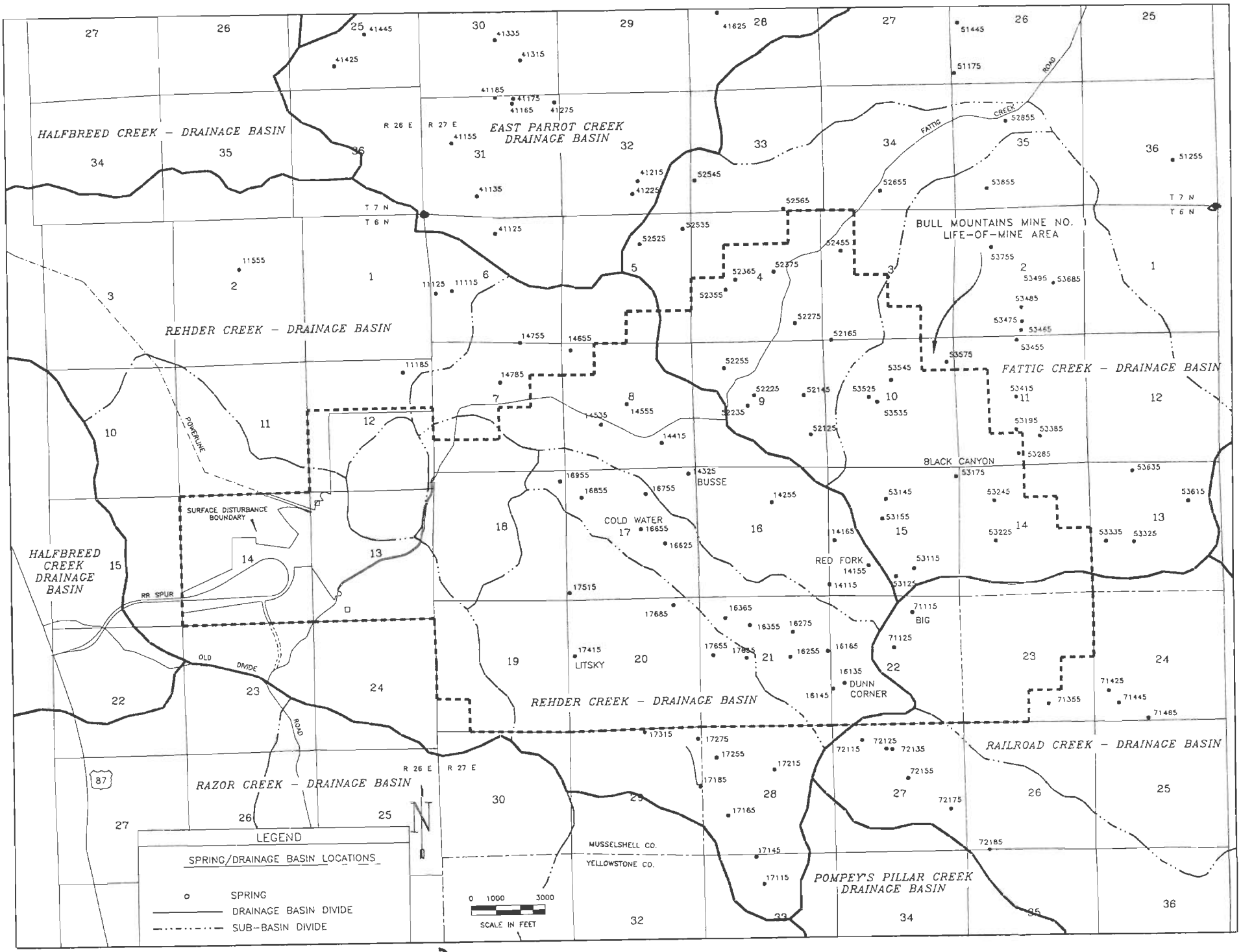


Figure III-3 Spring/drainage basin locations

Soils in the planned surface disturbance areas of the proposed life-of-mine area are predominantly loams, silty loams, or sandy loams, with an occasional increase in fines to silty clay. Soils are shallower along upper slopes and fans, and deeper on lower terraces and drainage bottoms. The relatively shallow, upland Cabbart soils dominate the life-of-mine area with the Cabbart loam dominating the surface facility complex. These soils are well drained, have limited available water capacity and are easily eroded. Sandstone outcrops and clinker characterize plateaus and rims.

The proposed 33-mile railroad corridor is located in both Musselshell and Yellowstone counties. Thirteen mapping units characterize the corridor in Musselshell County with loams, clay loams, and silty clay loams being predominant. Mineral and salt deposits, steep slopes, and rock outcroppings that are frequent in the foothills become fewer as characteristics are tracked from the mine site towards the southwest, and the Yellowstone County line. From the Musselshell-Yellowstone county line, southwesterly to the railroad corridor's junction with the mainline south of Broadview, clays, silty clays, and clay loams become more predominant. Throughout the railroad corridor, soils have high erosion potential and range widely in their depth. In the vicinity of swales and basins, the clayey and wet soils pose the greatest construction limitations (e.g., high water tables at or within 36 inches of surface, erosion risk, high frost-action potential, and shrink-swell potential).

The 17-mile powerline corridor is located entirely within Musselshell County. Soils along the corridor vary with geology and topographic features, with shallow loams and rock outcrop inclusions on the slopes and rolling hills and deeper loams in valleys along drainages. The loams are generally well drained and have the potential to erode. Wet areas and ponds are encountered along the corridor within the loam soils. These areas appear to be human-made or -influenced and as such, soils features may not be consistent with natural soils in the area.

The Huntley loadout site is characterized by loam and silty clay loam soils. These are moderately deep, well-drained soils formed on alluvial river terraces. They have a high erodibility potential, good water-holding capacity, and are good topsoils.

There have been no soils of prime farmland quality identified in the areas proposed for Project activities.

E. HYDROLOGY

1. Surface Water Resources

General surface drainage from the Bull Mountains area is north toward the Musselshell River and south toward the Yellowstone River.

There are no perennial stream systems present within or immediately adjacent to the proposed life-of-mine area. The nearest perennial stream is the lower reach of Halfbreed Creek near its confluence with the Musselshell River, 18 miles to the north. Numerous ephemeral drainage basins that range in size from 10 to 10,000 acres discharge surface runoff. These ephemeral channels flow only in response to precipitation, however there are perennial ponds and stream reaches created by flow from springs.

Northerly drainage occurs through Rehder and Fattig creeks, while Pompey's Pillar and Railroad creeks provide drainage to the southeast (see Figure III-3).

The proposed corridor for the rail spur would neither cross nor be adjacent to any perennial stream system. Generally, the corridor is proposed for high areas where intersecting ephemeral channels drain small areas. The upper Goulding and Dean creeks provide northerly drainage while the upper Razor Creek system provides the only major drainage to the southeast along the proposed corridor. The powerline corridor proposed for upgrade activities follows the Rehder and Halfbreed Creek drainages from the proposed life-of-mine area to the Musselshell River. The corridor crosses the perennial Musselshell River and continues into Roundup to a substation. The Huntley loadout site is currently located in a disturbed area where surface drainage is directed to a lined sediment pond.

No designated alluvial valley floors (AVFs) are present within the proposed life-of-mine area or in areas proposed for associated activities. However, there are potential alluvial valley floors adjacent to the proposed life-of-mine area. By applying the draft "Alluvial Valley Floor Identification and Study Guidelines" (U.S. Department of the Interior 1983) portions of Rehder, Fattig, Railroad, East Parrot, West Parrot, Halfbreed, and Pompey's Pillar creeks have been identified as potential AVFs.

2. Ground Water Resources

In general, ground water flow in the Bull Mountains area is to the northwest, consistent with the plunging syncline (see Geology). Flow volumes are more dependable in deeper aquifers and less dependable in more shallow aquifers of the Tongue River formation. The shallow aquifers in which springs tend to be confined, are highly dependent on precipitation, infiltration, and percolation through various coal seams and sandstones. The capability of aquifers to transmit water (permeability) ranges from thousandths of feet to multiple-unit feet per day which makes flow rates highly variable. There are 4 wells currently installed in the area of the proposed surface facility complex. At depths of about 200 feet, they are planned to supply potable water to proposed mine operations (see Ancillary Facilities, Appendix A).

In the Bull Mountains Basin, 3 aquifer-bearing geologic formations overlie the deep impermeable shales of the Montana Group. From deep to shallow they are: the Fox Hills-Lower Hell Creek, Tullock, and Tongue River formations (see Figure III-2). In addition, alluvial sands and gravels serve as productive aquifers where they are thick and well developed. Deep carbonate rocks of the Madison Group are a major but little-used aquifer.

In the vicinity of the proposed mine, the aquifer of the Lower Hell Creek formation is about 400 feet thick. Yields are highly variable and range between 5 and 200 gallons per minute (gpm). The aquifer of the Tullock formation commonly produces 15 gpm. Aquifers of the Tongue River formation include sandstones that have produced as much as 160 gpm in isolated cases. In the Bull Mountains area, yields tend towards 1 to 30 gpm. While the coal seams of the Tongue River member are potentially good aquifers, the Mammoth coal seam in the vicinity of the proposed mine is not a high-yielding aquifer. Alluvial aquifers in the immediate vicinity of the proposed mine do not consistently yield adequate supplies of water as they are relatively thin and discontinuous. The alluvial gravels in the vicinity of the

Huntley loadout are sands and gravels mixed with cobbles that yield supplies of water adequate for most uses.

One hundred-thirty springs have been located in and around the proposed life-of-mine area (see Figure III-3 and Table E-2, Appendix E). Some of the springs have been enhanced through tank and pond installation and many discharge to nearby drainages. Springs vary widely in quantity of flow, and period or season of flow. The springs supply water for livestock and wildlife use and support vegetation and aquatic communities of varying size and composition. Fourteen of the 49 springs located within the proposed life-of-mine area (including Red Fork, Busse, Dunn Corner, Cold Water, Litsky and Big) can be considered to be of high importance from a hydrologic standpoint (see Table III-3). These springs generally exhibit higher rates of flow, higher quality, and year-long availability. Of the remaining springs in the life-of-mine area, 21 are of moderate importance, 13 are of low importance, and 1 is of negligible importance. The cumulative and relative scores of a spring are the result of the application of technical criteria and procedures presented in Appendix E. Equivalent quantitative data were not available for the ranking of all springs. Springs for which quantative data were limited were ranked using both data and estimates. The resulting scores do not reflect the importance of springs to ranchers, in all cases. A column has been added to Table III-3 to illustrate those springs (of the 49 scored) that were not ranked at the highest level of importance, but that are regarded as important springs by local ranchers. Ranchers emphasize use, location, and flow availability as the most important aspects of springs for livestock.

Many of the springs and seeps in and around the proposed life-of-mine area are strongly influenced by seasonal and periodic fluctuations in precipitation. Ground water flow to springs and seeps occurs as discharge from deep bedrock and from weathered shallow bedrock and alluvium. Precipitation infiltrates clinker and other recharge areas, percolates through fractured strata (bedrock) and shallow alluvium until a shale or impermeable layer interrupts flow, and discharges at springs along the impermeable barrier (see Figure III-4). Spring flow either recharges the downgradient alluvium or continues as surface flow (Meridian Minerals Company 1989-1992).

Ground water in the deeper overburden is partially confined in and below a thick sandstone unit above the Rock Mesa coal seam. The upper surface of this water zone averages about 100 feet above the Mammoth coal. Rock units below the Rock Mesa sandstone are generally saturated, though they are low yielding and have relatively poor aquifer potential.

The average quality of spring and ground water in the area is not generally suitable for public or private water supplies without treatment but is suitable for use by livestock and wildlife. However, many eastern Montana communities use water of this quality due to a lack of alternative sources. Specific electric conductance of the springs averages 1,561 micromhos/centimeter (cm), while sulfate oncentrations average 467 milligrams per liter (mg/l), and total dissolved solids in the water average 1,118 mg/l. The alluvial ground water has an average conductance of 1,625 micromhos/cm, an average sulfate concentration of 535 mg/l, and an average total dissolved solids concentration of 1,184 mg/l. Deeper overburden ground water averages 1,644 micromhos/cm, 457 mg/l, and 1,143 mg/l, respectively.

Three different evaluation systems support the ranking of the water quality as to its suitability for human drinking water or suitability for livestock, wildlife and agricultural uses, or both. They include:

TABLE III-3

Relative Importance of Springs in the Life-of-Mine Area

SPRING NAME/NUMBER	H[1] YDROLOGY	A[2] QUATICS	V[3] EGETATION	L[4] AND USE	W[5] ILDLIFE	C[6] UMULATIVE	R[7] ELATIVE SCORE	R[8] ANCHERS
Red Fork 14115	4	2	1	3	2	12	2	*
14155	3	2	2	2	3	12	2	*
14165	4	2	2	2	3	13	3	*
14255	4	3	4	3	4	18	4	
Busse 14325	4	4	4	4	4	20	4	
14415	3	3	3	3	3	15	3	
14535	2	1	2	1	1	7	1	
14555	2	2	1	3	3	11	2	
Dunn Corner 16135	4	2	1	2	2	11	2	*
16145	4	1	1	1	1	8	2	
16165	3	1	4	2	3	13	3	
16255	4	1	1	1	2	9	2	
16275	3	2	2	2	3	12	2	
16355	4	3	2	2	3	14	3	
16365	4	3	2	2	3	14	3	
16625	3	1	2	1	1	8	2	
Cold Water 16655	4	4	4	4	4	20	4	
16755	3	1	1	2	1	8	2	
16855	2	1	1	1	1	6	1	
16955	3	1	2	2	1	9	2	
Litsky 17415	4	4	4	4	4	20	4	

TABLE III-3 (Continued)

SPRING NAME/NUMBER	H[1] YDROLOGY	A[2] QUATICS	V[3] EGETATION	L[4] AND USE	W[5] ILDLIFE	C[6] UMULATIVE	R[7] ELATIVE SCORE	R[8] ANCHERS
17515	3	3	3	3	1	13	3	
17635	3	2	1	3	1	10	2	
17655	2	2	1	2	1	8	2	
17685	4	3	2	3	3	15	3	
52125	3	2	2	3	3	13	3	
52145	2	2	2	3	3	12	2	*
52165	3	2	3	3	4	15	3	*
52225	3	1	1	2	2	9	2	*
52235	2	1	1	2	2	8	2	
52255	2	1	1	2	1	7	1	
52275	2	2	2	2	4	12	2	
52355	2	1	2	2	2	9	2	
52365	1	1	1	1	2	6	1	
52375	2	2	2	3	3	12	2	
Dugout 52455	3	2	2	3	3	13	3	*
53115	4	1	1	2	1	9	2	
53125	3	1	1	2	1	8	2	
53145	3	1	2	2	2	10	2	
53155	3	1	2	1	2	9	2	
Black Canyon 53175	3	4	2	4	4	17	3	*
53225	2	1	1	2	2	8	2	
53245	3	2	1	2	4	12	2	
53285	3	3	2	3	3	14	3	*
53525	2	1	2	2	2	9	2	
53535	2	1	2	2	3	10	2	
53545	3	1	3	2	3	12	2	

TABLE III-3 (Continued)

SPRING NAME/NUMBER	H[1] HYDROLOGY	A[2] AQUATICS	V[3] VEGETATION	L[4] LAND USE	W[5] WILDLIFE	C[6] CUMULATIVE	R[7] RELATIVE SCORE	R[8] RANCHERS
Big 71115	4	2	1	3	1	11	2	*
71125	3	2	1	2	1	9	2	*

1 See Table E-3-7, Appendix E
2 See Table E-3-7, Appendix E
3 See Table E-3-7, Appendix E
4 See Table E-3-7, Appendix E
5 See Table E-3-7, Appendix E
6 **CUMULATIVE SCORE ÷ 5 = RELATIVE SCORE**
7 1 is lowest score, 4 is highest
8 * indicates high importance to ranchers

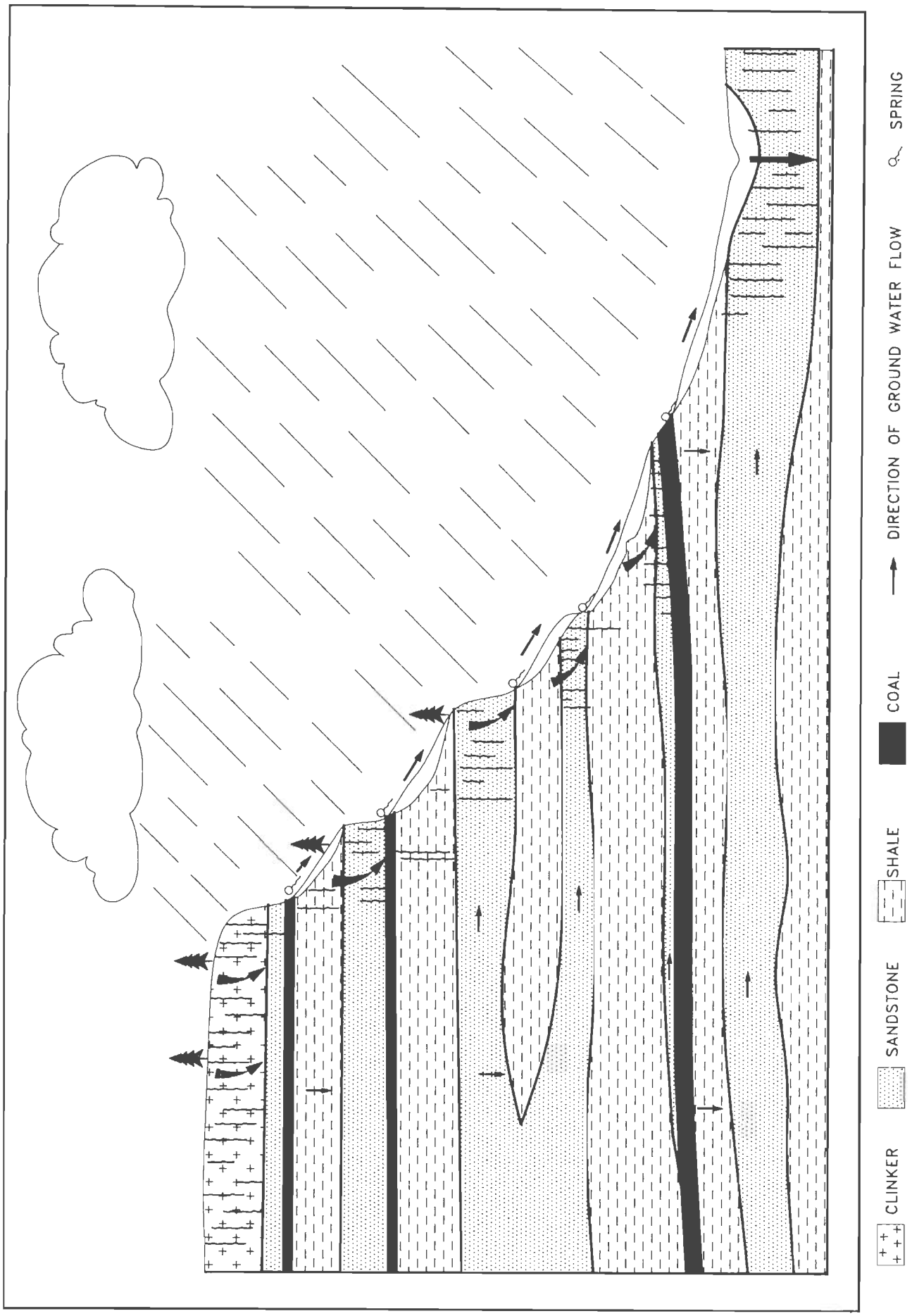


Figure III-4 Conceptual ground water model

National Secondary Drinking Water Standards, Montana Bureau of Mines and Geology publication of recommended limits derived from EPA and other agency recommendations recommended limits, and State of Montana Groundwater Classifications.

National regulations for water quality include the National Secondary Drinking Water Standards. These standards establish maximum recommended contaminant levels for human drinking water. The standard for sulfate in water is 250 mg/l and the standard for total dissolved solids is 500 mg/l. Average spring and ground water in the Bull Mountains area do not meet these standards. The Montana Bureau of Mines and Geology (Montana BMG) has published recommended permissible limits for inorganic constituents (minerals) in water. The Montana BMG publication recommends maximum contaminant concentrations (in mg/l) for drinking water, use by livestock, or for irrigation. Recommended sulfate is 250 mg/l for drinking and 1500 mg/l for livestock. Total dissolved solids recommendations are 500 mg/l for drinking and 5000 mg/l for livestock. Specific electrical conductance is recommended at a maximum of 1000 micromhos/cm for drinking water. Spring and ground water in the Bull Mountains area do not meet these recommended limits for drinking but are suitable for livestock use.

Ground waters are divided into 4 classes by the State of Montana (see Table E-2, Appendix E). The classes are determined by a range of specific electrical conductance. Specific electrical conductance depends on the concentration of ionized minerals in solution, or dissolved solids. Using the State of Montana classification, spring and ground water in the Bull Mountains area are Class II waters, suitable for wildlife and livestock use and marginally suitable for public and private water supplies.

F. VEGETATION

Vegetation of the Bull Mountains and surrounding area north of Billings is characteristic of the Eastern Sedimentary Plains of Montana in the 10 to 14-inch precipitation zone (Meridian Minerals Company 1989-1992; ECON INC. 1991). Topography varies from uplands, rock outcrops, and ravines forested with ponderosa pine and Rocky Mountain juniper at higher elevations, to adjoining sagebrush and mixed prairie grassland communities on benches, slopes, and drainages where soils are deeper.

Existing influences on local distribution of plant communities include soils, topography, surface disturbance, availability of water, management boundaries (fencelines), and a strong gradient in soil salinity from east-to-west. Grazing by livestock, fire suppression, and a large wildfire in 1984 substantially affected plant succession in the Bull Mountains area. The region has been disturbed by over a century of farming, mining and associated activities, road building, and residential development. Grassland or prairie vegetation types originally were extensive in the western part of the Bull Mountains area, but have been replaced largely by small grain production and more recently by Conservation Reserve Program (CRP) planting (see Land Use).

Eight broad vegetation communities plus the disturbed type exist in the Bull Mountains and surrounding area: silver sagebrush-mixed grassland; mixed grassland; ponderosa pine-mixed grassland; burned ponderosa pine-mixed grassland; improved pasture; agriculture; alkali/saltgrass; wetlands; and disturbed (ECON INC. 1991). (Vegetation types are described differently in the permit application, however these 8 types are included with those listed in the permit application.) These 8 broad types summarize 19 very complex vegetative communities including 6 grassland types, 6 shrub/grassland types,

6 ponderosa pine types, and 1 tame pasture type, all occurring on the life-of-mine area (Meridian Minerals Company 1989-1992). There are 26 vegetative communities in the railroad corridor (ECON INC. 1991).

The silver sagebrush-mixed grassland community occurs on lower valley slopes near drainages, especially where soils are deeper. Perennial grasses (western wheatgrass, blue grama, and Sandberg bluegrass) comprise somewhat over one-third of the canopy cover, with forbs providing 50 percent and shrubs and subshrubs about 14 percent of the canopy cover (see Table E-9, Appendix E). The silver sagebrush-mixed grassland has received considerable grazing pressure, favoring the less palatable species that predominate.

The mixed grassland community is interspersed with the ponderosa pine-mixed grassland community in the higher elevations on upland plateaus and benches with deeper soils. Due to this topographic positioning, it has received limited grazing, resulting in perennial grass dominance and relatively high forage production. In this community, western wheatgrass, needle-and-thread, green needlegrass, blue grama, and prairie junegrass typically account for over 60 percent of total vegetative cover and three-fourths of total production. Forbs account for 29 percent of cover and 18 percent of production.

The ponderosa pine-mixed grassland community generally occurs on moderate-to-steep upland slopes on shallow soils. Ponderosa pine is a minor component of the community canopy cover but is characteristic of the type. Fifty-two percent of canopy cover is provided by grasses, including bluebunch wheatgrass, western wheatgrass, and prairie junegrass, with forbs comprising about 41 percent of cover and one-third of the herbaceous production.

The burned ponderosa pine-mixed grassland community is a transitional community resulting from a wildfire in 1984. Grasses and forbs have proliferated in the post-fire community, while ponderosa pine reproduction is not evident. This burned community differs from ponderosa pine-mixed grassland and mixed grassland by the greater occurrence of crested wheatgrass, Japanese brome, cheatgrass, Kentucky bluegrass, and common dandelion as well as diverse shrub and forb components.

The improved pasture community consists of several cultivated areas planted to introduced grasses (crested and intermediate wheatgrass) and/or alfalfa. They are grazed and occasionally hayed.

The agriculture community consists of various grain farming and land in CRP. This community predominates in the area southwest of the Bull Mountains.

The alkali/saltgrass community occurs on saline/alkaline soils in lower basins southwest of the Bull Mountains. They are poorly drained and support simple communities of salt-tolerant species such as greasewood, foxtail barley, inland saltgrass, prickly lettuce, seepweed, and Nuttall's alkaligrass. Several noxious weed infestations are prevalent and appear to be actively spreading.

The wetland vegetation community accounts for less than 0.1 percent of the Bull Mountains and surrounding area communities but plays an important role in local ecosystems. Wetlands provide watering points for wildlife and livestock and provide habitat diversity. Species include several sedges,

rushes, bulrush, cattail, western rose, and snowberry. They are associated at higher elevations primarily with springs, seeps, and intermittent streams, and at lower elevations with small, developed ponds and dams. Precipitation-dependent wetland sites fluctuate annually, in a range from dried out to wet, in direct response to seasonal moisture, temperature, and wind. There are 49 springs in the life-of-mine area, all of which are important to the vegetation communities they support. However, of the 49 springs in the life-of-mine area, 5, including Busse, Cold Water, and Litsky have a high degree of importance for vegetation (see Table III-3). Of the remaining springs, 4 have moderate importance, 21 have low importance and 19 have negligible importance to the overall life-of-mine area vegetation.

The disturbed type includes subdivision homesites, ranch and farm sites, industrial, commercial, roads, powerlines, and other manifestations of human use (Meridian Minerals Company 1989-1992; ECON INC. 1991a). The Huntley loadout is a commercial-use area originally created from river-bottom rangeland (see Appendix B).

G. WILDLIFE

Eight broad vegetation communities plus the disturbed type provide wildlife habitat in the Bull Mountains and surrounding area (see Vegetation). Vegetation communities are considered synonymous with wildlife habitat types in this section. Ponderosa pine-mixed grassland, and burned ponderosa pine communities are most common at higher elevations of the Bull Mountains, with mixed grassland and silver sagebrush-mixed grassland common at intermediate elevations. Mixed grassland; improved pasture; agriculture, including Conservation Reserve Program (CRP) lands; and alkali/saltgrass basins occur in the western, lower elevations. Very small acreages of the wetlands community may occur at all elevations. Of the 49 springs in the life-of-mine area, 8 springs, including Busse, Cold Water, Litsky, and Black Canyon are of high importance to wildlife. Sixteen are of moderate importance, 11 are of low importance, and 14 are of negligible importance (see Table III-3).

Mule deer are the most abundant and sought-after game species in the Bull Mountains and surrounding area, while white-tailed deer are seldom observed (Dusek 1978; Meridian Minerals Company 1989-1992; ECON INC. 1992a). Mule deer in the Bull Mountains are essentially nonmigratory, making modest seasonal movements caused by changes in forage conditions and weather. Deer can be observed using all vegetation communities throughout the area, both adjacent to areas of human activities and in more isolated areas during all seasons. In lower elevations, mule deer use agricultural lands heavily, particularly CRP fields where cover is much taller and denser than in grain or stubble fields. In the higher elevations, deer preference is for the ponderosa pine-mixed grassland vegetation community. During the winter, this community is used considerably more than would be indicated by its availability for thermal cover and food provided by the shrub component of the community. Winter observations indicate mule deer concentrated in 3 areas; the Rehder Creek drainage and across Fattig Creek Road north of the life-of-mine area, the east end of Elbow Hill, and along Fattig Creek at the north edge of the life-of-mine boundary. Use of the area west and south of the PM Mine increased as winter progressed.

A migratory herd of 92-100 elk use the Bull Mountains (Dusek 1978). Elk are the second-most numerous game animal and are distributed throughout the higher elevations, generally in areas away from human activity. Portions of Rehder, Parrot, and Fattig Creek drainages are used as summer range while

Railroad and Pompey's Pillar Creek drainages serve as winter range. Some winter use occurs on the south side of Dunn Mountain. In winter, elk or their evidence have been observed occasionally throughout the life-of-mine area including some use on the south side of Dunn Mountain. Elk tend to concentrate on south-facing or other slopes blown free of snow. Spring observations of cow/calf groups in the vicinity of Dunn mountain suggest the area could be used for calving.

The central Bull Mountains are marginal antelope habitat. Open habitat such as silver sagebrush-mixed grassland, mixed grassland, and agriculture communities in the eastern part of the area, are fragmented and interspersed with the ponderosa pine-mixed grassland community. Antelope distribution in the life-of-mine area is both seasonal and relatively dispersed, occurring in spring, summer, and early fall. No critical antelope habitat types have been identified, however, antelope use most major drainages in the life-of-mine area. It is unlikely that antelope would intensively use higher elevations due to lack of suitable habitat and cover, and human activity. The western portion of the area has regular antelope use of agricultural and CRP fields (Cole 1956; Cole and Wilkens 1958). In summer and particularly in winter, antelope tend to be concentrated in large herds in nearby Hay and Commanche basins.

Merriam's wild turkeys are year-round residents of the Bull Mountains area. Turkeys are not native, having been introduced into the Bull Mountains in 1958 and having since spread throughout the area. They are readily observed in the ponderosa pine-mixed grassland community (preferred habitat), and the agriculture community (Greene and Ellis 1971). The ponderosa pine-mixed grassland community provides roosting trees year-round, thermal cover during cold weather, and food during all seasons for wild turkeys (Jonas 1966).

Adaptable sharp-tailed grouse are also year-round residents of the Bull Mountains area but use somewhat differing vegetation communities on a seasonal basis. Grouse use silver sagebrush-mixed grassland and mixed grassland communities for courtship, nesting, and brood rearing in spring and summer, and use the other communities to some degree for food and cover during fall and winter. A dancing ground (lek) is located within the life-of-mine area. It is in a disturbed area (next to a road sign) along the PM Mine access road. In the proposed railroad corridor, a dancing ground is located immediately adjacent to the proposed rail line. Grouse have also been observed on a possible second dancing ground on a narrow ridge of mixed prairie type between agricultural and burned ponderosa pine communities along the rail corridor.

Non-native Gray partridge and ring-necked pheasant are not observed frequently, but are present in the western agricultural community (Weigand and Janson 1976; Weigand 1980). With about 50 percent of agricultural land converted to CRP, both species should benefit from increased undisturbed "permanent" cover and respond with an increase in numbers and area occupied (Weigand and Janson 1976; Weigand 1980).

Sage grouse are sagebrush-dependent, and their habitat is very limited in the Bull Mountains area, most of it having been converted to agriculture decades ago. A few individuals have been seen in the proposed railroad corridor. With the dependency this bird has on sagebrush, particularly in the winter (Eng and Schladweiler 1972), this area has little chance of supporting more than a remnant population.

Fourteen species of raptors have been observed within the Bull Mountains and surrounding area in all major habitat types. The greatest number of species was observed during the spring and fall migration. The rough-legged hawk (an arctic nesting species) is the most common winter raptor. Spring and summer residents (red-tailed hawk, kestrel, and great horned owl) comprise most of the breeding season observations. The red-tailed hawk and the kestrel are the most frequently observed species, though raptor densities are quite low. Golden eagles have been observed at all times of the year. Other raptors present include the prairie falcon, ferruginous hawk, Cooper's hawk, turkey vulture, northern harrier, sharp-shinned and Swainson's hawks, and short-eared and burrowing owls (ECON 1992a; Meridian Minerals Company 1989-1992). Many raptors undoubtedly nest in the general area, but only 3 red-tailed hawk nests and a great horned owl nest have been found in the life-of-mine area. Turkey vultures, red-tailed hawks, kestrels, prairie falcons, and great horned owls are expected to nest in the western Bull Mountains areas, using cliff nests located in cavities or ledges of sandstone outcrops. Cliff-nesting sites are quite well-distributed in association with the ponderosa pine-mixed grassland and burned ponderosa pine-mixed grassland communities (Harrison 1979). Other raptors use trees, snags and hillsides for nesting. Suitable nesting habitat is abundant for raptors in the Bull Mountains and surrounding area. The bald eagle migrates through the area in spring and fall (Swenson et al. 1981). There have been 4 sightings of wintering bald eagles.

Seventy-three other bird species are known to inhabit higher elevations of the Bull Mountains, using 5 vegetation communities: ponderosa pine-mixed grassland community; burned ponderosa pine-mixed grassland community; mixed-grassland community; silver sagebrush-mixed grassland community; and the agricultural community (Meridian Minerals Company 1989-1992). The burned ponderosa pine-mixed grassland community provides an extraordinary abundance of snags as nesting habitat for cavity-nesting small birds such as woodpeckers, swallows, bluebirds, and wrens (Scott et al. 1977; Scott and Oldemeyer 1983; ECON INC. 1992a).

Ninety-six species of birds are known to use the lower, western portions of the Bull Mountains area, including 11 waterfowl species and 15 species associated with wetlands (see Table 10, Appendix E), (Skaar, Flath, and Thompson 1985; ECON INC. 1992b). Forty-five species of birds have been observed in the vicinity of wetland areas in the life-of-mine area (Meridian Minerals Company 1989-1992).

Several wildlife species belonging to such diverse groups as mammalian predators, aquatic birds, amphibians, and reptiles, can be observed within the Bull Mountains area. The coyote is common throughout the area. Other species include Nuttall's cottontail, Richardson's ground squirrel, black-tailed prairie dog, and least chipmunk.

Aquatic habitat in the area includes streams, ponds, springs, seeps, and areas associated with the wetland community. The Rehder, Fattig, and Railroad Creek drainages are ephemeral; however, there are perennial ponds and stream reaches created by flow from springs. Approximately 15 acres of wetland habitat occurs in the life-of-mine area, of which 3 acres are open water. A number of wet sites remain relatively undisturbed by current land use practices, however, many aquatic sites have been modified by livestock grazing or development of livestock watering facilities. Additional disturbances to the aquatic environment of the area include the 1984 fire and subsequent loss of insulating cover, and increases in

siltation from runoff and cattle disturbance. All animals found in the mine plan area use the streams, ponds, and springs, and related habitat to a greater or lesser degree.

Water birds and shorebirds use pond, spring, and stream areas. Other birds occupy riparian zones and/or harvest insects that emerge from wet areas. The aquatic invertebrate community is characterized by low-to-moderate species diversity, densities, and productivity. Species are predominantly those typical of standing water, however, a number of the taxa represented are found only in lotic (flowing water) habitats. The dominant invertebrate species are generally tolerant of widely varying conditions and are typically transient in nature or bottom dwellers that prefer standing water. Species from the midge (Chironomidae), mayfly (Ephemeroptera) and fly (Diptera) families dominate the invertebrate community, with aquatic earthworms (Oligochaeta) and amphipods also well represented. The periphyton communities (e.g., algae, bacteria, and protozoa) present in the springs, ponds, and streams are not common in eastern Montana, and indicate a higher water quality than is usually encountered in this part of the State (Dr. Loren Bahls, Department of Health and Environmental Sciences, personal communication, March 25, 1992). Of the 49 springs in the life-of-mine area, 4 springs, Busse, Cold Water, Litsky, and Black Canyon, are of high importance to aquatic organisms. Seven springs are of moderate importance, 17 are of low importance, and 21 are of negligible importance to aquatic organisms.

The primary aquatic/semiaquatic vertebrate species associated with the wetland community include the tiger salamander, chorus frog, and northern leopard frog. Painted turtles and an unidentified toad have also been observed. No fish species have been found in any of the ponds or stream reaches.

H. TRANSPORTATION

1. Transportation

Musselshell and Yellowstone counties are served by an extensive network of Federal, State and County roadways. Public bus transportation is available in the area from Intermountain Transportation Company. Public airports are located in Billings and near Roundup. Freight rail service is available in Broadview and Huntley.

2. Roadway Network

Fattig Creek Road is a 2-lane, improved, all-weather roadway that extends from Old Divide Road, northeast through the proposed mine area, to U.S. Highway 12. Old Divide Road is a 7-mile, 2-lane paved road that parallels U.S. Highway 87, starting and ending at intersections on U.S. Highway 87 (see Figure I-2). Both Fattig Creek and Old Divide roads are maintained by Musselshell County. In the area traversed by the proposed rail spur there are a number of roads. In Musselshell County, the County-maintained roads are Goulding Creek Road, Bailey Road, and the western end of Majerus Road. (Norma Wegmann, Musselshell County, personal communication, August 4, 1992). In Yellowstone County, the major roads are 21 Mile, Frey, Van Sky, and Oswald roads. (Suzette Summers, Yellowstone County, personal communication, August 4, 1992.) The named roads are County-maintained, all weather, gravel roads except for a paved section of 21 Mile Road east of Broadview.

U.S. Highway 87 and Montana Route 3 are Federal-aid Primary System (FAP), 2-lane paved roads maintained by the Montana Department of Transportation (MDT). U.S. Highway 87 extends from Billings, north through Roundup and Grassrange then northwest toward Great Falls. It travels through mostly level and rolling terrain with some steep grades and limited sight distance on some hills. Montana Route 3 extends from Billings, northwest through Acton and Broadview, ending just north of Lavina at a junction with U.S. Highway 12. Montana Route 3 is generally level terrain south of Broadview.

Highway 312 is a 2-lane paved road (4 lanes approaching the U.S. 87 intersection) maintained by MDT. Until it was replaced by Interstate 90, Highway 312 was part of the FAP System and served as the principal east/west arterial highway to Billings. Heath Street and Northern Avenue are 2-lane paved roads in Huntley, maintained by Yellowstone County. Heath Street serves both residential and industrial land uses in east Huntley.

MDT, through its pavement management system, evaluates the overall condition of State-maintained roadways every 2 years. This evaluation, used to identify potential highway improvements, includes pavement conditions (travel surface and structure), safety and traffic capacity.

MDT has several highway reconstruction projects planned along U.S. Highway 87 and Montana Route 3 (see Appendix B). These projects include pavement and shoulder widening, and strengthening and repaving of the travel surfaces. Along U.S. Highway 87, several segments have poor overall conditions. These segments are located about 7 miles north of Highway 312 and extending to about 1 mile south of the southern Old Divide/U.S. Highway 87 intersection. Along Montana Route 3, a section starting at the Yellowstone-Golden Valley county line and extending south to near the Billings city limits has poor overall conditions. Highway 312 has good overall pavement condition starting from U.S. Highway 87/Highway 312 intersection extending east through Huntley (John Wright, Montana Department of Transportation, personal communication, January 27, 1992).

3. Intersections

Three intersections of interest in connection with the proposed Project are the 2 U.S. Highway 87 intersections with Old Divide Road and the U.S. Highway 87 intersection with Highway 312.

Neither the northern nor southern Old Divide Road/U.S. Highway 87 intersections are controlled by traffic lights. Adequate line-of-sight distance is available at both intersections. Due to a curve on U.S. Highway 87, there is slightly greater sight distance at the northern intersection. (Donald P. Dusek, Montana Department of Transportation, personal communication, May 31, 1991). The major difference between the intersections is the vertical grade of U.S. Highway 87. Vehicles turning left (south) from the northern Old Divide Road/U.S. Highway 87 intersection onto U.S. Highway 87 may be delayed in accelerating to highway speed by a 4 percent upgrade for about 3,400 feet. Vehicles turning left (south) from the southern Old Divide Road/U.S. Highway 87 intersection onto U.S. Highway 87 encounter a 1.33 percent downgrade, and are aided in accelerating to normal travel speeds (Donald Dusek, personal communication, May 31, 1991).

Although the U.S. Highway 87/Highway 312 intersection has no standard traffic signal light control, (it only has flashing yellow and red lights), it meets the minimum vehicular requirements for

standard signals, as established by the Manual on Uniform Traffic Control Devices (Federal Highway Administration 1990). (Donald W. Cromer, Montana Department of Transportation, personal communication, November 18, 1991).

The northbound and southbound approaches of the U.S. Highway 87/Highway 312 intersection are controlled by stop signs supplemented by flashing red light. Both approaches consist of 2 lanes; a shared left-turn/through lane and a right-turn lane. The eastbound and westbound approaches are controlled only by flashing yellow light. These 2 approaches consist of 4 lanes; a left-turn lane, 2 through lanes and a right-turn lane. There is adequate sight distance on all of the intersection approaches. Vertical grades of all of the approaches are level, and do not affect vehicle operation through the intersection. Southbound to eastbound left-turns and westbound to northbound right turns are difficult for large trucks because the turns are greater than 90 degrees. Truck tires tend to ride up onto the curb or track off the pavement onto the shoulder when making the westbound to northbound right turn. As a result, trucks make this turn slower than other vehicles (Donald Dusek, personal communication, May 31, 1991).

4. Existing Traffic

The current Average Daily Traffic (ADT) for Fattig Creek Road is about 15 vehicles. Along Old Divide Road, the ADT is about 40 vehicles (Sandy Haugsdal, Musselshell County, personal communication, January 24, 1992). The ADT on U.S. Highway 87 varies from 2,570 vehicles, near the Highway 312 intersection, to 1,560 vehicles, north of the northern Old Divide Road intersection. Truck and heavy vehicle traffic accounts for about 10 percent of the total traffic volume traveling on U.S. Highway 87 (Donald Cromer, personal communication, November 18, 1991).

ADT on Highway 312 varies from 7,000 vehicles at the U.S. Highway 87 intersection, to about 2,400 vehicles east of Huntley. The percentage of truck and heavy vehicle traffic varies from about 9 percent at the U.S. Highway 87 intersection to about 5 percent near Huntley (Donald Cromer, personal communication, November 18, 1991).

The ADT on Montana Route 3 varies from about 1,200 vehicles, north of Acton, to about 1,100 vehicles near the Musselshell-Yellowstone county line. (Donald Cromer, personal communication, November 18, 1991).

No ADT figures are available for County roads along the rail spur route. It is estimated that the ADT is about 5 to 15 vehicles per day.

5. School Bus Routes

Five school systems operate buses in the area; the Roundup Public School District, Shepherd School District, Pioneer School District (in Billings), Billings School District, and Huntley Project Schools. Peak hours of bus activity on Highway 312, from U.S. Highway 87 through Huntley, and U.S. Highway 87 from Highway 312 to Roundup are from 6:45 to 8:15 a.m. and 3:10 to 4:45 p.m.. Limited bus traffic occurs on Highway 312 starting at 2:00 p.m. on Wednesdays. On U.S. 87 there is limited bus traffic starting at 2:20 p.m. on all school days.

The Independent School is located just north of the U.S. Highway 87/Highway 312 intersection and has an at-grade pedestrian crossing of U.S. Highway 87. Peak pedestrian and local service traffic (picking up and dropping off children) occurs from 7:00 to 8:00 a.m. and 3:30 to 4:30 p.m.

6. Capacity

Capacity is generally defined as the ability of a facility to accommodate vehicles or persons over a defined time period, given prevailing roadway and traffic control conditions. Levels-of-Service (LOS) is used to qualitatively describe the operational conditions within a traffic stream, and the perception by motorists and/or passengers. The 6 levels associated with LOS are designated as "A" through "F." LOS "A" represents free flow conditions while LOS "F" represents a disruption or breakdown of traffic flow (Transportation Research Board 1985).

The current LOS on Fattig Creek and Old Divide roads is "A." The LOS of the Fattig Creek Road/Old Divide Road intersection and both northern and southern Old Divide Road/U.S. Highway 87 intersections is "A" at all times. Vehicles can turn onto or from U.S. Highway 87 with little or no delay.

The current LOS for U.S. Highway 87 range from "A" to "D." Upon completion of the planned reconstruction projects, the LOS will range from "A" to "C." Traffic flow is generally stable and acceptable along U.S. Highway 87 (Donald Cromer, personal communication, November 18, 1991).

There is congestion at the U.S. Highway 87/Highway 312 intersection during peak travel periods. Vehicles turning left from the northbound and southbound approaches experience delays moving through the intersection. The LOS of the northbound and southbound approaches is "E" during both the a.m. and p.m. peak travel periods (Donald Cromer, personal communication, November 18, 1991).

The LOS on Highway 312 varies from "B" near Huntley to "D" near the U.S. Highway 87 intersection (Donald Cromer, personal communication, November 18, 1991). There is stable and acceptable flow from Huntley to west of the U.S. Highway 87 intersection. Near here flows become more congested and less stable when traffic increases on Highway 312.

The current LOS on Montana Route 3 south of Broadview is "B." There is stable and acceptable flow along this segment of Montana Route 3.

7. Accident History

MDT keeps records on the number and severity of all accidents on State-maintained roadways. Accident rates are expressed in accidents per million vehicle-miles. MDT also computes an accident severity rate for State-maintained roadways. This is defined as the ratio of fatal, injury, and property damage accidents to the total number of accidents on a roadway. The expression of the number and severity of accidents as rates allows direct comparison of the relative safety of State-maintained roadways.

The accident rate on U.S. Highway 87 is 1.19. This is lower than the 1.72 statewide average for an FAP roadway. The severity rate of accidents along U.S. Highway 87 is 1.78, and is greater than the 1.53 statewide average FAP severity rate (Donald Cromer, personal communication, November 18,

1991). This means there are fewer accidents per million vehicle-miles on U.S. Highway 87 compared to the statewide average for other FAP roadways, but the accidents are more severe.

The accident rate on Highway 312 of 1.74, is greater than that for an FAP roadway but less than the 2.10 rate for a Federal Aid Secondary (FAS) roadway. The severity rate of 1.50 for Highway 312 is less than the rate for both FAP and FAS roadways (Donald Cromer, personal communication, November 18, 1991). In this case, there are more accidents per million vehicle-miles on Highway 312 compared to the statewide average of FAP roadways, but fewer accidents per million vehicle-miles when compared to the statewide average for FAS roadways. Accidents occurring along Highway 312, are generally less severe than those on other FAP and FAS roadways within the State. Along Montana Route 3, the accident rate of 1.12 and severity rate of 1.59 are both lower than the FAP statewide average (Hank Butzlaff, Montana Department of Transportation, personal communication, January 24, 1992).

I. NOISE

1. Introduction

Noise can be characterized as unwanted, unpleasant sound. It can cause hearing losses, interfere with speech communication and the performance of complex tasks, and disturb sleep. Noise may be either intermittent or continuous, steady or impulsive. It can result from a broad range of sources and frequencies blending together or from one specific sound. The human response to noise is diverse and varies with the type of noise, time of day, and sensitivity of the individual.

Noise, as a physical phenomenon, refers to sound pressure variations audible to the ear. Sound pressures audible to the human ear typically range in amplitude from $2x10^{-5}$ to 200 Pascals, (i.e., a range of 10^7 or 10,000,000). A logarithmic unit known as the decibel (dB) was borrowed from electrical engineering to represent sound level. The dB is a dimensionless unit related to the logarithm of the ratio of the measured level to a reference level.

The ear is not equally sensitive at all frequencies of sound. At low frequencies, characterized as a rumble or roar, the ear is not very sensitive while at higher frequencies, characterized as a screech or a whine, the ear is most sensitive. The dBA was developed to measure and report sound levels in a manner more closely approaching how people perceive sound. Figure III-5 presents typical dBA levels for various sources in outdoor rural and urban environments and common indoor noise levels.

A change in sound level of 10 dB is usually perceived by the average person as a doubling (or halving) of the sound's loudness. This is true for loud and soft sounds. For example, a gas lawn mower at 100 feet would be about twice as loud as heavy traffic at 300 feet (see Figure III-5). Noisy urban daytime sounds would be perceived as being about four times as loud as heavy traffic at 300 feet.

A "metric" used in environmental noise analysis refers to the unit or quantity that measures or represents the effect of noise on people. The metric called the day-night average sound level (DNL) has been adopted by the U.S. Environmental Protection Agency (EPA) as the rating method used to describe community noise. DNL is the 24-hour energy average, A-weighted sound level with a 10 dB weighing

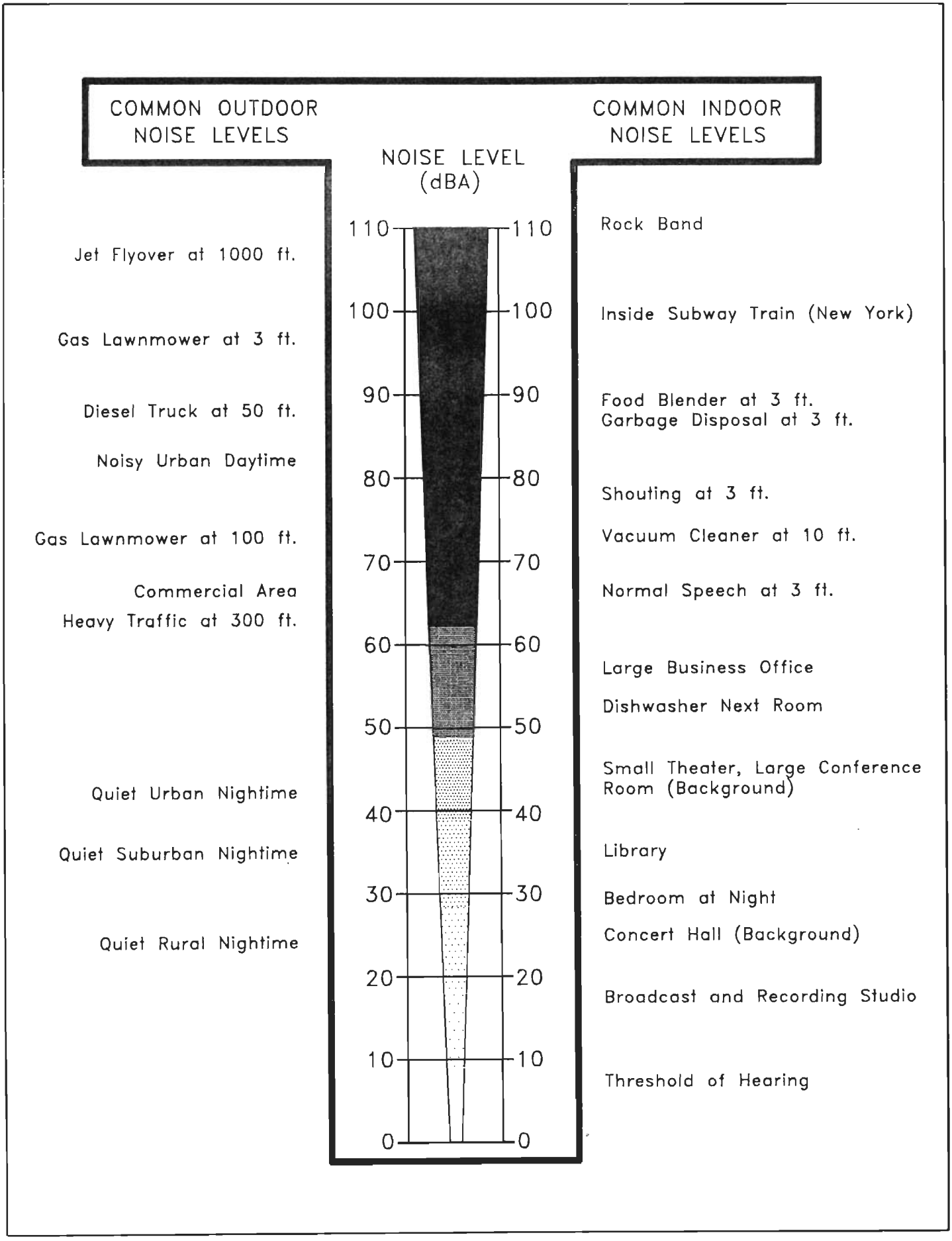


Figure III-5 Comparative noise levels

added to those levels occurring between 10 p.m. and 7 a.m. This penalty is added to account for the fact that noise at night is judged more annoying than the same noise during the day. The expression L_{dn} is used in this report to designate day-night average sound levels.

EPA has identified a range of yearly day-night sound levels sufficient to protect public health and welfare from the effects of environmental noise (U.S. Environmental Protection Agency 1974). Outdoor yearly levels on the L_{dn} scale are sufficient to protect public health and welfare if they do not exceed 55 dBA in sensitive areas (residences, schools, and hospitals). Inside buildings, yearly levels on the L_{dn} scale are sufficient to protect public health and welfare if they do not exceed 45 dBA. Maintaining an L_{dn} noise level of 55 dBA outdoors should ensure adequate protection for indoor living. Because these protective levels were derived without concern for technical or economic feasibility, and contain a margin of safety to ensure their protective value, EPA has indicated that they should not be viewed as standards, criteria, regulations, or goals. Rather, they should be viewed as levels below which there is not reason to suspect that the general population will be at risk from any of the identified effects of noise.

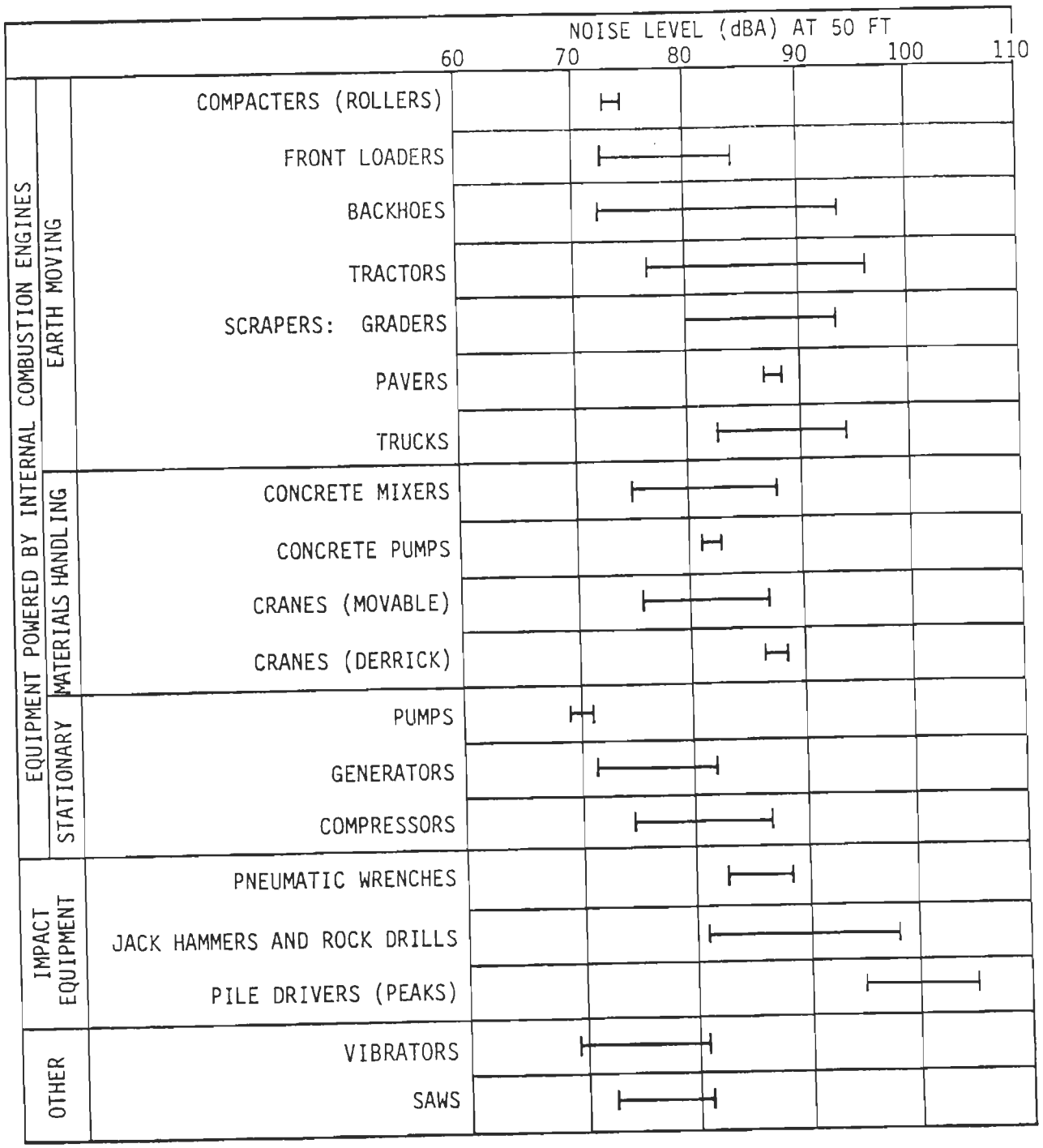
2. Existing Noise Environment

Current noise levels in and around the proposed mine area are from activities conducted at the PM Mine. Construction equipment, back-up alarms, wash-plant operations, vehicular traffic, and occasional blasting are the major noise sources. Construction equipment noise levels should currently range from about 72 to 95 dBA near the preparation facility to an ambient level of 40 dBA about 4,500 feet from the PM Mine area. During the night, when the PM Mine is not operating, ambient noise levels should be about 35 to 40 dBA. Typical construction noise levels are shown in Figure III-6.

Current noise levels along the proposed rail spur are from farm machinery and occasional traffic on rural roads. Because there are no major noise sources, L_{dn} noise levels of 35 dBA, typical of rural areas, should exist along the proposed right-of-way. When farm machinery and occasional traffic are present, noise levels may reach as high as 75 to 95 dBA at 50 feet and should drop to about 55 to 58 dBA 1,000 feet from sources.

Existing noise levels along the proposed coal-hauling route are principally due to vehicular traffic. L_{dn} values 100 feet from the edge of the road are about 59 dBA on both U.S. Highway 87 and Highway 312.

Existing noise levels in Huntley are primarily from vehicular traffic on Northern Avenue and Heath Street. Noise levels have not been measured in this area but can be approximated from traffic levels on these roads. During October, sugar beet truck traffic is the dominant noise source in the area. L_{dn} levels 100 feet from Northern Avenue and Heath Street may range from 50 to 55 dBA. From November through January, when beets are hauled to the factory, beet-truck traffic is less, and L_{dn} values would be about 45 to 50 dBA. During the remaining months of the year, traffic is greatly reduced and L_{dn} levels should range from 40 to 45 dBA.



Note: Based on Limited Available Data Samples.

Source: EPA 1971.

Figure III-6 Construction equipment noise ranges

J. SOCIOECONOMICS

1. Employment, Personal Income, and Population

In 1989, employment in Musselshell County totalled 1,850 and was dominated by farm-related jobs; 20 percent of all employment in the County was farm-related (see Table E-12, Appendix E). Secondary employment, consisting primarily of jobs in retail trade, services, and government sectors, totalled 50 percent of all jobs in the County. Total employment in Musselshell County declined by 94 jobs between 1980 and 1989. Most of the decrease occurred in the mining sector (162 jobs lost) and the retail trade sector (33 jobs lost). During this same period, the number of jobs increased slightly in the transportation and utilities industry, while the services industrial sector realized an increase of 118 jobs.

Historically, Yellowstone County has served as a commercial trade center for southeastern Montana and, consequently, most jobs in the County have been related to the retail trade and service sectors (see Table E-12, Appendix E). In 1989, farm employment in Yellowstone County comprised 2 percent of total jobs; less than either the Musselshell County or statewide percentages. Since 1980, employment in Yellowstone County has increased 14 percent; however, most gains in employment have been in the lower paying secondary jobs (services and retail trade), while the number of higher paying jobs in mining, construction, manufacturing, and transportation has decreased.

Unemployment in Musselshell County has declined from a high of 10.6 percent in 1986 to the present level of 7.8 percent (see Table E-13, Appendix E). The decline occurred because of the decrease in the available labor force and the absence of any new employment opportunities. In the past, the unemployment rate in Musselshell County has been 1 or 2 percent higher than the statewide rate, except in the late-1970s and early-1980s when oil field activity was peaking. In Yellowstone County, unemployment has been lower than the statewide rate since 1980, and stood at 4.8 percent in 1990.

Total personal income and earnings by industrial sector for the State of Montana, and Musselshell and Yellowstone counties are detailed in Table E-14, Appendix E. In 1989, earnings totalled $29.3 million in Musselshell County and were dominated by earnings from farm, transportation and utilities, services, and government jobs. Earnings from mining activities, including oil and gas exploration, have declined from 15 percent of total personal income in 1980 to the present level of 4.5 percent. During this same period, farm earnings increased from $1.7 million to $5.5 million. In Yellowstone County, the major source of earnings was the services sector, with slightly over 20 percent of total personal income attributed to this secondary industry.

Between 1980 and 1990, the population of Musselshell County decreased by 322 people or about 7.3 percent (see Table E-15, Appendix E). Most of the population loss in Musselshell County occurred in Roundup; population declined from 2,116 in 1980 to 1,808 in 1990. Population changes in Yellowstone County have closely paralleled statewide changes since 1970. The population of Yellowstone County increased from 108,035 in 1980 to 113,419 in 1990; however, this small increase represented an actual net out-migration over the 10-year period.

Projections of population and economic characteristics for the area indicate growth rates similar to those experienced between 1970 and 1990 (see Table E-16, Appendix E). Over the 20-year projection period, the population of Musselshell County, without consideration for the proposed Project, is expected to grow at an annual rate of 0.5 percent to 4,615 people (National Planning Association Data Services, Inc. 1991). This projected growth is nearly identical to the 1970-90 population growth rate for the County. By the year 2010, employment in Musselshell County is projected to increase by about 10 percent to a level of 2,052 jobs. Both employment and population growth rates of Musselshell County are representative of a stable economy with little or no economic expansion projected. Similarly, the outlook for Yellowstone County is reflective of little or no growth over the next 20 years. The population of Yellowstone County is projected to grow from 113,419 in 1990 to 134,968 by 2010, representing an approximate annual growth rate of 0.9 percent. Employment is projected to grow at an annual rate of 1.4 percent, from 70,279 in 1990 to 92,981 by 2010.

2. Public Sector Fiscal Conditions

Property taxes are the most important source of funding for Musselshell County and annually account for nearly two-thirds of all revenues. In Montana, property taxes are based on the taxable valuation of a county and, in fiscal year (FY) 1992, Musselshell County had a total taxable valuation of $6.8 million (Montana Department of Commerce 1991). In FY 1992, Musselshell County adopted an annual budget of about $1.5 million, including $817,301 for general fund purposes. In FY 1992, the city of Roundup had a taxable valuation of $1.5 million and an annual general fund budget of about $349,410. Property taxes account for nearly two-thirds of Roundup's revenues.

In FY 1992, Yellowstone County, which provides services for the communities of Huntley and Shepherd, adopted a total budget of $39.9 million including about $9.9 million for general fund purposes (Montana Department of Commerce 1991). About one-half of the budget is funded by property taxes based on a total taxable valuation of $184.4 million. In FY 1992, Billings, the County seat of Yellowstone County, adopted a total budget of $55.4 million. The total budget included projected general fund expenditures of $44.0 million, based on a total taxable valuation of about $106.0 million. About one-third of this total budget is funded through property taxes. During the same fiscal period, the town of Broadview had an annual general fund budget of $9,974 based on a taxable valuation of $139,304.

Maintenance and construction budgets for Highway 312, U.S. Highway 87, and Montana Route 3 are the responsibility of the MDT. Musselshell County has fiscal responsibility for Old Divide Road while Yellowstone County maintains streets in Huntley. The primary source of revenue for maintaining State highways is the State fuel tax and gross vehicle weight (GVW) tax. Construction of State highways also is funded by State fuel taxes; however, matching Federal funds account for about 67 percent of all highway construction in Montana. Traditionally, Montana has received approximately 2 dollars in Federal-aid highway funds for every dollar of Federal fuel tax collected in the State (Montana Department of Transportation 1991).

Average annual maintenance costs for 1989-91 were $126,620 for U.S. Highway 87, $38,654 for Highway 312, and $175,320 for Montana Route 3 (Tim Morris, Montana Department of Transportation, personal communication, March 18, 1992). The MDT does not attempt to justify whether or not traffic, and related fuel and GVW tax on any roadway in Montana, support the cost of maintenance

or reconstruction. Furthermore, local governments do not track maintenance costs of roadways by location, therefore operation and maintenance costs are not available for Old Divide Road or Heath Street in Huntley.

Local governments in Montana levy an assessment against property-taxable valuation to fund maintenance and construction of roadways. For FY 1992, Musselshell County levied 18.158 mills to raise $93,340 for operation and maintenance of County roads. That amount combined with $114,800 of local government severance tax from oil and gas, and $131,330 of non-tax revenue, provided a total Fiscal Year 1992 road fund budget of $339,470 (Sanford Haugsdal, Road Superintendent for Musselshell County, September 24, 1992).

General fund expenditures for area school districts usually account for about two-thirds of the school budget. Nearly all general fund-related revenues are realized through property taxation. In attempting to equalize school budgets throughout the State, the 1988 legislature shifted the funding of general fund budgets from local districts to State and County equalization. At present, it is the goal of the legislature to finance about 80 percent of all school district general fund expenditures through equalization.

In FY 1992, general fund budgets per elementary student enrolled varied from $2,690 at Shepherd to $12,350 at Broadview (Office of Public Instruction 1991). General fund monies spent per elementary school student were about $3,093 in Roundup Elementary School District, $3,210 in Billings, and $2,985 Huntley. At the high school level, general fund budgets varied from $3,779 per student in Billings to $6,914 per student in Broadview. Roundup School District budgeted $4,404 per high school student in general funds, while Shepherd School District expected to spend $4,545 per high school student. In this same time period, Huntley School District projected that it needed $4,620 in general fund monies per high school student. In FY 1992, the statewide average general fund expenditures per student were $3,058 for elementary students and $6,200 for high school students.

3. Public Water Supply, Wastewater Treatment, and Solid Waste

Municipal water for Roundup residents is obtained from 2 sources. The primary water source originates in an abandoned coal mine on the south side of the Musselshell River and is supplemented by water from the Musselshell River. Water is stored in 2 concrete reservoirs with a combined capacity of 3 million gallons. The water supply, pumping capability, and storage capacity of the Roundup municipal water system are adequate for present population. The Roundup municipal wastewater treatment facility consists of a 2-cell lagoon system. The system is well maintained, in adequate condition, and underutilized.

The Broadview community water supply is served by 2 wells with a combined capacity of 92 gpm (Jerry Burns, Montana Department of Health and Environmental Sciences, personal communication, July 2, 1992). Water is stored in a 21,000-gallon tank. The water system is in good condition and is adequate to accommodate some new households and businesses. The 2-cell lagoon wastewater system in Broadview is in good condition and could serve a larger population (Jerry Burns, personal communication, July 2, 1992).

Huntley receives its public water from a well and stores the water in a 18,000-gallon tank. The capacity of the Huntley water system is low for the population served, and the community probably should install a second well to provide a backup water source (Jerry Burns, personal communication, July 2, 1992). Individual septic tank systems are used by Huntley residents for wastewater disposal.

Solid waste collection and disposal in Musselshell County are provided by the Musselshell County Refuse District. Refuse is picked up and hauled to the Roundup transfer station where it then is hauled by a private contractor to the Billings landfill for disposal. The transfer station operation is functioning below capacity. Solid waste in Yellowstone County is collected and disposed of in the Billings landfill which, with no recycling, has adequate capacity until year 2045 (Jim Flisrand, Billings Solid Waste Collection and Disposal, personal communication, June 30, 1992).

4. Law Enforcement and Fire Protection

Law enforcement in the area is provided by the Montana Highway Patrol, Musselshell and Yellowstone County Sheriff's departments, and Billings Police Department. The Highway Patrol concentrates on traffic patrol and traffic-related incidents, whereas the sheriff's departments focus on criminal activity in Musselshell and Yellowstone counties. There are an adequate number of highway patrol officers to serve the Billings area; however, the Roundup area needs more officers (Captain Craig Reap, Montana Highway Patrol, personal communication, June 30, 1992; Captain Don Seyfert, Montana Highway Patrol, personal communication, June 30, 1992).

The Musselshell County Sheriff's Department, a consolidated city (Roundup)/County agency, provides law enforcement services for an estimated population of 4,100. Additional officers are needed to provide adequate protection for Musselshell County residents (Sheriff Paul Smith, Musselshell County Sheriff's Department, personal communication, June 30, 1992). The 14-bed County jail, located in Roundup, is an antiquated facility that needs to be either renovated or replaced.

The Yellowstone County Sheriff's Department provides law enforcement for an estimated population of 113,419 including the unincorporated communities of Huntley and Shepherd. More officers are needed for this area (Captain Richard Brennan, Yellowstone County Sheriff's Department, personal communication, June 30, 1992).

The Billings Police Department provides law enforcement services to an estimated population of 81,000. The department is understaffed and needs more officers to provide adequate law enforcement services to the city (Captain John Hall, Billings Police Department, personal communication, June 30, 1992).

All fire departments in the study area, except for Billings, are volunteer organizations. The Musselshell County Rural and Roundup Fire Department has an adequate number of volunteers and firefighting equipment for existing demand (Duane Brewer, Musselshell County/Roundup Fire Department, personal communication, July 1, 1992).

The Bull Mountains Volunteers, an initial-attack firefighting unit in Musselshell County, was organized in 1988 to provide additional fire protection in the Bull Mountains area. Although there are enough volunteers, firefighting equipment is limited.

The Broadview and Shepherd Volunteer Fire departments have sufficient volunteers and equipment to serve the existing population (Robby Badgett, Broadview Volunteer Fire Department, personal communication, July 7, 1992; Laura Vanberg, Shepherd Volunteer Fire Department, personal communication, July 1, 1992).

The Huntley Fire Department has 4 to 5 volunteers--not enough to provide sufficient fire protection to the community (Steve Erb, Huntley Volunteer Fire Department, personal communication, July 7, 1992). Huntley's firefighting vehicles and equipment are limited and in poor condition. In addition, the fire department is not properly equipped to provide year-round fire protection and volunteers are not trained to fight structural fires. Huntley and Worden fire departments share an emergency telephone number and maintain a mutual aid agreement (Yellowstone County Planning Department 1991).

Billings has 6 fire stations to provide fire protection to various areas of the city, but, in general, not to the rural areas surrounding Billings. Billings Fire Station #6 would respond to fires or provide equipment in Shepherd since they maintain a mutual aid agreement with the Shepherd Fire Department and all Billings fire stations would respond to wildland fires if requested by Montana DSL (Lonnie Larson, Billings Fire Department, personal communication, June 30, 1992).

5. Ambulance Services

The Musselshell County Ambulance Service in Roundup provides on-the-ground ambulance service to an estimated population of 4,100 and responds to an average of 25 emergency calls a month. The Musselshell County Ambulance Service is staffed by an adequate number of volunteers. The ambulances are high-mileage vehicles and probably should be replaced (Marion Ferguson, Musselshell County Ambulance Service, personal communication, June 30, 1992).

Broadview, Shepherd, and Huntley have no ambulance service available other than Billings. There are 3 on-the-ground ambulance and 2 air ambulance services in Billings, a sufficient number to provide appropriate emergency care to Billings and the surrounding area.

Worden provides ambulance service to the entire Huntley Project area, including the community of Huntley. Shepherd has a Quick Response Unit which provides immediate first aid until an ambulance arrives at the scene (James Kraft, Yellowstone County Disaster and Emergency Services, personal communication, October 19, 1992).

6. Housing

Year-round housing units in Musselshell County, including the Bull Mountains area, increased 9 percent between 1980 and 1990, from 1,997 to 2,183. Although the number of occupied units remained stable through the 10-year period, vacant housing units increased by 75 percent, from 299 to 522. Rental vacancy rate was 20 percent in 1990 (U.S. Department of Commerce 1991).

In 1990, there were 1,006 year-round housing units in Roundup, with 78 percent occupied (U.S. Department of Commerce 1991). Three-quarters of the homes were classified as one-unit structures and 80 percent were valued at less than $50,000.

Similar to Musselshell County, year-round housing units in Yellowstone County increased between 1980 and 1990 from 42,689 to 48,781, with vacant housing units increasing by 46 percent. Rental vacancy rate was 10 percent in 1990 (U.S. Department of Commerce 1991). In Billings, year-round housing units increased by 28 percent, with a 62 percent increase in vacant housing units.

The Billings Multiple Listing Service, which provides a listing of homes within a 70-mile radius of Billings, had 519 residential listings as of June 22, 1992, of which an estimated 45 were outside of Billings (Sue Anders, Billings Multiple Listing Service, personal communication, June 30, 1992). The Billings housing market has been very active and fewer homes are on the market than during the last few years (Charles Yegen, Peter Yegen Jr., Inc., personal communication, July 1, 1992; Jacque Stannebein, Landmark Realtors, personal communication, July 2, 1992; Sue Anders, personal communication, June 30, 1992).

Rental units in the Billings area are expensive and difficult to locate. When apartments or houses become available, they are rented almost immediately (Charles Yegen, personal communication July 1, 1992; Jacque Stannebein, personal communication, July 2, 1992).

Billings has a large supply of mobile home spaces (3,026 licensed mobile home and 353 recreational vehicle (RV) or tent spaces), while the smaller communities of Roundup (67 mobile home and 3 RV spaces), Broadview (12 mobile home spaces), Shepherd (6 mobile home spaces), and Huntley (14 mobile home spaces) have a limited supply (Montana Department of Health and Environmental Sciences 1992).

Billings has many motels to provide temporary housing (2,679 licensed motel/hotel rooms), whereas Roundup and Broadview have few (54 and 6 rooms, respectively) (Montana Department of Health and Environmental Sciences 1992).

7. Educational Facilities

Public schools in the Yellowstone County area include Broadview, Shepherd, Huntley Project (located in Worden), and Billings. Roundup School District is in Musselshell County. Broadview School District is situated in 3 counties--Yellowstone, Musselshell, and Stillwater.

Roundup School District maintains 2 school buildings--Central Elementary School (kindergarten through grade 6) and Roundup Middle/High School (grades 7 through 12). Roundup school enrollment has remained fairly stable since 1988, decreasing from 709 students in 1988 to 689 students in 1991. Based on current enrollment figures and new accreditation standards to become effective July 1, 1992, the elementary school is at capacity; however, seventh and eighth grade classes could accommodate 25 additional students and high school classes could enroll 20 more students before reaching capacity (Superintendent Jay Erdie, Roundup School District, personal communication, July 1, 1992).

Broadview School District maintains 1 school building serving students in kindergarten through grade 12. School enrollment of Broadview School District has fluctuated little between 1988 and 1991. School enrollment in 1991 was 70 students in kindergarten through grade 8 and 40 in grades 9 through 12. Overcrowded conditions currently exist at Broadview School (Superintendent Dan Nelsen, Broadview School District, personal communication, July 1, 1992).

Shepherd School District has 4 school buildings serving students in kindergarten through grade 12. School enrollment increased 7 percent between 1988 and 1991. During this period, enrollment in the lower level grades increased, while enrollment in the high school decreased. Shepherd Elementary Grade School is crowded even though a vacated cafe next to the school was purchased and converted into classroom space, and the high school will near capacity within 2 years (Superintendent Calvin Spangler, Shepherd School District, personal communication, July 2, 1992).

Huntley Project School District maintains 3 school facilities in Worden--an elementary school (kindergarten through grade 6), a middle school (grades 7 and 8), and a high school (grades 9 through 12). School enrollment decreased 5 percent between 1988 and 1991, from 698 to 662 students. The elementary grade school is filled to capacity, but the upper level grades could accommodate increased enrollment even though there has been a recent increase in seventh and eight grade enrollment (Ramona Stout, Huntley Project School, personal communication, July 1, 1992).

Billings School District #2 consists of 24 elementary schools, 4 middle schools, and 3 high schools. Between 1988 and 1991, school enrollment remained fairly stable. In school year 1991, there were 10,854 students in kindergarten through grade 8 and 4,723 in grades 9 through 12.

8. Human Services and Health Care Facilities

State, Federal, and County funding support social welfare services in Musselshell County. The County-administered welfare program provides Aid to Families with Dependent Children, Food Stamps, County Assistance (general and medical), and Medicaid. Caseloads in the Roundup office have increased dramatically over the past couple years, growing to a higher average level than formerly experienced during peak caseload months (January, December, and February). The current number of staff is not adequate to dispense the required services in a timely manner (Boni Braunbeck, Musselshell County Human Services, personal communication, June 30, 1992).

Two general practitioners, 1 dentist, and 1 optometrist provide health care services in Roundup. Roundup Memorial Hospital is the only licensed hospital within Musselshell County. Two physicians from Roundup and 12 physicians from Billings have doctors' privileges to provide health care services at the hospital (Max Long, Roundup Memorial Hospital, personal communication, June 30, 1992). In 1991, the 17-bed hospital had an occupancy rate of 7.5 percent (Gary Rose, Montana Department of Health and Environmental Sciences, personal communication, June 29, 1992).

Musselshell County Mental Health Center and Musselshell Chemical Dependency Center share an office in Roundup. The Mental Health Center provides counseling to the chronically mentally ill. The Musselshell Chemical Dependency Center provides out-patient counseling, referrals for in-patient care, and mandatory classes to driving-under-the-influence offenders.

No licensed physicians have health practices in Broadview, Shepherd, or Huntley. Billings has 308 licensed physicians employed in a variety of medical practices (Carol Norling, Montana Department of Commerce, Professional and Occupational Licensing Bureau, personal communication, June 30, 1992).

There are 2 hospitals in Billings--Deaconess Medical Center and Saint Vincent Hospital and Health Center. The 280-bed Deaconess Medical Center had an occupancy rate of 64.5 percent in 1991, while St. Vincent Hospital, also a 280-bed facility, had an occupancy rate of 71.0 percent in 1991 (Gary Rose, personal communication, June 29, 1992). The Billings area also has a number of businesses providing mental health and chemical dependency counseling.

9. Social Well-being

The social and economic character of Roundup and the surrounding area has evolved in conjunction with ranching, coal mining, and oil production. These have been the dominant sources of employment and income for Roundup area residents. Historically, the Roundup area economy has followed a "boom/bust" pattern, starting with the cattle industry in the 1880s and extending through the coal mining and oil development periods. Many area residents' social values, perceptions, and lifestyles have been influenced by the cyclic nature of good economic times followed by economic recession.

The ways in which people identify and respond to one another in Roundup are typical of small western towns--informal and personal. Residents know almost everyone in town and are aware of individuals' character, occupation, and socioeconomic status. The small town atmosphere, the quiet and predictable pace of life, and mutually supportive networks of family and friends are valued by residents.

In recent years, the Bull Mountains area has experienced an influx of people seeking the seclusion, scenery, and relatively pristine natural surroundings of the area. Many Roundup residents have termed these newcomers "mini-farmers" because they have purchased small acreages and have small numbers of livestock. It is perceived by Roundup residents that Bull Mountains residents are becoming somewhat of a social, political, and economic influence because they are organizing to reflect their specific interests, such as the Bull Mountains Landowners Association and Bull Mountains Volunteers.

The effects of proposed mine development on the social life of Roundup and Bull Mountains residents are apparent within the area. Some people have become polarized based upon their support or opposition to the Project. Roundup residents tend to favor new coal development, whereas the ranchers and Bull Mountains "mini-farmers" are perceived by Roundup residents to oppose it, even though the majority of Bull Mountains residents reported in a survey that they were not opposed to the mine. Social interaction between the "pro" and "anti" factions has become strained because of the relatively high degree of emotion associated with coal development (Economic Consultants Northwest 1989).

Broadview, the smallest incorporated town in Yellowstone County, evolved as an agricultural community and railroad loading site for agricultural and livestock commodities. Local lifestyles are influenced by factors that affect agricultural productivity and economics, such as amount of rainfall and market prices. As with most rural Montana communities, the agricultural lifestyle fosters strong ties between the people and the land (Montana Department of Natural Resources and Conservation July 1974).

Agriculture tends to produce its own subculture--work is physically hard, economically risky, and few times of the year can an operation be left to fend for itself. Broadview residents describe factors they like most about the area as being the quiet and small town environment, wildlife, open spaces, sparse population, and clean, fresh air.

Passage of the Carey Land Act in 1894 led to the development of extensive irrigation projects in the Shepherd/Huntley area, with settlers moving in to farm the land. The Huntley area was not developed until after 1904 because the area south of the Yellowstone River was part of the Crow Indian Reservation. Early homesteaders brought a diversity of cultures from Europe and Scandinavia and have contributed to the ethnic history of the area.

Social life throughout the Shepherd/Huntley area is typical of rural and small town areas of Montana. Farming and ranching families, many descendants of original settlers, provide a dominant social influence. Lifestyles and patterns of social interaction reflect traditional values and are characterized by strong interpersonal bonds based on shared ideas, trust, tradition, and community activities.

Area residents value the quiet, rural environment with open spaces, clean air, and a diversity of wildlife. Although people in the area value independence and low population density, extensive social interchanges are important elements of their lifestyles.

According to some local residents, past use of the existing Montana Rail Link low-volume coal loadout facility in Huntley (see Appendix B) has impacted the community. For a few months in 1990, coal was hauled from the proposed mine area to the Huntley loadout. In a recent survey (Economic Consultants Northwest 1991), 92 percent of the respondents indicated that they were aware that coal was hauled to the loadout facility and 43 percent of these respondents said they were affected by the Project. Coal dust, noise, safety of children due to increased traffic, highway deterioration, and the intrusion of the Project into residents' daily lives were concerns identified by the respondents as a result of the operation of the loadout facility in 1990. Since that time a group of Huntley residents has organized a subcommittee of the Huntley Community Club to oppose the Project.

Seasonally, trucks haul sugar beets to a stockpile facility in Huntley (see Appendix B). Residents generally have not voiced concerns about the hauling of sugar beets similar to those expressed about the proposed coal truck traffic.

K. RECREATION

Within Roundup and the immediate vicinity, outdoor recreation facilities include a 9-hole golf course, tennis courts, swimming pools, baseball fields, a community center (gymnasium), a large campground with over 50 sites, and a community park. Visitor use at the campground averages 3 sites per night but the campground fills to capacity for short periods during summer when special events draw visitors to town (Gayna Smiedala, Roundup Chamber of Commerce, personal communication, January 30, 1992). Golf course use averages 800-950 non-members and 200-225 members, annually. Use is light to moderate except for occasional weekends (Monty Sealy, Roundup Chamber of Commerce, personal communication, March 4, 1992).

The majority of Roundup and Bull Mountains residents participate in dispersed outdoor recreation activities including hunting, fishing, camping, walking, and horseback riding. Some of these activities take place in the Bull Mountains. However, most land in the Bull Mountains is privately owned, providing limited access for recreational pursuits.

Sections of Federal (BLM) land are generally isolated from each other by privately-owned lands. No federally-managed campgrounds or parks are located in this area of the Bull Mountains.

Deer harvest records indicate that hunting activities in the Bull Mountains area (Hunting District 590) have steadily increased over the past 5 years (Montana Department of Fish, Wildlife and Parks n.d.). In 1991, 4,134 deer hunters alone generated 16,521 hunter days of recreation in the hunting district. Elk and antelope hunting is also available to a limited extent but hunting is controlled by an established permit system. In 1991, 130 elk hunters generated 871 hunter days. In 1991, 762 turkey hunters in Musselshell County generated 2,235 hunter days. Big game hunting season opens about the middle of October and runs through Thanksgiving weekend. There are both spring and fall seasons for turkey hunting.

Fishing pressure is generally very light along the Musselshell River where most fishing occurs. Private stock ponds also provide fishing opportunities to a limited degree (Jay Newell, Department of Fish, Wildlife and Parks, personal communication, March 6,1992).

A total of 450 acres have been developed into 78 parks in Billings. An additional 918 acres are yet to be developed into 4 parks outside the city limits (Gene Blackwell, Billings Recreation Division, personal communication, January 30, 1992). Yellowstone County has developed an additional 53.9 acres into 74 parks (Cumin Associates 1984).

Huntley operates and maintains a 6-acre community park. Development within this park includes playground equipment, a basketball court, baseball diamond, and picnic facilities. Dispersed activities occurring in the community involve walking, jogging, and bicycling. Many residents of Huntley are retired and participate in these activities on a daily basis (Jim Pope, Vice President of the Huntley Community Club, personal communication, January 30, 1992).

L. LAND USE

According to County comprehensive plans, about 1 percent of the land in Musselshell County and about 3 percent of the land in Yellowstone County is urban or urban built-up area. The remaining land is primarily agricultural, including rangeland, forest areas (forest cover and commercial forest), cropland, and pastures. There are also limited areas of rural/suburban tracts. Very little of the land area of either county is currently mined. Land in the Bull Mountains Project area is primarily forest and cropland, with some rangeland and rural/suburban tracts.

Land uses of the proposed life-of-mine area, rail spur, and transmission line include rangeland, cropland, coal mining, timber production, wildlife habitat, and recreation. Table III-4 provides a breakdown of existing land uses for the proposed life-of-mine area. The proposed Huntley loadout would be located in an existing rail-serviced industrial area.

1. Mineral Resource Development

PM Mine is currently permitted to mine coal in the western portion of the proposed life-of-mine area. Appendix B provides a full description of the PM Mine. Adjacent to the southeast is the reclaimed Meridian test pit area (see Figure B-1, Appendix B). The PM Mine and Meridian coal test pit cover about 202 acres of land, or 1.9 percent of the total life-of-mine area. About 71 acres of this land are currently used for livestock grazing.

2. Public Utilities

The only utility lines in the proposed life-of-mine area are those that serve the few scattered residences, ranches, and the PM Mine. There are no major transmission or pipelines in the proposed life-of-mine area.

The proposed 69 kV Fergus Electric Company power transmission line, planned to serve the proposed mine, can be divided into 2 sections. The first is a 10-mile upgrade from the Montana Power Company substation at Roundup, south to the South Roundup substation. The second is a 7-mile extension from the South Roundup substation south and east to the proposed mine (see Figure I-2). The first section is located in an existing easement that generally parallels U.S. Highway 87. The second section follows U.S. Highway 87 south for 2 miles then traverses a combination of agricultural, timberland, and grasslands to the mine area.

There are 2 oil and gas pipelines that cross the proposed rail spur right-of-way from northwest to southeast. The first is located about 8 miles east and the other 16 miles east of the west terminus of the rail spur. The first easement is owned by Continental Pipeline Company and the second by Glacier Pipeline Company.

One power transmission line tower, owned by Montana Power Company, is located adjacent to the rail spur about 4 miles east of its west terminus. From this point, the transmission line runs eastward along the rail spur's south right-of-way line for about 2 miles.

TABLE III-4

Bull Mountains Mine No. 1 Life-of-Mine Area
Land Use Acreages

	ACREAGE OCCUPIED	PERCENT OF TOTAL AREA
1. Residential/fish and wildlife habitat/ recreation	438	4.0
2. Cropland/grazing land	17	0.2

Table III-4 (continued)

	ACREAGE OCCUPIED	PERCENT OF TOTAL AREA
3. Grazing land/fish and wildlife habitat/ recreation	9,944	91.6
4. Special-use pasture/fish and wildlife habitat/recreation	262	2.4
5. Grazing land/fish and wildlife habitat/ industrial/commercial	50	0.5
6. Special-use pasture/fish and wildlife habitat/industrial/commercial	21	0.2
7. Industrial/commercial	109	1.0
8. Developed water resources	15	0.1
	10,856	100.0

Source: Meridian Minerals Company 1989-1992.

3. Livestock Grazing/Agricultural Land

Approximately 10,294 acres, 94.8 percent of the life-of-mine area, are used for livestock grazing, mainly cattle and some horses. About 17 of these acres, north of the PM mine, are primarily used to grow alfalfa or wheat and are used secondarily as grazing land. Although there are no areas set aside solely for use as wildlife habitat, 10,715 acres of the life-of-mine area do provide wildlife habitat (see Table III-4). There are a total of 49 springs in the life-of-mine area. Four of these, Busse, Cold Water, Litsky, and Black Canyon are highly important to livestock grazing and wildlife, 14 are moderately important, 24 have a low importance, and 7 have a negligible importance (see Table III-3).

The proposed rail spur traverses a variety of agricultural uses. About 10 and one-fourth miles of the east end is primarily grazing land with ponderosa pine cover. The remaining right-of-way is primarily fields of small grains, hay, wheatgrass lowlands, alkali/salt grasslands, and conservation reserve lands. Conservation Reserve lands are lands that have temporarily been set aside under the Federal Conservation Reserve Program (CRP). The CRP is in effect to help owners and operators of eligible cropland conserve and improve soil and water resources by removing highly erodible or other eligible cropland from production. The CRP also curbs the production of surplus commodities, thereby increasing commodity prices received by farmers, improving water quality by reducing soil erosion, reducing

sedimentation in streams and along roadsides, and enhancing fish and wildlife habitat. The owner and/or operator of the land is compensated for keeping the land out of production for the term of the agreement.

4. Other Land Uses

A portion of a dispersed housing subdivision, about 438 acres, is located in the north portion of the life-of-mine area. The subdivision is being developed by Yellowstone Basin Properties, Inc. About one-third of the available parcels have been sold; however, only 1 house has been built to date. There are several scattered, rural residences within one-half of the proposed 69 kV transmission line and the life-of-mine area. The proposed rail spur right-of-way would come within 300 to 400 feet of 2 ranch houses, and within one-fourth to one-half mile of several others.

The proposed Huntley loadout would be located in a rail-served industrial area in the southeast portion of Huntley (see Figure B-2). A sugar beet loading facility, rail yard, and grain elevator are immediately adjacent to the proposed loadout site. There are residential areas to the northeast, north, and northwest of the proposed site. The closest residence is within 500 feet of the site. To the west, within 1,000 feet of the proposed loadout, is the urban area of Huntley. Detailed descriptions of existing facilities and operations are in Appendix B.

M. VISUAL RESOURCES/AESTHETICS

The Bull Mountains area is characterized by wooded rolling hills and low mountains (the highest is Dunn Mountain with an elevation of about 4,750 feet) and open, flat, grass- and farmlands. In general, the region is a mix that combines areas with some outstanding visual features and some that are fairly common to the region. There are some areas of extensive cultural modifications including Roundup and Broadview, the PM Mine, Meridian's coal test pit and agricultural fields.

The proposed life-of-mine area is composed of hills and low mountains, interspersed by gently sloping valleys, with some upland grasslands, hayfields, ponderosa pine and rock outcroppings. There is a mixture of outstanding visual features, some that are common to the region, and some extensive modifications. The PM Mine has disturbed about 101 acres. The Snowy, Big Horn, Pryor, Beartooth, and Crazy mountains are visible from Dunn Mountain, the highest point of the Bull Mountains (over 1 mile south of the Musselshell-Yellowstone county line). The Crazy and Beartooth mountains are about 100 miles distant.

The proposed 33-mile rail spur runs from the proposed mine, on the east end, in a generally southwesterly direction to the Burlington Northern mainline, about 2 miles south of Broadview. A 6,800-foot siding would parallel the mainline south of its junction with the rail spur. The rail spur right-of-way varies from 150- to 500-feet wide and traverses land ranging from wooded hills and grassy valleys with some small, steep-sided canyons on the east end, to flat, open fields and lowlands on the west end. The east end is a mix of some outstanding visual features with some common to the region, while the west end is composed of features that are subtle, with little contrast, and common to the region.

The proposed transmission line would include 10 miles of upgraded line located in an existing easement that runs from Roundup, south to the Roundup substation, and 7 miles of newly-constructed

line in a 50-foot right-of-way running south and east from the Roundup substation to the proposed mine. The line would travel through rolling hills and valleys with mixed pine and grasslands.

The Huntley loadout is located at an existing rail-served industrial area in the southeast corner of Huntley, adjacent to a sugar beet stockpile and loading area, grain elevator, and the Montana Rail Link tracks. There are residential areas to the northeast, north and northwest; the closest residence is about 500 feet from the proposed facility. The scenic quality of this area has been substantially impacted by cultural modifications.

All of the proposed facilities are located in areas whose visual/aesthetic features are a mix of some outstanding and some common features and areas whose features are fairly common to their physiographic region. There are no areas of special, critical, or unique scenic significance, and no national landmark sites on any of the proposed mine facility sites.

N. CULTURAL RESOURCES

1. Prehistoric and Historic Resources

Prehistoric resources are physical properties resulting from human activities predating written records, identified as either isolated artifacts or sites. Sites contain concentrations of artifacts (e.g., stone tools and ceramic shards), features (e.g., campfires and tipi rings), and plant and animal remains. Depending on their age, complexity, integrity, and relationship to one another, sites may be important and capable of yielding information about past cultures and settlement patterns. Prehistoric site types in the Bull Mountains area include campsites, cribbed log structures, limited activity sites, rock art, rock cairns and quarries, and workshops.

Historic resources consist of physical properties that postdate the existence of written records and include architectural structures (e.g., log cabins, dams, and bridges) and archaeological features such as foundations, trails, and trash dumps. Such resources may have research potential in the same manner as prehistoric sites, but historic sites are more often considered important because of their association with important historical persons or events, or as examples of distinctive architectural styles.

The active disturbance area, including the facilities area, haul roads, and the railway corridor, was surveyed at a high-intensity (Class III) level. The balance of the life-of-mine area was surveyed for rock art and standing structures since controlled subsidence should not materially disrupt subsurface materials. Steep slope areas where subsidence could disrupt subsurface deposits have been identified. These will be surveyed at the Class III level in advance of mining and any new sites evaluated and mitigated as required.

Thirteen sites (10 lithic scatters, a homestead, a stone circle site and a prehistoric/historic site) have been found in the proposed life-of-mine area (Rood 1990; Tetra Tech, Inc. 1991). Five prehistoric lithic scatters and the stone circle site were recommended as potentially National Register of Historic Places (NRHP) eligible pending additional testing (Rood 1990; Tetra Tech, Inc. 1991). Seven sites have limited research potential and are not considered eligible for the NRHP.

Several additional sites have been located throughout the life-of-mine area but have not been fully recorded or evaluated for NRHP eligibility. Other undiscovered sites doubtless occur within the life-of-mine area. Some of these will probably prove to be NRHP eligible. Areas with the highest probability for prehistoric and historic sites would be near springs, or along ridge tops with southern or eastern exposures (Rood 1990). Except in the steep slope areas noted above, no disturbance of these sites is anticipated.

Sixteen prehistoric lithic scatters, 23 historic sites (a school site, 13 homesteads, and 9 trash scatters) and 1 prehistoric/historic site have been found in and around the proposed rail spur corridor (Pool 1991; Tetra Tech, Inc. 1991). Thirty-one of these sites (13 prehistoric lithic scatters and 18 historic sites) have been recommended NRHP eligible or potentially eligible pending additional testing or archival research. Eight sites have limited research potential and are not considered NRHP eligible.

No prehistoric or historic sites have been found along the proposed transmission line corridor or the Huntley loadout facility (Husted 1989; Wood 1990).

2. Native American Resources

Native American (traditional) resources are sites, areas, and materials important to Native Americans for religious or heritage reasons. Sensitive resources may include some types of prehistoric sites, features and artifacts, contemporary sacred areas, traditional use areas (e.g., native plant habitat), and sources for materials used in the production of sacred objects and traditional tools.

Native American groups with traditional ties and concerns in the Bull Mountains area include the Crow, Blackfeet, GrosVentre, Sioux, Northern Cheyenne, Assiniboine, Shoshone, and Arapaho. Several areas that may contain resources sensitive to these groups have been located in the area. Sensitive site types may include vision quest sites, large rock features, rock art sites, burials, ceremonial structures, and dance grounds (Deaver 1986). Sensitive places in the area may include mountain peaks or springs.

CHAPTER IV

ENVIRONMENTAL CONSEQUENCES

This chapter contains the Agency's analysis of probable impacts to the human environment that would result from construction and operation of the proposed Bull Mountains Mine No. 1, its coal transportation system, and associated support facilities (the Project). It also contains the analysis of probable cumulative impacts that would result from adding the proposed activities to other existing and reasonably foreseeable activities in the Billings-Huntley-Roundup-Broadview area.

In order to perform the impact analysis contained in this chapter, certain assumptions were made. The following assumptions are for the purpose of this analysis only. They were not intended to be the final projection of future activities that may or may not materialize in the area over the next 44 years.

A. IMPACTS OF ALTERNATIVE 1

1. Assumptions for Alternative 1

Assumptions used by the Agency to perform the impact analysis for Alternative 1 include:

- The permit application package submitted by Meridian for operations associated with Bull Mountains Mine No. 1 with conditions attached, is in compliance with Montana Strip and Underground Mine Reclamation Act (MSUMRA) and other applicable State and Federal laws.

- Mining and reclamation technology would not change substantially throughout mine life.

- Labor, equipment, and/or market shortages/surpluses would not materially change projected levels of development.

- Impacts to coal supply or demand (regional or otherwise) are beyond the scope of this EIS.

- The life of the mine would be 44 years: 3 years for pre-mining development, equipment erection, and limited coal production; 30 years for active mining; 1 year for facility demolition and final reclamation; and a minimum of 10 additional years for bond release after seeding, fertilizing, irrigation, or other work to ensure revegetation was complete (see Table I-2). The life of the temporary loadout at Huntley would be 3 years: 2 to 3 months for upgrading the facility, 24 months for active loadout operations during early development at the mine, and 6 to 9 months for facility demolition, final reclamation, and bond release. The life of the rail spur would be 34 years: about 2 years for construction, 30 years for use during active coal hauling, and 1 year for decommissioning and limited reclamation. The term of the construction and operation activities considered in the cumulative analysis would be as specified in Appendix B.

- The Project as described in Appendix A would be initiated in early-1993.

- Reclamation would be initiated when an area was no longer needed for either mining or production operations. No reclaimed acres would be available for postmining land use until the end of mine life. Postmining land use at the Huntley loadout would begin after final bond release.

- The local short-term impacts of the Project are those that would occur during the period from premining development through bond release (i.e., 44 years at the mine and 3 years, including 24 months of loadout operation, at the Huntley loadout). Long-term impacts of the Project are those that would persist beyond final bond release. For construction and operation activities considered in the cumulative analysis, short-term impacts are those that occur during the term of the respective activities. Long-term impacts are those that would persist beyond the terms of these activities as indicated in Appendix B.

- An irreversible and irretrievable commitment of resources would occur when resources were either consumed, committed, or lost as a result of the Project.

  The commitment of a resource would be "irreversible" if the Project started a "process" (chemical, biological, and/or physical) that could not be stopped. As a result, the resource, or its productivity, and/or its utility would be consumed, committed, or lost forever.

  Commitment of a resource would be considered "irretrievable" when the Project directly eliminated the resource, its productivity, and/or its utility for the life of the Project.

- Qualitative terms are used to describe anticipated magnitude of impacts and, where appropriate, anticipated importance of impact to the human environment. The terms "major," "moderate," "minor," and "negligible" describe magnitude.

  "Significant," "potential to become significant," and "insignificant" describe importance.

  Impacts are assumed to be insignificant unless identified otherwise.

- Cumulative impacts are defined as collective impacts of the Project when considered in conjunction with other past, present, and reasonably foreseeable activities. (These activities are described in Appendix B.) Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

- The geographical limits for the analysis of probable impacts in this EIS primarily encompass the life-of-mine area, the railroad corridor, the powerline corridor, areas designated for hydrological mitigation outside the life-of-mine area, and the life-of-operation areas for associated development facilities located in the Billings-Huntley-

Roundup-Broadview area. Where larger geographical limits were established to allow for required analyses and assessment of impacts, a description follows:

Geology. The geologic study area is a region within the Bull Mountains basin defined by surface outcrops of the Fort Union Formation, specifically, the Tongue River Formation.

Vegetation. For the rail corridor, the study area included a 1- to 2-mile band along the 30-mile corridor. This area encompasses about 40,000 acres.

Wildlife. The wildlife study area includes the proposed life-of-mine area plus a 3.2 km (2 mile) buffer zone. This larger area was intended to reflect the limits within which wildlife would be influenced by a fully developed project. For the rail corridor, the study area included a strip of land about 1 and one-half to 2 miles wide along the entire corridor.

Transportation. The study area is bounded by existing highway systems and the proposed rail spur in Musselshell and Yellowstone counties. Roadway segments defining the study area are: Fatting Creek Road, Old Divide Road, U.S. Highway 87, Highway 312, Montana Route 3, and Heath Street in Huntley.

Socioeconomics. All of Yellowstone and Musselshell counties, the incorporated municipalities of Roundup, Billings, and Broadview and the unincorporated communities of Shepherd and Huntley are included in the study area.

Recreation. For recreation, the study area is bounded by Roundup on the north and Billings on the south with the proposed mine and Broadview being the east and west boundaries, respectively. In general, the study area encompasses a radius of about 50 miles.

Visual Resources. The visual study area includes all lands within 5 miles of, and with a direct line-of-sight to, mine-related facilities and activities.

- The employment assumptions for the economic analysis include: Meridian would be able to hire 75 percent of the direct mine-related employment from the available work force in the Billings labor market area, which includes Roundup, Broadview, Huntley, and Shepherd.

- An employment multiplier of .45 represents the number of secondary jobs created for each direct mine-related job.

- Ninety percent of all secondary employees would be hired locally.

- Demographic assumptions include: The average family size for mine-related employees would be 3.1 persons per family while secondary and construction employees would have an average family size of 2.1 persons per family.

- In-migrating workers would relocate within the study area as follows:

  - Seventy-four percent to Billings.

  - Thirteen percent to Roundup.

  - Seven percent to rural Yellowstone County.

  - Six percent to rural Musselshell County.

- Forty-five percent of the in-migrating children would be enrolled in grades kindergarten through 8th grade, 19 percent would be enrolled in high school, and 36 percent would not be enrolled in school.

- Income assumptions include: The average annual salary for jobs directly related to mine activities would be $33,309. The average annual salary for secondary workers would be $15,397. Both of these averages are based on the statewide average salary paid to mining and service sector employees in 1990.

- Fiscal assumptions include: Local government mill levies would remain at 1990 levels for the life of the mine. State funding and equalization for local school districts would not change for the life of the mine.

- The contract sales price of coal would average $15 per ton (1989 dollars) for the life of the mine.

2. Air Quality

a. Impacts to air quality in and around the surface facility complex from mining-related activities.

Major emissions during the construction, mining, and reclamation phases of the Project would be from generation of fugitive dust. The principal sources of fugitive dust would be from activities related to: land clearing; earthmoving; drilling and blasting; truck and/or train loading operations; wind erosion from coal, soil, and spoil stockpiles and conveyors; coal-handling operations; and vehicle traffic on unpaved haul roads. Dust generated from these open sources is termed "fugitive" because it is not discharged to the atmosphere in a confined flow stream (e.g., stack, chimney, or vent).

The air quality impact of a fugitive dust source depends on the quantity and drift potential of the dust particles injected into the atmosphere. The larger dust particles settle out near the source (often creating a local nuisance problem), while a considerable amount of fine particles are dispersed over much

greater distances. Theoretical drift distances, as a function of particulate diameter and mean wind speed, have been computed for fugitive dust emissions. For a typical wind speed of 10 miles per hour (MPH), particles larger than 100 micrometers (μm) are likely to settle out within 20 to 30 feet from the source. (For comparison, a human hair has a thickness of 100 μm.) Particles 30 to 100 μm, depending on the extent of atmosphere turbulence, are likely to settle within a few hundred feet. Dust particles smaller than 30 μm are generally recognized as emissions that may remain indefinitely suspended.

Current State and Federal ambient air quality standards for particulate matter include only particles with a diameter less than or equal to 10μm (PM_{10}) because those are the particles that penetrate into the windpipe, upper lung, and deep lung (alveolar) regions of the respiratory tract. Even though the biological response of individuals differs, particle penetration to these areas poses the greatest health risk. Because of the low risk of adverse health impacts from deposition of larger particles in the respiratory passages of the head, particles over 10μm were excluded from the standard. Montana PM_{10} standards are shown in Table III-2.

Other pollutant emissions would include exhaust emissions from diesel-powered construction equipment, trucks, and other motor vehicles, and stack or ventilation emissions from the mine, boiler, and coal preparation and clean coal processing plant. Pollutants from these sources would include carbon monoxide (CO), nitrogen oxides (NO_x), sulfur dioxide (SO_2), and particulates (PM_{10}).

Maximum Project-related 24-hour average PM_{10} impacts near the life-of-mine boundary during full coal production would range from about 3 to 79 $\mu g/m^3$. These PM_{10} concentrations equate to Total Suspended Particulate (TSP) concentrations of about 5 to 132 $\mu g/m^3$. These maximum concentrations are higher than concentrations typically found near the boundary. Greater impacts would occur on days that have light winds and poor dispersion conditions (temperature inversion). These conditions normally occur during winter in the early morning hours. Annual PM_{10} impacts at the life-of-mine boundary would range from 0.2 to 7 $\mu g/m^3$.

Total 24-hour average PM_{10} impacts (Project concentrations plus background concentrations) would range from 56 to 132 $\mu g/m^3$ near the life-of-mine boundary. Annual PM_{10} concentrations would range from about 9 to 16 $\mu g/m^3$. These concentrations would be well below Montana PM_{10} Ambient Air Standards (see Table III-2).

Air quality would occasionally be degraded by Project particulate concentrations in excess of the allowable 24-hour average Prevention of Significant Deterioration (PSD) Class II incremental TSP concentration of 37 $\mu g/m^3$. Particulate increment requirements are not applicable for the mine because estimated particulate emissions would be about 115 tons per year. A PSD permit would be required only if there were annual emissions of 250 tons or more from mining operations.

Gaseous pollutant concentrations (NO_2, CO, SO_2) would not exceed Montana Ambient Air Standards and air quality degradation by NO_2 and SO_2 would be less than the applicable PSD Class II increments.

In order to minimize air quality impacts from particulates, the following dust controls would be used, (for additional details, see Appendix A):

- Particulate emissions from the coal dryer would be controlled with a baghouse;
- Conveyors outside the mine portal would be partially enclosed. Water sprays would be used to minimize dust generation from the conveyors at transfer points;
- Coal stockpile feed conveyors would be equipped with variable tube stackers to minimize the fall distance to the pile and control spillage;
- Open coal stockpiles would be sprayed with water, as necessary;
- Coal crushing equipment would be equipped with water sprays;
- Water or other approved dust suppressants would be applied to active roadways and parking areas, as needed;
- Coal, rock, soil, and other dust-generating material would be promptly removed from all roads;
- Speed would be limited to 25 MPH on all roads within the mine property;
- Yard areas and parking lots would be graveled;
- Disturbed areas susceptible to potential fugitive dust emissions would be revegetated, mulched, or otherwise stabilized; and
- Topsoil and subsoil storage stockpiles would be revegetated as soon as possible after they were established.

The Agency concludes that impacts to air quality in and around the surface facility complex from mining-related activities would be minor over the short term and negligible over the long term.

b. Impacts to air quality along and around the rail spur from mining-related activities.

Direct emissions would result from construction of the rail spur, operation of coal trains, and reclamation activities. Fugitive dust would result from activities related to land clearing, earth moving, and vehicle traffic on unpaved roads. Fugitive coal dust emissions would come from the coal cars when trains passed. Exhaust emissions from diesel-powered construction equipment, trucks, other motor vehicles, and diesel locomotives would include carbon monoxide (CO), nitrogen oxides (NO_x), sulfur dioxide (SO_2), and particulates.

Daily pollutant emission rates for rail spur construction and coal train operations are presented in Table IV-1. In order to estimate regional or County impacts, Musselshell County emissions were used since that is where most of the rail spur would be located (see Table IV-1). Emissions include those from fuel combustion in stationary sources, transportation, solid waste disposal, and industrial processes. The transportation category includes automobiles, trucks, buses, and trains (e.g., Burlington Northern trains). As shown in Table IV-1, particulates from rail spur construction would have the highest pollution rate. However, the increase in the County particulate burden from the proposed Project would be only 1 percent. NO_2 and CO emissions from rail spur construction would each add about 4 percent to the County pollutant burden.

Local, temporary increases in pollutant concentrations, especially fugitive dust (PM_{10}), could occur a few hundred feet downwind from railroad construction sites. When construction activities ended, pollutant concentrations would return to near background levels.

TABLE IV-1

Comparison of Rail Spur Construction and Coal Train Operations Pollutant Emissions With Musselshell County Emissions

Pollutant	Musselshell County Emissions[1] (lb/day)	Rail Spur Construction Emissions[2] (lb/day)	% Increase in County Emissions	Coal Train Emissions[2] (lb/trip)	% Increase in County Emissions
CO	12,707	81.6	0.64	87.9	0.69
NO_x as NO_2	3,616	134.1	3.6	250	6.5
SO_x as SO_2	395	15.5	3.8	38.5	8.9
Particulates	109,425	1,058[3]	0.96	16.9[4]	0.02

Notes: [1]Source: National Emission Data System (Farrel 1992).
[2]Emission factors: EPA Document AP-42 (EPA 1985).
[3]Includes exhaust and fugitive dust emissions.
[4]Does not include coal dust.

Operation of coal trains would produce an increase in County SO_2, NO_2, and CO pollutant burdens and temporary increases in downwind concentrations of pollutants emitted in the exhaust of the diesel locomotives (see Table IV-1). At a residence located 500 feet from the railroad spur, these concentration increases would be brief, and concentrations would quickly return to background levels. Even though some coal dust would be blown from coal trains, it was not possible to quantify the amount because emission factors have not yet been determined for dust blowing from coal trains.

In the Broadview area, the addition of 1 train per day to traffic currently on the Burlington Northern mainline would not cause an appreciable change in local pollutant concentrations.

During reclamation, emissions from the equipment and vehicles used to remove the ties, rail, and ballast would produce some fugitive dust and diesel exhaust emissions. These would produce some temporary increases in concentrations, up to a few hundred feet downwind.

During construction of the rail spur, construction areas would be watered to minimize fugitive dust emissions. Regular preventive maintenance would be performed to minimize gaseous pollutant emissions from the construction equipment and other vehicles due to engine problems. Good maintenance practices would also be used on the diesel locomotives.

The Agency concludes that impacts to air quality along and around the rail spur from mining-related activities would be minor over the short term and negligible over the long term.

c. Impacts to air quality from truck haulage of coal on U.S. Highway 87, Highway 312, and Heath Street.

Haul trucks would enter U.S. Highway 87 at its southern intersection with Old Divide Road. They would follow U.S. 87 south to the intersection with Highway 312, then east along Highway 312 to Huntley. In Huntley, trucks would proceed south along Heath Street. These are all paved roads.

Direct air emissions would come from coal truck exhaust, particulate matter from wear of bearings and brake linings, abrasion of tires against the road surface and fugitive re-entrained traffic dust. Re-entrained fugitive dust consists primarily of common sand and soil, mostly tracked or deposited onto the roadway by vehicle traffic. Some of the direct emissions may settle to the roadway surface to be re-entrained. Re-entrainment rates are higher if the pavement surface has deteriorated. Some coal dust would escape during transport but could not be quantified since emission factors for coal dust from truck haulage were not available.

Daily emission rates for CO, NO_x, hydrocarbons (non-methane), and re-entrained dust are presented in Table IV-2. The percentage increases in Yellowstone County pollutant emissions that would result from hauling coal over the paved roads would be 0.1 percent or less (see Table IV-2). These small increases in pollutant emissions would contribute very little to the overall pollutant burden in Yellowstone County.

Local pollutant concentrations a few hundred feet downwind of the highway would increase briefly when a coal truck passed. These higher concentrations would quickly return to background levels after the exhaust plume passed a given downwind location.

TABLE IV-2

Comparison of Coal Truck Pollution Emissions With Yellowstone County Emissions

Pollutant	Yellowstone County[1] (lb/day)	Project Coal Truck Emissions (lb/day)[2]	% Increase in County Emissions
CO	192,060	177.0	0.09
NO_x	96,263	138.8	0.14
Hydrocarbons	66,690	36.4	0.05
Particulates	208,904	99.8[3]	0.05

Note: [1]Source: EPA National Emission Data System, 1988 (Farrel 1992).
[2]Emission factors from EPA document AP-42 (EPA 1985).
[3]Re-entrained dust and exhaust particulates; coal dust from trucks not included.

Sometime after 1993, a 6.2 mile section of U.S. Highway 87, several miles south of the south end of Old Divide Road, is scheduled for reconstruction (see Appendix B). During the year of construction, cumulative traffic and truck traffic emissions downwind of this section of the highway would

be higher than other areas adjacent to the haul route. The cumulative air quality effects would end upon completion of construction.

Coal dust emissions from haul trucks would be minimized by using tarps and/or special trailer designs, and limiting trucks to a maximum 15 mph on Heath Street in Huntley. Truck haulage would last for a 2- year period, after which pollutant concentrations would return to previous levels.

The Agency concludes that impacts to air quality from truck haulage of coal on U.S. Highway 87, Highway 312, and Heath Street would be minor to moderate over the short term and negligible over the long term.

d. Impacts to air quality in and around the Huntley area from construction, operation, and reclamation of the Huntley loadout.

Construction activities related to expansion of the Huntley loadout would produce fugitive dust and exhaust pollutants. During construction, pollutant emissions, especially fugitive dust, would move downwind and cause temporary increases in ambient concentrations a few hundred feet from the site.

Two major types of pollutant emissions, fugitive dust and coal dust, would come from operation of the loadout facility. Fugitive dust would be produced by truck travel on unpaved haul roads within the facility. Coal dust would be generated by coal dropping from trucks into bins, wind erosion from the stockpile and open conveyors, coal dropping from conveyors onto the stockpile and into rail cars, and bulldozing the stockpiles. Direct emissions of CO, NO_x, and particulates would occur from diesel equipment, trucks, and locomotives.

Predicted ambient pollutant concentrations, including Project impacts, background concentrations, and combined total concentrations are presented in Table IV-3. Table IV-4 describes the location of air quality monitoring receptors.

The predicted concentrations represent maximum values which would usually occur during the early morning hours when the winds are light and pollutant dispersion is at a minimum (temperature inversion). These worst case meteorological conditions usually occur during the winter and early spring. The average or typical concentrations would be lower than the values shown in Table IV-3. None of the total concentrations would exceed the Montana Ambient Air Quality Standards.

The maximum 24-hour PM_{10} concentration (37.6 $\mu g/m^3$), resulting from Project operations, indicates that the degradation of air quality would occasionally exceed the allowable PSD increment. The PM_{10} concentration of 37.6 $\mu g/m^3$ equates to a TSP concentration of about 63 $\mu g/m^3$. This concentration would be about 1.7 times the allowable PSD increment of 37 $\mu g/m^3$. None of the other Project pollutant concentrations would exceed the PSD Class II increment. PSD permit requirements would not be applicable to the facility because the estimated particulate emissions would only be about 12 tons per year.

Reclamation of the Huntley loadout would produce some fugitive dust and diesel exhaust emissions. Ambient pollutant concentrations would increase a few hundred feet downwind of the facility,

during reclamation operations. Once reclamation was completed, pollutant concentrations would return to background levels.

In addition to pollutant emissions from the loadout, fugitive dust and exhaust emissions would occur from regular train traffic passing through the Huntley area, and from operation of the Huntley sugar beet loading site and grain elevator (see Appendix B). Sugar beets are stockpiled during October and hauled to the factory from October through January. Peak pollutant emission rates would occur in October with somewhat lower rates from November through January. Pollutant concentrations resulting from the combined operation of the 2 facilities would result in greater downwind air quality impacts from October through January.

TABLE IV-3

Summary of Predicted Maximum Ambient Concentrations for the Huntley Loadout Compared to Ambient Air Quality Standards and PSD Increments

Pollutant	Averaging Period	Receptor Identification[1]	Project Contribution ($\mu g/m^3$)	Background Concentration[2] ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)	Montana Standard ($\mu g/m^3$)	PSD Class II Increment ($\mu g/m^3$)
PM_{10}	24-hour	2	37.6	41	79	150	37 (TSP)
	Annual	3	6.8	14	21	50	19 (TSP)
NO_2	1-hour	1	95.0	20	115	565	*
	Annual	3	0.4	2	2	100	25
CO	1-hour	1	99.3	1,100	1,199	26,300	*
	8-hour	1	9.4	770	779	10,000	*

Note: [1] See Table IV-4.
[2] Source: Coenenberg 1992 and Urone 1976.
* No ambient PSD increment established by EPA.

To minimize fugitive dust emissions, a water spray system would be installed on the access roads and the coal stockpile (see Roads and Railroads, Appendix A). Coal would be transferred out of the pile by belt-conveyor through a reclaim tunnel. A flexible chute would help control coal dust emissions as the coal fell into rail cars. After the 2-year period of loadout use, pollutant concentrations would return to previous levels.

TABLE IV-4

Location of Air Quality Monitoring Receptors Shown in TABLE IV-3

Receptor Identification	Map Description
1	About 700 feet west of the center of the proposed loadout facility, near Northern Avenue.
2	About 650 feet southwest of the center of the proposed loadout facility, near the grain elevator.
3	About 1000 feet northeast of the center of the proposed loadout facility near the Heath Street intersection.

The Agency concludes that impacts to air quality in and around the Huntley area from construction, operation, and reclamation of the Huntley loadout would be minor over the short term and negligible over the long term.

3. Geology

a. Impacts to the stability of slopes and sandstone cliffs in and around the life-of-mine area from mining-related subsidence.

Effects of subsidence from the proposed longwall mining in the Bull Mountains can be described by 3 impact zones (Appendix C). The fragmented zone, which would fracture and collapse, is expected to begin immediately above the active mining area and extend up to 140 feet above that area. The next zone, the fractured zone, is expected to extend 400 to 600 feet above the fragmented zone and would fracture and deform. The deformation zone extends upward from the fractured zone to the surface. In the deformation zone, the ground would be expected to deform without fracturing; cracks could develop at the surface. Most surface cracks are expected to weather and close during the first 2 years following subsidence.

Surface effects of subsidence depend on characteristics of the overburden as well as depth of mining below the surface, height of coal seam removed, mine layout, and mining direction. Meridian proposes to remove 13.5 feet of coal, and maximum subsidence is predicted to be 9.5 feet (Agapito and Maleki 1989; Allgaier 1988). The trough of subsidence (see Figure C-3) predicted for the proposed

mining area would be deepest at its center, graduating to little or no subsidence at the ultimate boundary of coal removal.

Throughout a particular subsidence trough, slope failures and toppling of sandstone cliffs may occur. Slope instability and failure, rock toppling, and alteration to topography and drainage patterns have the greatest potential to occur where steep slopes, weathered materials, and unstable structural conditions exist over the subsidence trough.

Subsidence-related failures would accelerate the slower, natural processes of weathering, erosion, sloughing, and toppling in the area. Where mountains and hills overlie mining, and overburden is thick, surface effects of subsidence would be expected to be most evident at the bases and edges of steep slopes. Eventually, slopes would stabilize and natural conditions would determine the extent to which toppling and sloughing would occur in the future.

The Agency concludes that impacts to the stability of slopes and sandstone cliffs in and around the life-of-mine area from mining-related subsidence would be minor over the short term and negligible over the long term.

4. Topography

a. Impacts to topography of the surface facility complex from construction, mining, and reclamation activities.

Activities associated with construction and operation of the Project would impact the landscape and topography of the life-of-mine area. Elevations in a portion of the area of the existing PM Mine, near the portal, would rise about 60 feet as the result of backfilling and grading the existing open pit high wall. In the main facilities area, postmining topography eventually would be similar to adjacent premining topography. Flat areas expanded during mining would have runoff controlled through sediment ponds. Planned reclamation would restore the main facilities area and roads to approximate original elevations and contours, while maintaining topographic diversity (see Waste Disposal Area, Appendix A).

Filling the waste disposal area (WDA) would change the existing valley into a gentler mountain slope (see figures A-10 and A-11, Appendix A). Postmining topography in the WDA would rise from 0 to 140 feet as a result of filling from mining activities. Slopes, slope construction, and revegetation would be designed for maximum stability and the new drainages, channels, and floodplains in the WDA would be designed to pass runoff at velocities that would not cause erosion (see Storm Water and Sediment Control Facilities, Appendix A). During filling, topography would be interrupted by abrupt benches and incomplete slopes as the waste material was deposited and compacted. After filling, some benches would still be present on the face but postmining topography would generally blend with adjacent undisturbed topography.

The Agency concludes that impacts to topography of the surface facility complex from construction, mining, and reclamation activities would be moderate to major over the short term and

minor to negligible over the long term. In the WDA, there would be an irretrievable loss of topographical diversity.

b. Impacts to topography in and around the life-of-mine area from mining-related subsidence.

Mining-related subsidence has the greatest potential to alter drainage patterns and impact slope stability where steep slopes, weathered materials, and unstable geotechnical conditions overlie the subsidence trough. The lowering of ground surface, sloughing of slopes, and related filling of drainages and alteration of drainage patterns, would be most evident around the bases of hills and mountains. Sloughing of slopes related to subsidence, and resulting changes, are an acceleration of natural topographic change in the life-of-mine area.

The Agency concludes that impacts to topography in and around the life-of-mine area from mining-related subsidence would be minor over the short term and negligible over the long term.

c. Impacts to topography along the rail spur from construction and reclamation activities.

Construction of the proposed 33-mile rail spur would introduce a permanent change in topography along the majority of the 150- to 500-foot wide right-of-way. Extensive cuts-and-fills would be necessary to meet the needs of the design grade. In addition to the elevated railbed, numerous road crossings, road relocations, and bridges would impact local topography during mine operation.

During proposed reclamation, rail ties and ballast would be removed, and the railbed would be abandoned in place throughout much of the 33-mile length. The abandoned, elevated railbed, steep side slopes, and extensive cut-and-fill slopes would permanently change topography along the rail spur right-of-way except on State-owned parcels. Existing gentle slopes and terrain would be changed to include the abrupt profile of the railbed and road crossings.

The Agency concludes that impacts to topography along the rail spur from construction and reclamation activities would be moderate over both the short and long terms.

5. Soils

a. Impacts to soil productivity in areas of mining-related surface disturbance.

Surface disturbances related to proposed mining and associated activities have the potential to change the productivity of disturbed soils in the life-of-mine area, and the locations of ancillary facilities, including the Huntley loadout. Productivity of topsoils and subsoils that are stripped and stockpiled may be altered. Soil structure and horizonation would be altered to a certain extent as a result of soil salvage and redistribution activities. However, a two-lift soil salvage and redistribution method would be used to segregate topsoil and subsoil materials. This soil handling methodology minimizes mixing of surficial and subsurface horizons and, as such, reduces dilution of surface horizon organic matter and essential nutrient concentrations.

Soil compaction may result from scraper laydown of soil materials, but this problem should be alleviated by scarification of the reconstructed soil profile using a tillage implement (i.e., subsoiler). Stockpiling of soil materials may, in the long term, reduce soil micro-organism populations, soil fertility, and viable plant propagules. However, following soil replacement, the former will rejuvenate within a few years and the latter two problems will be overcome by seeding, shrub/tree seedling planting, and applying straw mulch to enhance soil organic matter content.

Following soil laydown, erosion hazard may be enhanced on steeper slopes until vegetation has been established. However, erosion would be reduced by conducting seedbed preparation activities on the contour, seeding within 90 days after soil laydown, and straw mulching and crimping steeper slopes.

Within the life-of-mine area, and the area to be reclaimed at the Huntley loadout, revegetation success would be enhanced by mulching, fertilization, pest control, access control, seedbed preparation, and appropriate soil replacement technique. Multiple vegetation communities are planned for revegetation. Erosion control measures, and reseeding plans would be implemented if necessary. Unsuitable material from the spoil would be segregated by special handling during placement in the WDA (see Backfilling (Special Handling), Appendix A).

Along the rail spur right-of-way, topsoil would be re-spread and an improved pasture vegetation seed mix would be used between the fire control barrier and right-of-way edge immediately following construction. The compacted subsoils and abrupt slope of this area would limit soil productivity and reduce expected revegetation success. During abandonment the area directly under the track ballast would be reseeded but would not be reclaimed, except on State-owned parcels, and the productivity of this 60 acres would be permanently reduced. Extreme compaction and reduction or loss in nutrient content and biological activity of soils in this area would limit natural revegetation success (see Topsoil Replacement, Appendix A).

The Agency concludes that impacts to soil productivity in areas of mining-related surface disturbance would be moderate to major over the short term and minor over the long term. Productivity losses under the track ballast would be irretrievable.

6. Hydrology

a. Impacts to ground and surface water supplies in and around the life-of-mine area from mining and mining-related subsidence.

Aspects of the mining operations that have the greatest potential to impact ground water supplies in and around the life-of-mine area include mine dewatering and removal of coal hydrologic units (see Figure IV-1). The Mammoth coal and saturated zones immediately above would be impacted during mining from removal and dewatering. The drawdown would extend furthest in the sandstone unit above the Mammoth coal but due to low permeability and relatively low hydraulic gradient, the drawdown would not extend far beyond the life-of-mine area. Five private wells using this aquifer have a high probability of being destroyed or removed by mining and related dewatering. Two private wells may have their productivity decreased by mining and related dewatering. In addition, the mining operation would reduce recharge to the upper underburden, the zone in the first 30 feet below the bottom of the

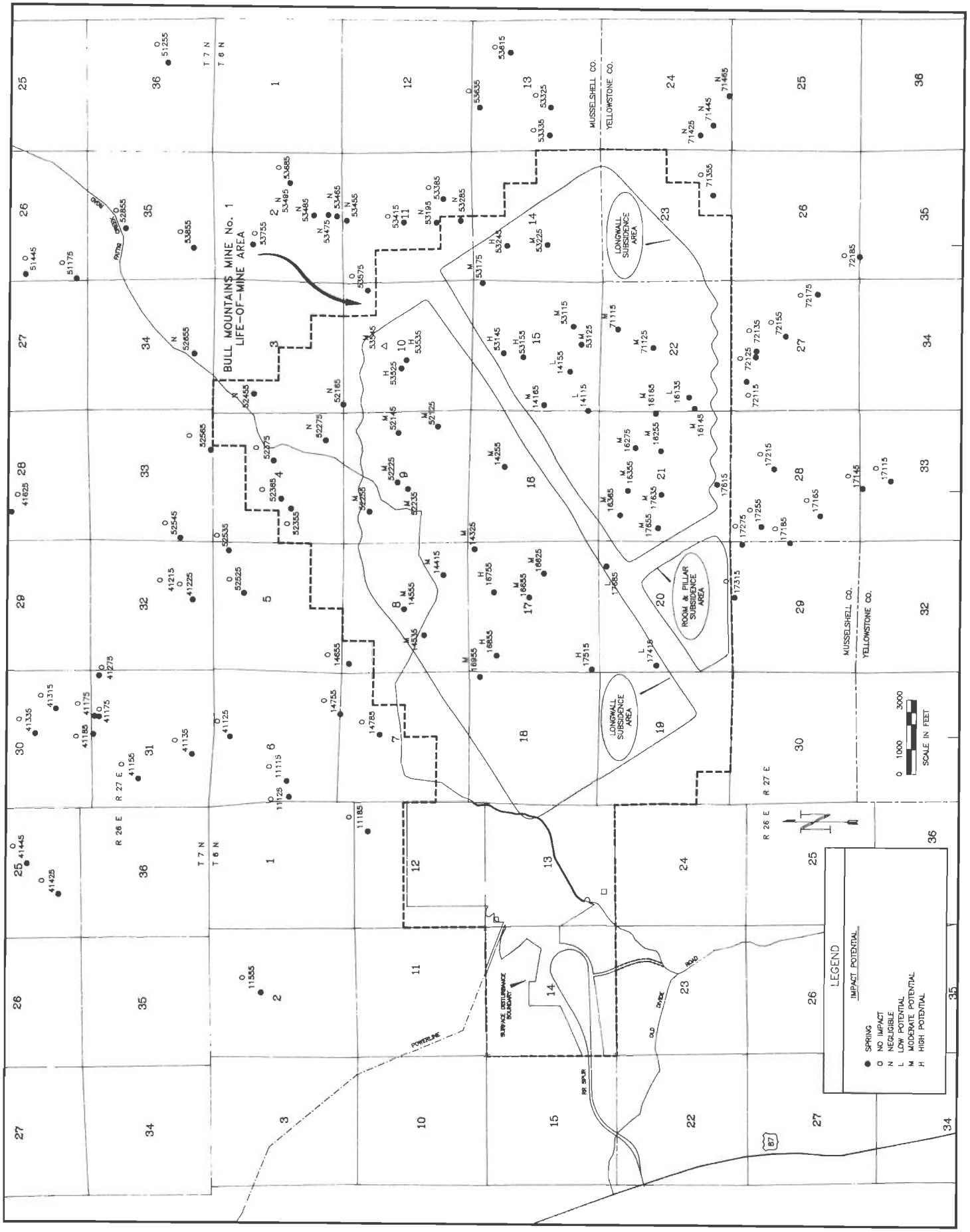


Figure IV-1 Potential for impacts to springs

Mammoth coal. The zone has low permeability and the extent of impact should be limited. In 5 years, the extent of a 5-foot drawdown could be less than 2 miles. The mining operation would have minimal impact on the deeper underburden zone. After mining, flooding of lower workings would be allowed and filling of the mine pool would occur. Rate of pool rise should taper off due to seepage, and heads should eventually stabilize at the portal level, about 50 feet below the premining levels, and discharge into PM Draw. The mine pool should stabilize at the portal level as a result of seepage and portal discharge and should act as a permanent sink for area ground water.

Mining-related subsidence has the potential to impact ground water systems in the overburden. Water-bearing units would be affected to varying degrees depending on structural, locational, and mining-specific variables. Permeability increases and lowered water tables may be experienced as tensional stresses open cracks and fractures and accentuate the flow of water. Some changes in recharge and flow characteristics would be permanent. Following the initial deformation of subsidence, ultimate settlement would tend to compress tensile fracture widths to some extent and partial recovery of premining hydrologic conditions can be anticipated (Booth 1986 and 1992; Van Roosendaal et al. 1990).

While a single summarizing impact to the overall hydrologic balance of the life-of-mine area is difficult to predict, it is clear that shallow fractured bedrock and alluvial ground water systems that feed springs and seeps have the potential to be disrupted. The discharge of ground water from these systems to springs and seeps and ultimately through the tributary drainages could be diminished, lost, or relocated over the short and long terms. The possible disruption of flow through the tributary drainages could affect the potential alluvial valley floors (AVFs) in Rehder, Fattig, and Railroad creeks.

Hydrologic mitigation plans are proposed to ensure that quantities of ground and surface water would be replaced, and water rights protected, in and around the life-of-mine area. Water supplies would be replaced for landowners that would lose all or part of their water as a result of mining operations. Mitigation plans are proposed for springs and seeps that provide water for wildlife, livestock, and wetland plant communities and aquatic life. Specific plans propose implementable alternatives for mitigating losses to the springs and seeps having the highest potential for impact. Specific mitigation plans (see Table A-3, Appendix A) have been proposed for 42 springs (including Red Fork, Busse, Dunn Corner, Cold Water, Litsky, and Big). The remaining 88 springs in and around the life-of-mine area are not believed to be at substantial risk but would be monitored and appropriate mitigation implemented if mining-related impacts were detected (see tables III-3 and E-8, Appendix E). Tributary drainages to the potential AVFs and mine pool discharge would be monitored as well. Mitigation plans include phases that: 1) provide an interim water supply to impacted spring sites; 2) attempt to repair and enhance the natural restoration of impacted spring sites; and 3) if necessary, provide a permanent replacement or supplemental water source. Mitigation plans would ensure the maintenance of hydrologic functions for the potential AVFs. Mitigation techniques would include fracture sealing and flow rerouting, and using culverts and channel lining, where appropriate.

The potential for the success of hydrologic mitigation could be enhanced by planning flexibility. If natural restoration enhancement or low maintenance techniques were not successful, water would be replaced by wells and distribution systems. There may be short periods between mitigation phases or steps where water may not be available. When mitigation activities were complete, dependable supplies would be available. Mitigation systems could supply flows of water that could be slightly more or less

than a particular spring previously discharged. Mitigation systems would have the potential to provide water for longer durations during the year than springs naturally provided. Replacement water supplies may, however, limit the water available to wildlife, change the quality and character of wetlands and limit water availability for future, competing uses. Mitigation systems would remain as long as needed after mine closure with maintenance supported by a financial trust established under the supervision of Montana DSL for permanent maintenance and operation of hydrologic mitigation facilities (see Hydrologic Mitigation, Appendix A).

The Agency concludes that impacts to ground and surface water supplies in and around the life-of-mine area from mining and mining-related subsidence would be minor to moderate over the short and long terms.

b. Impacts to water quality in and around the life-of-mine area from mining and mining-related subsidence.

Subsidence from longwall mining would have the potential to impact ground and surface water quality. Within the Bull Mountains area, ground water is of a quality marginally suitable and not recommended for direct human consumption due to high levels of inorganic (mineral) constituents including sulfate. Where surface water is the result of ground water discharging to springs and seeps, it is also not recommended for human drinking water. Subsidence from longwall coal mining would have the potential to increase levels of the same inorganic contaminants that currently limit the suitability of water for various uses . Concentrations of other ions may be increased as well.

As subsidence cracks and deforms rock layers that overlie mine workings, new rock faces are exposed to physical and chemical processes that occur where air and water can penetrate. The rock faces expose new minerals to ground water percolating through the fractures. These minerals can then be dissolved by the water, increasing the water's mineral content. This increase is generally offset by corresponding increases in percolation rates. The same subsidence forces and related fracturing that expose new mineral sources to ground water provide the means for that ground water to move through rock layers more quickly. Since ground water has more and wider fractures through which to move, the time that ground water remains in contact with a rock layer as it percolates through the layer is reduced. If ground water percolates more quickly, the ability of ground water to dissolve minerals may decrease.

Subsidence is not predicted to have a very large impact on concentrations of inorganic constituents in ground or surface water. Concentrations of inorganic constituents in postmining ground and surface water should remain at or near premining levels and water would continue to be suitable for wildlife, agricultural, and livestock uses (Thompson 1982; Reiten and Wheaton 1989).

The Agency concludes that impacts to water quality from mining and mining related-subsidence would be negligible to minor over the short and long terms.

c. Impacts to ground water quality and quantity in and around the life-of-mine area from mining and mining-related operation of wells.

Wells for potable water supplies, mining operations, and hydrologic mitigation plan requirements would be operated in the life-of-mine area.

Four existing wells, less than 200 feet deep in the Fort Union formation, would supply the potable water system within the surface facility complex. The wells would pump water to a treatment system and storage tank (see Ancillary Facilities, Appendix A). The predicted effect of operating potable supply system wells would be limited to minimal drawdown during operation. Test-pumping one of the wells at 5 gallons per minute (gpm) for 4 days resulted in no measurable change in other nearby wells. The wells would be plugged and sealed during reclamation.

Two wells (1 operational, 1 standby) would be designed to pump about 500 gpm from a depth of 8,000 feet in the Madison formation to supply water for coal preparation (see Wells, Appendix A). Estimated drawdown at 10 miles from the site, based on well head calculations, would be about 0.4 percent of the available head (U.S. Geological Survey 1979). Since there are no other wells extracting water from the Madison formation in the vicinity of the mine, impacts on ground water supplies from operating the deep wells would be limited to short-term drawdown or head loss, which should be minimal. The quality of surface and ground water downgradient from the coal preparation operations could be affected by the discharge of the brackish water pumped from the Madison Formation. The 2 wells would be plugged and sealed during reclamation.

Hydrologic mitigation activities (see Hydrologic Mitigation, Appendix A) include 2 shallow wells and 2 deep wells. The 2 shallow wells would be installed to replace disrupted spring flow where horizontal drains may not be effective due to access or topographical barriers or where the adjacent shallow ground water system had been dewatered. The shallow wells would penetrate the shallow fractured and weathered bedrock at 50 to 100 feet and would be pumped by windmills. The shallow wells would pump small quantities of ground water at variable rates to permanent storage and delivery systems. The wells would remain after mine closure. Maintenance would be supported by a permanent trust fund. The limited withdrawals should have no predictable effect on ground water supplies in the shallow aquifer system.

The 2 deep wells would be installed in those areas where subsidence-related fracturing is predicted to completely dewater the shallow ground water system. The deep wells are planned to penetrate deep underburden sandstone below the Mammoth coal seam. The 600- to 700-foot deep wells would be equipped with electric pumps for discharging water to permanent storage and delivery systems. Sustained yields between 10 and 14 gpm could be expected. Drawdowns, 2 miles from the well, are predicted to be between 13 and 50 feet which accounts for between 6 and 23 percent of the available 220-foot head. With no other known wells completed in the same formation, there is no potential for the deep hydrologic replacement wells to affect supplies for other uses. The wells would remain after the mine closed with maintenance supported by a permanent trust fund (see Hydrologic Mitigation, Appendix A). The effect of operating the deep replacement wells would be limited to the lowering of head.

The Agency concludes that impacts to ground water quality and quantity in the life-of-mine area from mining and mining-related operation of wells would be minor over the short term and negligible over the long term.

d. Impacts to ground and surface water quality in sections 12 and 13 from mine waste disposal.

Mine waste would be disposed of in the WDA. About 19,000,000 tons of waste would be spread over an underdrain of non-slaking rock with side drains that directed flows to the underdrain for discharge. The drain system would control the discharge of and to ground water in the vicinity of the WDA. Waste material would be spread on the WDA in maximum 2-foot lifts and compacted to 90 percent dry density (90 percent of maximum density at optimal moisture conditions) . Coal processing waste would be air-dried prior to compaction. Topsoil would be respread and the surface revegetated when final elevations had been reached. Diversion channels and sedimentation ponds would contain runoff from the WDA while under construction and until permanent vegetation had been re-established. Diversion channels in the WDA and sedimentation pond WDA would be designed to accommodate a 100-year/24-hour runoff event. There should be little or no potential for discharge of soluble or suspended waste constituents during construction or after completion of the WDA. However, if water that has percolated through the waste and accumulated soluble constituents were discharged to downgradient surface water and ground water, downgradient water quality would be impacted.

The Agency concludes that impacts to ground and surface water quality in sections 12 and 13 from mine waste disposal would be negligible to minor over the short and long terms.

e. Impacts to ground water quality in the Huntley area from loadout operation.

Dust control, runoff from stockpiled coal, and operations at Huntley loadout would produce runoff water with high amounts of suspended and dissolved solids. Runoff from operations and rainfall is currently directed to a lined sediment pond on the loadout site (see Appendix B). Directing runoff to the lined pond would continue to prevent large quantities of water from standing on the soil surface, infiltrating into the soil, and percolating toward ground water during proposed operations. Small quantities of runoff and precipitation would evaporate from the soils in the area. Coal waste and other materials are not expected to contaminate ground water in the loadout area. They would be collected in the pond and removed to the WDA during reclamation or as needed.

The Agency concludes that impacts to ground water quality in the Huntley area from the loadout operation would be negligible over the short and long terms.

f. Impacts to alluvial ground water supplies in the Huntley area from the water supply well at the loadout.

The water supply well at the Huntley loadout site was installed by Meridian in 1990 to supply water for dust control and operations purposes. The 20-foot well is installed in alluvial gravel that is characterized by sand and gravel mixed with very large cobbles. Assuming permeabilities in the mid-range characteristic of such aquifer materials (Freeze and Cherry 1949), the proposed pumping rate of

about 20 gpm would create minimal drawdown as close as 1,000 feet from the well. The well is proposed to remain operational after Meridian's use of the loadout. Future operations should not extend drawdown effects beyond those predicted for Meridian's use.

The Agency concludes that impacts to alluvial ground water supplies in the Huntley area from the water supply well at the loadout would be negligible over the short and long terms.

7. Vegetation

a. Impacts to wetland communities in and around the life-of-mine area from mining-related subsidence.

Up to 9 acres of wetland communities could be disrupted by subsidence, reducing or eliminating critical ground water recharge to some of the springs and seeps in the area (Meridian Minerals Company 1989-1992). Not all sites making up the 9 acres would be completely disrupted. Impacts could range from short, intermittent, and temporary disruptions to total and permanent disruption, depending on the extent of subsidence at each location. Of the 5 springs having a high importance to vegetative communities, 3 are predicted to undergo a major impact from subsidence and 2 are predicted to sustain subsidence-induced impacts that have the potential to become major. Of the 4 springs with moderate importance to vegetative communities, 1 has been predicted to undergo a major impact from subsidence and 1 has been predicted to sustain an impact that has the potential to become major (see Table E-8, Appendix E).

Some wetland communities may be temporarily disrupted, with effects being similar to naturally-occurring drought or intermittent rather than continuous flow.

Upon complete loss of water at some affected sites, competitive relationships among plants could cause changes in community composition, with "dry-land" species replacing wetland species. Aggressive species, especially weeds, could initially flourish in those limited areas where moisture conditions and soil stability were extensively disturbed by subsidence.

Wetland communities permanently disrupted by subsidence would be replaced with alternative, consistent water sources, concurrent with planting of native wetland species (see Revegetation Operations, Appendix A). Natural revegetation would also begin immediately, principally from wind dispersion of the reproductive mechanisms of native wetland species. In some cases, an impacted wetland site that contains a depression might trap adequate precipitation moisture to maintain some of the previously existing wetland species.

Replaced wetland communities should be able to provide habitat diversity and function very similarly to original wetland communities within 2 to 5 years.

The cumulative 9 acres of disturbed wetlands represent a very small proportion of the life-of-mine area, less than 0.1 percent, but comprise a moderate proportion of existing life-of-mine area wetland communities (Meridian Minerals Company 1989-1992). However, existing sites would be affected gradually, over mine life, thus the impact at any given time should be minimal.

The Agency concludes that impacts to wetland communities in and around the life-of-mine area from mining-related subsidence would be moderate over the short term and minor over the long term.

b. Impacts to wetland communities along the rail spur from construction, operation, and reclamation activities.

Direct excavation and filling, eliminating most or all of the vegetation and disrupting the soil, would temporarily disrupt up to 1 acre of wetland community during rail spur construction (ECON INC. 1992b). The wetland acreage impacted would be a very small proportion of the land area bisected by the proposed rail spur.

To mitigate the 1-acre wetland disruption, depressions along the right-of-way borrow area would be created, forming more than 1 acre of new wetlands (see Revegetation Operations, Appendix A). Although right-of-way postconstruction seeding would not include wetland species, those species should establish in newly wet areas rather quickly (carried by the wind and in bird and animal droppings). The new wetland communities should be similar in composition and function to the disrupted community within 2 to 5 years.

The Agency concludes that impacts to wetland communities along the rail spur from construction, operation, and reclamation activities would be minor over the short term and negligible over the long term.

c. Impacts to vegetative productivity and community stability along the powerline easement and the rail spur from mining-related disturbance.

Disturbance along the powerline easement would have a small, temporary impact on vegetation productivity and stability. During construction, surface disturbance would cause temporary localized plant community instability, characterized by invasion of weedy plants. Where noxious weeds (spotted knapweed and Canada thistle) invaded, control measures would be used. The rhizomatous native grass species dominating the plant communities of the easement are resistant to disturbance and are strong soil stabilizers (ECON INC. 1991a).

Plant community disturbance within the rail spur right-of-way would be extensive during construction, particularly in cut-and-fill sections. The low productive potential of some soils would limit reclamation success on the western portion of the right-of-way.

Graded slopes between the fire control barrier and the edge of the right-of-way would be seeded immediately after rail spur construction. At the conclusion of rail use, the rails, ties and ballast would be salvaged and the base grade of the rail spur would be seeded with the improved pasture vegetation type seed mix and abandoned in place, except on State-owned parcels (see Revegetation Operations and Table A-2, Appendix A). The proposed treatments should provide long-term stabilization and productivity outside the fire barriers. The top of the abandoned roadbed may support a desirable plant community with stable but lower productivity in 10 to 15 years after abandonment. Introduced crested wheatgrass used to seed the roadbed should have no effect on the species composition of adjacent vegetation communities.

The Agency concludes that impacts to vegetative productivity and community stability along the powerline easement and rail spur from mining-related disturbance would be moderate to major over the short term, depending upon the success of the revegetation and the intensity of the uncontrolled weed invasion, and negligible over the long term. The loss of vegetation productivity until re-establishment by successful reclamation would be irretrievable.

d. Impacts to vegetative productivity and community stability within the surface facility complex and the Huntley loadout from mining-related disturbance.

Proposed mining-related activities would result in up to 871 acres being disturbed, of which 101 are already disturbed by the PM Mine. The disturbance would cause impacts to vegetation productivity and community stability within the surface facility complex. Impacts would occur from displacement of soils and vegetation during construction and operation activities. Weedy plants would accompany disturbance and could include noxious species, such as spotted knapweed, that could persist throughout mine life.

Proposed reclamation would return a number of grass-dominated plant communities to the area (see Revegetation Operations, Appendix A). Productivity and stability would be restored within 2 to 5 years to equal or exceed that of premining communities, although plant diversity could be reduced from premining levels.

Small stands of ponderosa pine community would be destroyed in the 170 acres making up the WDA portion of the surface facility complex. However, the ponderosa pine community is the most extensive vegetation community in the area and the affected acreage would constitute a small percentage of the type. The impact would be mitigated over time by reclamation planting of juvenile ponderosa pine (see Revegetation Operations, Appendix A).

The Huntley coal loadout would be cleaned up at the conclusion of coal-loading use. The sediment pond would be allowed to evaporate, and the sediment and liner along with any remaining coal waste would be removed to the WDA and buried. The pond site would be backfilled with the original soil and seeded (see Topsoil Replacement and Revegetation Operations, Appendix A). Vegetation establishment on the former pond site should be accomplished in 2 years if the site was not disturbed for some new commercial use.

The Agency concludes that impacts to vegetative productivity and community stability within the surface facility complex and Huntley loadout from mining-related disturbance would be moderate in the short term and negligible in the long term. The loss of vegetation productivity until successful re-establishment by reclamation would be irretrievable.

8. Wildlife

a. Impacts to tree- and cavity-nesting birds in and around the life-of-mine area from mining-related subsidence.

Most obligate cavity-nesting birds found in the area are small (e.g., woodpeckers, swallows, bluebirds, wrens) and make use of a variety of cavities in trees, rock cliffs, and earth banks. The 1984, wildfire swept through much of the Bull Mountains, creating an abundance of snags and potential cavities for small-bird nesting. Larger species such as prairie falcons, turkey vultures, and great horned owls have fewer options and for the most part are restricted to cavities found in rock outcrops. Other raptors nest in trees, large shrubs and on hill sides, all of which are plentiful in the area.

Subsidence could cause some trees and snags to fall, earth banks to fail, and rock cliffs to collapse. Home ranges of large cavity-nesting birds are large enough to allow them to take advantage of the abundant rock outcrop habitat available elsewhere. Subsidence would be more likely to create than destroy rock outcrop cavities. As reclamation progressed, rock piles as large as 1,000 square feet would be established at a density of about 10 to 15 piles per 640 acres (see Wildlife Habitat, Appendix A).

The Agency concludes that impacts to tree- and cavity-nesting birds in and around the life-of-mine area from mining-related subsidence would be minor over the short term and negligible over the long term.

b. Impacts to sharp-tailed grouse nesting and brood-rearing habitat, turkey-roosting habitat, and mule deer winter range from construction, operation and reclamation of the waste disposal area (WDA).

The WDA would fill a drainage that has timbered slopes and grassland valley floor representing a small proportion of the ponderosa pine-mixed grassland community in the life-of-mine area (Meridian Minerals Company 1989-1992). The WDA would be unavailable to most wildlife species during construction and use. As mature ponderosa pine were gradually removed from WDA slopes, turkey-roosting habitat would be reduced. As the drainage was filled, activity could temporarily displace turkey use of the WDA. Nesting and brood-rearing habitat for sharp-tailed grouse would be temporarily displaced to adjacent undisturbed ponderosa pine-mixed grassland habitat during construction. Construction and operation of the WDA would temporarily reduce deer utilization, especially during winter.

Similar topography and vegetation is available in adjacent drainages, well within the radius of daily sharp-tailed grouse, wild turkey, and mule deer activity. Reclamation plans call for restoring similar vegetation components and functions, but with some area and distribution differences. For example, final reclamation would restore some but not all of the timbered slopes present before construction of the WDA. Initial reclamation would include planting of trees and grassland with the shrub component left to natural invasion (see Revegetation Operations, Appendix A). As reclamation progressed, sharp-tailed grouse, turkeys and deer would likely be attracted to the area as a forb component became an important ingredient of early reclamation efforts. Initial plant communities with

stands of forbs and grasses could enhance both nesting and brood rearing for sharp-tailed grouse, and food for turkeys and deer, and at maturation be as functional for those purposes as the original habitat.

The Agency concludes that impacts to sharp-tailed grouse nesting and brood-rearing habitat, turkey-roosting habitat, and mule deer winter range from construction, operation, and reclamation of the WDA would be minor over the short term and negligible over the long term.

c. Impacts to elk, deer, and antelope in the Bull Mountains area from increased human activity and development associated with mining-related activity.

Elk are not numerous in the Bull Mountains (92-100) and are probably maintained at a tolerance level established by landowners (Dusek 1978; Meridian Minerals Company 1989-1992). As human activities (e.g., mining, subdivision) increased, elk would redistribute their activities for avoidance when possible. Spreading subdivision, and adding more people, dogs, and livestock to adjacent elk habitat may have a greater impact on elk distribution than mining. When human activities increased to the point where adequate isolation for elk would be unavailable, elk numbers should decrease.

Mule deer appear more tolerant of human activity than elk, may compete less directly with domestic livestock, and are more numerous than elk in the Bull Mountains. Deer are observed commonly near ranches and in the vicinity of the current mining activity at the PM Mine. Antelope in the area are seasonal, moving out of the Bull Mountains onto Commanche and Hay basins during the winter. Much of the summer use by antelope is associated with agriculture. Antelope are apt to be influenced favorably by initial rail spur-reclamation planting communities.

Poaching levels in the Bull Mountains area are now considered "very low" but would be expected to increase somewhat with more human contact associated with Project development (Roger Fliger, Montana Department of Fish, Wildlife and Parks, personal communication, March 9, 1992).

The Agency concludes that impacts to elk, deer, and antelope in the Bull Mountains area from increased human activity and development associated with mining-related activity would be minor over the short term and negligible over the long term.

d. Impacts to wildlife productivity within the life-of-mine area from mining-related subsidence.

Gradual subsidence-caused changes that could temporarily influence the seasonal distribution of elk, deer, and other wildlife include topography, vegetation, and water availability. Water resources at 42 of the 130 existing springs and seeps in the Bull Mountains area could be disrupted by mining-related subsidence (see Hydrologic Mitigation and Table A-3, Appendix A). Of the 8 springs having a high importance to wildlife, 3 are predicted to undergo a major impact from subsidence and 3 are predicted to sustain subsidence-induced impacts that have the potential to become major. Of the 16 springs with moderate importance to wildlife communities, none have been predicted to undergo a major impact from subsidence and 6 have been predicted to sustain an impact that has the potential to become major (see Table E-8, Appendix E).

It is unlikely that subsidence would be perfectly uniform. Resultant topographic and vegetation changes could provide somewhat greater habitat diversity than currently exists. Changes in ground configuration could cause exposure of mineral soil, which could result in greater vegetative diversity. Animal den sites could be disturbed and created. Most wildlife species are accustomed to irregular ground surface, so "accidents" as a result of subsidence are not likely.

Water resources disrupted by subsidence would be replaced by various methods such as optimizing water retention, pond development, spring renovation, water distribution system development, repair of shallow fractures, horizontal drains, vertical wells, and guzzlers. In the interim between disruption and mitigation, rapid response methods to assure a continuous water supply would include hauling water to temporary or existing stock tanks (see Interim Water Supply, Appendix A). Wetland enhancement of 9 acres outside the life-of-mine area would provide additional mitigation for wetlands being temporarily or permanently disrupted. The provision of assured permanent water sources by reclamation would allow wildlife distribution to approximate present conditions.

Shallow fractured bedrock and alluvial ground water systems that feed springs and seeps have the potential to be disrupted by several aspects of mine construction and operation. The discharge of ground water from these systems to springs and seeps would be diminished, lost, or relocated over the short and long terms. Disruption of water supply may affect up to 15 acres of wetlands to varying degrees. Impacts may range from temporary disruption with effects being similar to naturally-occurring drought or intermittent water supply, to complete loss of water, (and aquatic habitat) at some affected sites. Aquatic animal communities would be correspondingly affected. Complete loss of water to an aquatic habitat would result in the loss of the associated animal community. Impacts could range from short, intermittent, and temporary disruptions to total and permanent disruption, depending on the extent of subsidence expression at each location. Potential effects include shifts in invertebrate community structure, with species tolerant of disturbed situations becoming more competitive; loss of some less tolerant species; and concentration of aquatic animals, increasing competition for food in an already stressed aquatic system. Larger, more mobile aquatic species may be displaced to surrounding unaffected habitats, depending on their availability. Of the 4 springs having a high importance to aquatic animal communities, 2 are predicted to undergo a major impact from subsidence and 2 are predicted to sustain subsidence-induced impacts that have the potential to become major. Of the 7 springs with moderate importance to aquatic animal communities, 2 have been predicted to undergo a major impact from subsidence and 2 have been predicted to sustain an impact that has the potential to become major (see Table E-8, Appendix E).

Specific mitigation plans (see Table A-3, Appendix A) have been proposed for 42 springs. The remaining 88 springs are not believed to be at substantial risk but would be monitored and appropriate mitigation applied if mining-related impacts were detected (see Table E-8, Appendix E). Aquatic animals would be expected to colonize mitigation sites and replaced wetland communities should be able to provide values and functions similar to original wetland communities within 5 years.

The Agency concludes that impacts to wildlife productivity within the life-of-mine area from mining-related subsidence would be minor over the short term and negligible over the long term.

The Agency concludes that impacts to aquatic animals in the life-of-mine area from mining and mining-related subsidence would be minor to moderate over the short term and negligible over the long term.

9. Transportation

a. **Impacts to traffic flow and public safety along public highways from mining-related traffic.**

There would be more traffic on public highways in Musselshell and Yellowstone counties when the proposed coal mine began operation. Mine workers would drive from home to work, trucks would haul coal from the mine to the loadout at Huntley, and service-related vehicles would travel to the mine to deliver supplies and perform construction and maintenance operations at the mine.

The impact of mine worker and service-related traffic would last throughout the time of coal removal. Mine worker traffic would be added to U.S. Highway 87, Old Divide Road, and Fattig Creek Road. On an average day, 400 vehicle-trips could be added to these roadways. These trips would occur throughout the day with peak traffic at times when work-shift changes occurred. It is anticipated that there would be a small number of mine service-related vehicle trips during daytime hours.

Trucks hauling coal from the mine and returning to reload would add to the number of trucks traveling on roadways in the area during the 2-year operation of the Huntley loadout. Trucks would operate 24 hours a day at a rate of 4 trucks per hour (see Coal Transportation, Appendix A). This would add a maximum of 192 truck trips per day to the truck haul route. After construction of the proposed rail spur, coal hauling to the Huntley loadout would be discontinued.

The overall impact of mine-related traffic would be to add more vehicles to the area roadways, thereby lowering the Levels-of-Service (LOS) and potentially increasing the number of accidents. Increased exposure between mine-related traffic and school buses could increase the chance of an accident (Donald Cromer, personal communication May 4, 1989). All of the proposed coal trucks and mine-related traffic traveling to and from the Billings area would cross the pedestrian school crossing north of the U.S. Highway 87/Highway 312 intersection.

Coal trucks traveling at normal highway speeds could have some flying rock/coal coming from their loads. The loose material could distract a following or passing driver and cause loss of vehicle control. Excessive dust could obscure visibility. Covered loads, washed coal, and air foil windscreens proposed for the trucks would lessen the chance of flying rock/coal from the trucks.

Since there are no traffic signals at either the north or south Old Divide Road/U.S. Highway 87 intersections, all turning traffic from Old Divide Road onto U.S. Highway 87, and left-turning traffic from U.S. Highway 87 onto Old Divide Road must yield to through traffic on U.S. Highway 87. Mine-worker and service-related traffic could reduce the LOS of the 2 intersections since there would be more vehicles using the intersection and vehicles would wait longer to make turns onto or from U.S. Highway 87. A small number of worker and service-related vehicles could come from the north on Fattig Creek Road.

Coal trucks move slower and require more space and time to make a turn at intersections. They also need more time to accelerate to a normal travel speed from a stopped position. Since southbound trucks would leave Old Divide Road at the south intersection with U.S. Highway 87, they would be assisted in reaching normal travel speed by a slight downgrade. Coal trucks could lower the LOS of the Old Divide Road/U.S. Highway 87 intersection because vehicles would have to wait longer to make turns onto U.S. Highway 87 (Donald Dusek, personal communication, May 31, 1991).

At the Old Divide Road/ U.S. Highway 87 intersection, several factors could contribute to the accident rate: drivers waiting to make turns from Old Divide Road onto U.S. Highway 87 could become impatient and turn onto the highway in front of traffic on the road; because of a roadway curve and grade on U.S. Highway 87, drivers could misjudge the space and time needed to turn onto U.S. Highway 87; and drivers on U.S. Highway 87 might have to slow down for the mine-related turning traffic (Donald Dusek, personal communication, May 31, 1991).

Since coal trucks would slow to go up long, steep grades, and since passing zones are not available, the trucks would slow vehicles behind them. The reduction of speed, bunching of traffic into platoons, and inability to maneuver freely could lower the LOS on U.S. Highway 87. Two segments of U.S. Highway 87 could suffer a decrease in LOS from "B" to "C" due to roadway conditions and vertical grades. One segment starts at the Musselshell-Yellowstone county line and extends 2 miles south. The second segment begins 1 mile south of Old Divide Road intersection and extends 4.5 miles south. Overall, acceptable and stable traffic flow would continue to occur along U.S. Highway 87 with coal trucks causing occasional traffic speed reductions.

A greater percentage of trucks on the highway and trucks moving slower than other vehicles increases the chance of an accident (Donald Cromer, personal communication, March 21, 1989). Two other factors that could contribute to increased truck accidents are trucks' requirements for greater stopping distances, and hills that limit the sight distance for truck drivers. These factors become more important at night and during the winter months.

Reconstruction projects on U.S. Highway 87 would result in a better roadway surface, add stronger and better shoulders, and increase the traffic capacity and safety of the roadway. The increased traffic from mine workers, coal trucks and service-related vehicles would add congestion to the highway during the reconstruction projects. Vehicle stops, delays, and accidents while travelling through a highway work zone would be more frequent with the addition of more traffic. Coal trucks delayed at construction sites could then bunch together rather than being spaced at 15 minute intervals.

Most of the mine-worker and service-related traffic from the Billings area would travel through the U.S. Highway 87/Highway 312 intersection. This additional traffic would increase the vehicle delay and add to congestion at the intersection. The increase in vehicle delay and congestion should not reduce the LOS of this intersection.

Coal trucks traveling from the mine to Huntley could have a difficult time turning at the U.S. Highway 87/Highway 312 intersection (Donald Dusek, personal communication, May 31, 1991). The left turn from southbound to eastbound toward Huntley is greater than 90 degrees and must be made after a stop. Before turning, the coal trucks would need to wait for a gap in the through traffic on Highway

312. If the wait for a gap was long, trucks could begin the turn without enough time and space, impeding the eastbound and westbound through traffic. This slow maneuver by a fully-loaded truck could reduce the capacity and LOS of the intersection.

Coal trucks returning to the mine from Huntley would have a difficult right-turn maneuver from westbound to northbound at the U.S. Highway 87/Highway 312 intersection (Donald Dusek, personal communication, May 31, 1991). The path of the truck wheels might not stay within the width of the roadway and the truck tires could ride up onto the curb or track off the pavement onto the roadside. Trucks would make the turn at slower-than-normal speeds and could delay other traffic, thereby lowering the intersection's LOS.

Even though mine-worker and service-related trips would increase traffic on Highway 312, stable and acceptable traffic flow should be maintained. However, coal trucks would travel slower along Highway 312, especially near the U.S. Highway 87 intersection, and since there are no passing zones, the trucks could slow vehicles behind them, bunching traffic into platoons and restricting maneuverability on Highway 312. This increased vehicle delay and restriction of maneuverability should not qualitatively reduce the LOS of this intersection.

On Highway 312, accidents involving coal trucks could occur at a rate greater than for other vehicles, especially during the winter months (Donald Cromer, personal communication, March 21, 1989). This is because coal trucks may travel more slowly and require a greater distance to stop than other vehicles, take longer to turn, and to accelerate to normal travel speed.

The interaction of coal trucks with seasonal sugar beet and grain truck traffic in Huntley would be of short duration and would occur on roads with light traffic volumes.

The LOS of the Highway 312/Heath Street intersection and at the entrance to the loadout facility could be reduced because of the increased number of vehicles. The potential for accidents would increase with additional trucks approaching the intersections at the same time.

There are few residences on Heath Street in Huntley. Vehicle trips generated from these residences should create few conflicts between the proposed coal trucks going in and out of the loadout. With good sight distance in all directions, and coal trucks restricted to 15 MPH, accidents involving the coal trucks and cars traveling in the Heath Street area should be avoidable.

Because the rate of accidents rises with increases in traffic (American Association of State Highway and Transportation Officials 1990), more accidents would occur at all the intersections and on all roadways . Accidents should continue to occur at about the existing rate per million vehicle-miles.

The Agency concludes that the impact to traffic flow and public safety along public highways from mining-related traffic would be moderate with the potential to become significant during the 2 years the Huntley loadout is in operation. Impacts should be negligible over the long term.

b. Impacts to traffic flow and public safety on public and private roads between U.S. Highway 87 and Montana Route 3 from coal train traffic crossing roads.

Coal trains would delay traffic no longer than 10 minutes at the at-grade railroad crossings between the proposed mine and railroad siding south of Broadview (see The Bull Mountains Rail Spur, Appendix A). More vehicles would be stopped on those roadways with higher daily traffic volumes. Trains crossing County and State (Montana Route 3) highways would stop and delay the highest number of vehicles during peak periods of traffic.

When the trains crossed, vehicles would form a line. Traffic would resume after trains passed. The line of vehicles would temporarily lower the LOS, but would quickly disperse because daily traffic volumes are not high and the geometry of the roads is adequate.

The railroad crossing of Montana Route 3 would be located within a 6.5 mile area scheduled for reconstruction in 1995 (see Appendix B). The vehicle delays for construction could be increased because of the railroad crossing. The presence of the railroad crossing could lengthen the reconstruction schedule and increase construction costs.

Coal trains crossing County roads would create the potential for accidents. If sight distance was inadequate as drivers approached an at-grade crossing, there could be vehicle/train or vehicle/vehicle collisions. Sight distance would more likely be limited in areas where crossings occur in hilly terrain or where roadways are curved.

Exposure between traffic and coal trains would be small because trains would run infrequently and traffic would be low. Even with good sight distance, accidents could occur because of poor driver judgement and/or inattentive driving.

The Agency concludes that the impacts to traffic flow and public safety on public and private roads between U.S. Highway 87 and Montana Route 3 from coal train traffic crossing roads would be minor over the short term and negligible over the long term.

c. Impacts to the integrity/stability of County and State roads from trucking coal from the mine to the Huntley loadout.

The required thickness of roadway pavement is determined by the amount of traffic and number of heavy vehicles on the road. Roadway pavement has a limited life before it requires repaving or reconstruction.

Repeated trips of heavy vehicles on a roadway impact both the pavement surface and the pavement structure below the surface (Yoder 1975). Surface impacts include potholes, small pavement cracks and general wear and tear of the surface. Impacts to pavement structure result in large areas of pavement cracking, breakup of the pavement, dips in the road, or ruts in the wheel paths.

Coal trucks traveling to Huntley would carry loads with an average weight of 37.8 tons (see Coal Transportation, Appendix A). These trucks could accelerate the rate of damage to pavement surface and

shorten the life expectancy of the pavement structure. Pavement degradation would increase the need for and cost of maintenance and necessitate roadway reconstruction sooner than expected (Donald Cromer, personal communication, November 18, 1991).

Damage to the all-weather gravel surface on that portion of Fattig Creek Road used for mine access would also be accelerated. It could become rutted and develop potholes and dips in the surface, thus necessitating continual maintenance.

The pavement surface and structure of Old Divide Road would deteriorate faster from numerous heavy coal trucks. Resurfacing and reconstruction would be necessary sooner because the lifespan of the pavement would be reduced. Repair work would be necessary during coal hauling.

Coal trucks would accelerate wear and tear on U.S. Highway 87 and Highway 312, increasing the need for resurfacing and reconstruction of some segments (Donald Cromer, personal communication, November 18, 1991). U.S. Highway 87 would sustain the coal truck traffic better than Highway 312 because recent and proposed reconstruction projects would provide generally stronger pavement. Maintenance projects could be necessary during the hauling period, and road reconstruction could be required on Highway 312 sooner than expected.

Coal trucks would worsen existing pavement damage to Heath Street in Huntley. The pavement surface would break up especially at the intersection with Highway 312. Heath Street could require repaving during the coal hauling period.

The Agency concludes that impacts to the integrity/stability of County and State roads from trucking coal from the mine to the Huntley loadout would be major and significant over the short term and minor to moderate over the long term.

d. Impacts to the integrity/stability of County roads in the life-of-mine area from mining-related subsidence.

Mining activities could cause subsidence of Fattig Creek Road where it crosses the life-of-mine area. Subsidence would cause dips in the roadway and/or a weakened roadway structure. Subsidence would force slower vehicle travel because of uneven roadway surfaces. Heavy vehicles traveling on roadways weakened by subsidence could cause further settlement.

Poor road surface conditions would increase vehicle operating and maintenance costs. Weaker road surfaces and roadbed structure would require gross vehicle weight restrictions on the County roads.

An agreement with Musselshell County requires Meridian to repair any damage to Fattig Creek Road due to subsidence. Meridian would be responsible for temporary or permanent relocation of any sections of the road which could not be maintained in a satisfactory condition.

Subsidence could continue after mining activities stopped. However, without repeated use by heavy vehicles, the chance of roadway damage would be reduced.

The Agency concludes that impacts to the integrity/stability of County roads in the life-of-mine area from mining-related subsidence would be minor over the short term and negligible over the long term.

10. Noise

a. Impacts to the Bull Mountains area from noise generated by mining-related activity.

The subjective effects of noise on humans depends on a combination of physiological and behavioral traits. By nature, subjective effects are difficult to describe because different people react differently to noises. For example, a jet airplane flying overhead may disrupt a conversation between people and cause momentary hearing loss. One person might term this occurrence as extremely annoying, whereas another person may find it only a mild nuisance. Community reaction surveys have found that prolonged L_{dn} noise levels approaching or above 80 dBA generally disturb people enough that they take vigorous community action to try to reduce or eliminate the noise source.

During construction, the principal source of noise would be from operation of equipment. It was assumed that construction would occur only during the daytime. Noise levels in the vicinity of equipment would range from 80 to 90 dBA. Noise levels decrease with distance from the source. At 1,000 feet from the source, levels would be about 60 dBA while at 4,500 feet they would be at an acceptable level of about 51 dBA.

During the anticipated 24-hour a day mine operation, principal noise sources would be preparation plant equipment, ventilation fans, construction equipment, conveyors, dumping of coal into bins, trucks, and rail cars. The L_{dn} noise levels would range from 72 to 95 dBA in the vicinity of the main facilities. The L_{dn} noise levels would decrease and reach acceptable outdoor levels of about 40 dBA at the nearest residences (about 4,500 feet from the proposed mine site).

Occasionally, there would be blasting in the rock quarry. "Blast noise," in contrast to traffic noise, is impulsive, generally lasting less than 1 second, and has a rapid onset that can produce a "startle" effect. The noise level at a given location is a function of the source strength (charge weight), meteorological conditions, (e.g., temperature inversion, wind direction and speed) and distance to the observer. Blasting noise from the proposed quarry would probably be audible at the nearest residences as well as others within 1 to 2 miles.

Heavy equipment used at the mine would be well maintained and fitted with adequate mufflers to minimize noise levels. Also, loud stationary equipment would be partially or completely enclosed.

The Agency concludes that impacts to the Bull Mountains area from noise generated by mining-related activity would be minor over the short term and negligible over the long term.

b. Impacts along the rail spur from railroad construction and train-generated noise.

Railroad construction equipment would temporarily increase noise levels along the proposed rail spur. It was assumed that construction would occur only during daylight hours. Residences within 1,000 feet of the right-of-way would be subjected to acceptable outdoor noise levels of 55 to 60 dBA during construction. This impact would be temporary since, at any given location along the right-of-way, construction activities should not last more than 45 days.

During regular operations, L_{dn} values would be about 42 dBA at residences 500 feet from the right-of-way and about 38 dBA at residences 1,000 feet from the right-of-way. These L_{dn} values are relatively low because a maximum of only 1 train per day would travel from the mine to Broadview. However, during the few minutes that would be required for the train to pass, noise levels would be 85 to 90 dBA at 500 to 1,000 feet from the right-of-way.

In the Broadview area, L_{dn} values would be somewhat greater than those presented above. These higher values would result from the regular train traffic on the Burlington Northern mainline which passes through Broadview.

The Agency concludes impacts along the rail spur from railroad construction and train-generated noise would be minor over the short term and negligible over the long term.

c. Impacts from noise generated by coal trucks traveling from the mine to the Huntley loadout.

Coal truck traffic would increase ambient noise levels along U.S. Highway 87, Highway 312, and Heath Street. An increase of about 4 dBA to a maximum L_{dn} value of about 63 dBA would occur 100 feet from the edge of the roads. An L_{dn} value of 63 dBA has been known to elicit widespread community complaints.

Sometime after 1993, reconstruction of 6.2 miles of U.S. Highway 87 is scheduled several miles south of the south entrance to Old Divide Road. If this reconstruction takes place during the time proposed for hauling coal by truck, cumulative noise levels would be higher than along the rest of the route during the 1-year reconstruction period. After reconstruction was completed, cumulative noise impacts would stop and noise would resume preconstruction levels.

Trucks hauling coal would be well maintained and fitted with adequate mufflers to minimize noise levels. Banning the use of "jake" brakes in Huntley and restricting speed on Heath Street to 15 MPH would also help reduce noise. (see Coal Transportation, Appendix A). Truck hauling would be continual during a 2-year period, after which noise levels would return to previous levels.

The Agency concludes impacts from noise generated by coal trucks traveling from the mine to the Huntley loadout would be minor to moderate over the short term, and negligible over the long term.

d. Impacts to the Huntley area from the generation of noise due to the construction and operation of the Huntley loadout.

Huntley loadout would be upgraded over a 2- to 3-month period (see Huntley Truck Haul and Loadout, Appendix A). Noise during this period would be construction equipment. Noise levels would range from 55 to 60 dBA at 1,000 feet. Noise would decrease to ambient levels (45 dBA) at 3,000 feet.

Noise sources associated with operation of the loadout would include arrival and departure of trucks and trains, operation of conveyor belts, dumping coal into the dump bin, dozing the pile, and loading railroad cars. Noise levels within 100 feet of the facility would range from 80 to 85 dBA. Noise levels at the nearest residence, about 500 feet away, (see Figure A-3), would range from 55 to 60 dBA. Noise generated during operation of the loadout would be noticed by Huntley residents, and occasionally would be above acceptable levels recommended by the EPA.

Noise generated by sugar beet and grain trucks from October through January would be added to noise from coal trucks and the loadout facility. Noise impacts would be greater during this 4-month period than during the rest of the year. Regular train traffic would also increase noise levels as trains passed through Huntley.

In order to minimize night-time noise levels at the coal loadout, the bulldozer and loader would have strobe warning systems replacing standard backup alarms. This modification is subject to regulatory approval by the U.S. Mine Safety and Health Administration. After the 2-year use of the Huntley loadout, noise would return to previous levels.

The Agency concludes that impacts to the Huntley area from the generation of noise due to the construction and operation of the Huntley loadout would be minor to moderate over the short term, and negligible over the long term.

11. Socioeconomics

a. Impacts to employment, personal income, and population from mining-related activities.

Employment created by construction and operation of the proposed mine would include jobs 1) at the mine site, 2) related to transportation of coal to Huntley (years 1 and 2), at the loadout facility in Huntley (years 1 and 2), due to transportation of coal by railroad (years 3 through 32). In addition, it is expected that secondary jobs would be created due to the demands for goods and services from employees directly related to mine activities.

Local hire ratios are expected to average 75 percent for mine-related workers and 90 percent for secondary workers. About 90 direct and secondary workers and their families are expected to migrate into the area. Three-fourths (68) of the in-migrating workers are expected to move to Billings, while 12 are expected to move to Roundup and 10 to rural areas of the 2 counties. Population impacts on local communities from the Project would be less than 1 percent in Billings and surrounding rural areas, and less than 2 percent in Roundup.

Construction employment would total about 88 jobs; 38 positions at the mine, 12 at the loadout facility, 26 related to the rail spur, and 12 for powerline construction (see Table I-3). From years 1 through 3, operations employment would involve about 300 jobs at the mine, 12 at the loadout facility, and 50 related to coal transport. Following completion of the rail spur, direct mine-related employment would involve jobs only at the mine site; about 300 jobs through mine life. Secondary employment created by mine-related activities (primarily in the trades and services sectors) is expected to total 133 jobs. Most secondary jobs would be created in the Billings area where a majority of the mine workers are expected to live and purchase goods and services.

The Project may compete with several projects in attempting to hire local employees (see Appendix B). In January of 1992, the Billings labor market area, including Billings, Roundup, Huntley, and Broadview, had about 5,000 active applicants seeking employment (Mike Melbourne, Billings Job Service, personal communication, January 29, 1992). Various components of the proposed Project could be expected to require about 225 mine-related workers, 53 transportation and loadout facility workers, and 120 secondary workers from the local available labor force.

While total employment in Musselshell County would increase by an estimated 300-350 jobs (an impact of 20 percent), the economic base would not expand appreciably since most of the workers are projected to live in Yellowstone County. Total employment in Yellowstone County, which would consist of jobs at the Huntley loadout facility and secondary jobs, would be impacted by less than 0.1 percent.

Total wages and salaries (1990 dollars) due to mine-related activities should amount to about $12.0 million per year during full operations. Almost $10.0 million of this income would be directly related to the Project, while an additional $2.0 million would be attributable to secondary employment. Further income also would be realized through the local purchase of supplies and equipment by the mining company. Meridian expects to expend about $3.4 million per year on local purchases (Bob Ochsner, Meridian Minerals Company, personal communication, February 3, 1992).

Little impact on income in Musselshell County is expected since a majority of workers are projected to reside in or near Billings. Consequently, most of the income is expected to be spent in Yellowstone County. In 1989, total earnings in Yellowstone County surpassed $1.2 billion, therefore the impact on Yellowstone County earnings from mine-related activities should be less than 0.5 percent.

Following the conclusion of mining, the number of jobs lost could eventually total about 433 direct and secondary jobs. Negative impacts to employment and income would occur at about the same rate as when the jobs were created. The population may be impacted less since workers associated with the mine may not leave the area because of local employment opportunities, lack of job availability in other areas, or because of family ties or other personal relations in the immediate area.

The Agency concludes that impacts on employment, personal income, and population from mining-related activities would be moderate and beneficial to Musselshell County and minor and beneficial to Yellowstone County over the short term. Over the long term, employment, personal income, and population impacts from mining-related activities are expected to be moderate and negative to Musselshell County and minor and negative to Yellowstone County.

b. Impacts to public sector fiscal conditions from mining-related activities.

Direct tax revenues from the proposed mine and related facilities should average about $9.0 million per year (1989 dollars). Musselshell County is expected to receive about $1.2 million per year, increasing total revenues to the County by about 80 percent. Roundup Elementary and High School districts should realize increased general fund revenues of 30 percent, or about $700,000 per year through taxation from mining-related activities. Musselshell County equalization taxes for schools are expected to average $1.7 million per year on the mine and coal production. Roundup would not appreciably benefit from direct taxes on the mine. Yellowstone County and Broadview schools are each expected to receive about $20,000 per year from the Project, primarily from taxable valuation on the loadout in Huntley and the rail spur.

The State of Montana would receive an estimated $2.6 million per year through taxes for statewide school equalization, coal severance tax, Resource Indemnity Trust Tax, and royalties paid for mining coal on State lands. The Federal government is projected to receive about $2.8 million per year through taxes related to the Black Lung Tax, Abandoned Mine Lands Tax, and royalties paid on coal mined on Federal properties.

In addition to taxes paid directly by the coal developer and transportation provider, new governmental revenues also would be realized through taxes on fuels used by trucks hauling coal to Huntley, and from payroll taxes on mining-related workers. Diesel fuel and gross vehicle weight (GVW) taxes should total $302,953 for the 2 years of hauling coal to Huntley (Don Cromer, Montana Department of Transportation, personal communication, November 18, 1991). Federal payroll taxes are expected to average $1.8 million per year (15 percent tax rate) and State payroll taxes should total $0.6 million per year (5 percent tax rate). In addition to payroll taxes, State and local governments also would benefit from individual taxes such as fees, fines, property taxes, and gambling revenues.

Costs for providing additional services for the projected in-migrating mine workers should be experienced by all governments in the area. The primary costs to Musselshell County are expected to be increased need for law enforcement, and operation and maintenance costs of Old Divide Road. However, increased tax revenues from the mine eventually should cover all increased Musselshell County costs from mine development and coal hauling. Roundup School districts and the city of Roundup are expected to experience minimal costs from adding services for the few families that are projected to move into the area.

Yellowstone County, the city of Billings, and Billings public schools have the capacity to accommodate the small number of projected in-migrating families, and should experience limited costs. The exception may be the additional costs expected for operation and maintenance of streets in Huntley. Rural school districts in Yellowstone County (Broadview, Shepherd, and Huntley), although presently at capacity and potentially overcrowded due to accreditation standards, also are projected to experience minimal costs related to the in-migrating workers and their families.

The primary increase in State expenditures due to mining-related activities would be the operation, maintenance, and potential reconstruction costs of U.S. Highway 87 and Highway 312 from coal hauling to Huntley. Estimates of increased maintenance and operations costs for the 2 highways are not available;

however, assuming average statewide maintenance revenue proportions, about $106,000 from the increased fuel and GVW should be available for maintenance. This would nearly double the present maintenance budget of the 2 highways. Pavement damage to the 2 roadways, due to projected coal hauling from the mine to Huntley, could total between $1.3 million and $2.0 million (Donald Cromer, personal communication, November 18, 1991).

Following closure of the mine, public sector fiscal conditions of local, State, and Federal governments should be negatively impacted at about the same rate as when the mine opened. Musselshell County and Roundup public schools would lose a valuable source of funding and their budgets would realize sizable declines in revenue. Other local governments should be slightly impacted from closure of the mine.

Cumulative activities should not impact public sector fiscal conditions of any governments in the area. Yellowstone County and associated governments have the infrastructure to accommodate in-migrating workers. Very few of the cumulative developments would use government services in Musselshell County, nor would they use the same roadway system as the proposed Project.

The Agency concludes that impacts to public sector fiscal conditions from mining-related activities would be major and beneficial to Musselshell County and minor and beneficial to Yellowstone County over the short term. Over the long term, impacts to public sector fiscal conditions are expected to be major and negative to Musselshell County and minor and negative to Yellowstone County.

c. Impacts to law enforcement agencies from mining-related activities.

Agencies responsible for law enforcement in Roundup, Broadview, Shepherd, Huntley, and Billings areas are currently understaffed. Additional traffic and criminal activity as a result of increased population from the proposed Project would stress law enforcement services in the area. Transport of coal by truck from the proposed mine to the Huntley loadout and the increased number of commuting vehicles on the highway would require additional traffic patrol and enforcement efforts. Due to the anticipated increase in traffic, officers may need to commit more time and resources to patrolling U.S. Highway 87 and Highway 312, requiring a shift in patrol duties from other portions of the County. After the rail spur was constructed, coal truck traffic would cease, thus alleviating a portion of the additional workload of traffic patrol officers.

When the mine closed, a small number of people would be expected to leave the area. If law enforcement agencies hired additional staff to meet the needs of the growing population and retained that level of staffing, it is unlikely that the agencies would be overstaffed.

Cumulative development (see Appendix B) primarily would be concentrated in the immediate Billings area; consequently, Musselshell and Yellowstone County Sheriff's departments should not be impacted by the proposed developments. Billings Police Department, which is currently understaffed, would be impacted by the influx of construction workers in the Billings area.

The Agency concludes that the impact to law enforcement agencies would be moderate when trucks were hauling coal between the proposed mine and Huntley loadout facility. For the remainder of

the short term, the impact would be minor. Impacts to law enforcement agencies from mining-related activities would be negligible over the long term.

d. Impacts to housing in the Roundup and Billings areas from mining-related activities.

Rental housing in the Roundup area is limited; however, there are enough houses for sale to accommodate the small number of projected in-migrants to the area. Additional housing may become available for rent by those who have been unsuccessful in selling their homes.

The in-migration of workers may increase housing demand.

A large number of families moving from the area as a result of mine closure is not anticipated; therefore, it is not expected that the housing market would markedly change over the long term.

Cumulative development should not impact housing in the Roundup area. Temporary shortages of rental housing in the Billings area may be experienced due to cumulative development. Construction activities may last through the summer, a time when motels experience higher occupancy rates due to tourist travel. It is possible that construction workers occupying motel rooms over the construction phase would displace tourists seeking motel accommodations.

The Agency concludes that impacts to housing in the Roundup and Billings areas would be minor over the short term and negligible over the long term.

e. Impacts to educational facilities from mining-related activities.

Ninety new families are projected to move to the area as a result of the proposed mine development. School enrollment in the Roundup School District is expected to increase by 8 elementary and 4 high school students, while in the rural school districts of Broadview, Shepherd, and Huntley Project, school enrollment is projected to increase by a total of 4 elementary and 2 high school students. An increase of 38 elementary and 15 high school students is projected for the Billings School District.

The majority of in-migrating workers and their families are expected to reside in the Billings School District, which has the capacity to accommodate the small number of added students. Although few workers are expected to move to Roundup, Broadview, Huntley, or Shepherd, schools within these areas are currently at capacity and any additional students could further stress the facilities.

Accreditation standards, which would require smaller class sizes in kindergarten through second grade, will be implemented in 1992. With or without the Project, these standards may require additional educational facilities if newly-enrolled elementary students are not evenly distributed throughout elementary grades.

Positive impacts may result from approval of the Project. School districts within the coal-impacted area would have the opportunity to apply for grants for school facility expansion through the Local Impact Assistance Program of the Montana Coal Board. Approval of the grants would provide funding for expansion of school facilities.

Due to the small number of families expected to move away from the area after mine closure, negligible impacts on school districts should occur over the long term.

Cumulative development in the Billings area should not impact the school districts. It is expected that few in-migrating construction workers would bring their families with them to live for the short duration of construction activities. In addition, the largest portion of construction activities usually occurs during the warmer months of the year, a time when school usually is not in session.

The Agency concludes that impacts to educational facilities from mining-related activities would be moderate with the potential to become significant over the short term and negligible over the long term.

f. Impacts to social well-being in the Bull Mountains area from mining-related activities.

The magnitude of potential impacts on social well-being would depend on the ability of community members to adapt to social changes resulting from the proposed Project. Past history in the Roundup and Bull Mountains areas with cyclic resource developments such as coal, oil, forest products, and agriculture has imparted a social history of boom and bust. Due to this pattern of life, many social experiences necessary to deal with new development already exist.

Positive impacts to social well-being would be realized through increased job opportunities and local spending. However, since not all jobs created by the proposed Project would be filled by local residents and only a portion of the income would be spent locally, residents with high expectations that the Project would revitalize the area's depressed economy would experience disappointment if the Project failed to provide a large infusion of wages.

Residents who oppose the Project and associated rail spur would be adversely affected by its approval. These residents may experience feelings of anxiety, stress, and a perceived loss in quality of life. Those residents who established and joined grassroots organizations to oppose the Project probably would feel that their attempts had been futile.

Quality of life of Bull Mountains residents who live close to the proposed mine and associated rail spur would be adversely affected. Some residents moved to the Bull Mountains for solitude and they could be disturbed by the noise of construction and operation of the proposed mine and railroad; increased traffic as a result of hauling coal and commuters working at the proposed mine; increased dust created by mining construction and operation and traffic; and increased danger on the haul route due to the frequency in which coal trucks would be leaving and entering the proposed mine site.

Residents who gained economically as a result of the proposed Project would be the primary group impacted in the long term when mine closure eliminated direct or indirect economic benefits. Other groups should not be impacted by mine closure.

Cumulative development in the Billings area should not impact the social well-being of the Bull Mountain residents.

The Agency concludes that impacts to social well-being in the Bull Mountains area would be moderate with the potential to become significant over the short term and minor over the long term.

g. Impacts to social well-being in the Huntley area from operation of the loadout facility.

Operation of the proposed loadout facility would create additional dust, noise, and traffic and would increase the risk of traffic-related accidents. Currently, Huntley has a railroad stockpiling facility and experiences relatively large volumes of truck traffic, seasonally, during the sugar beet harvest. Some residents consider sugar beet traffic to be tolerable because it does not affect the community year-round, and labor and income associated with the beet harvest remains local. Year-round heavy traffic from coal hauling is widely perceived to represent a major change in the community with little local benefit. Similarly, little income would be generated for Huntley from the proposed loadout facility because truckers would probably reside elsewhere.

Closure of the Huntley loadout facility would be a positive impact on the social well-being of Huntley residents who opposed the proposed Project.

Cumulative development in the Billings area should not impact the social well-being of Huntley area residents.

The Agency concludes that impacts to social well-being in the Huntley area would be moderate with the potential to become significant over the short term and moderately positive over the long term.

12. Recreation

a. Impacts to outdoor recreational opportunities in the Bull Mountains area from mining-related activities.

Dispersed activities such as camping, fishing, and hiking would not be impacted by mining-related activities. Hunting however, may be temporarily disrupted due to noise, dust, and human activities associated with construction. Temporary displacement of some large game animals would be expected to occur, particularly near the surface facility complex, and along the rail spur during construction. This impact would be limited to those areas where hunting on private land was previously open to the public. Some displaced big game animals could relocate to State and Federal lands and actually increase hunting opportunities in some instances. In general, the impact to hunting would increase with proximity to active construction areas.

As areas of reclamation occurred, elk and deer would be attracted to them. In similar mining operations in Colorado and Wyoming, specially-designed wildlife fences have been constructed to keep deer off reclaimed areas (Bob Carroll, Ecological Consulting Services, Inc., personal communication, March 13, 1992.) Colstrip mine in southeastern Montana has documented problems with large numbers of mule deer trampling and grazing newly-reclaimed areas. Because hunting is usually restricted around a mine, reclaimed areas generally act as a reserve for animals (Bob Carroll, personal communication, March 13, 1992). As a result of probable increases in wildlife within restricted areas, peripheral hunting

opportunities could increase. In addition, reseeding of the railbed after construction would attract deer and elk.

The Agency concludes that impacts to outdoor recreational opportunities in the Bull Mountains area from mining-related activities would be minor over the short term and negligible over the long term.

b. Impacts to outdoor recreational opportunities in the Huntley area from mining-related activities.

Recreation opportunities in Huntley would be impacted from coal dust generated at the loadout and carried to town by southeasterly winds. The quality of the recreation experience for those engaging in dispersed recreation activities including walking, jogging, and bicycling would be impacted during these times. The closer to the loadout these activities occurred, the greater the impact would be.

Increased coal truck traffic would impact the safety and general enjoyment of walkers, joggers, and bicyclists who used Heath Street for these activities. Impacts would be greatest in October when the sugar beet harvest peaks. During this time, both coal and beet trucks entering Huntley from the north would be using Heath Street. Due to the existing traffic load on Old Highway 10 - Northern Avenue, most Huntley residents do not use it as a recreation route (Jim Pope, personal communication, January 30, 1992.)

Noise impacts would be greatest within 30 to 40 feet of Heath Street and 1,000 feet of the loadout (see Noise). Beyond that distance, noise generated at the proposed coal loadout would decline to a level compatible with outdoor recreation activities. Huntley Community Park, located about 1,000 feet southwest of the proposed coal loadout is at the outer limits of the acceptable range; recreation activities should not be affected.

The Agency concludes that impacts to outdoor recreational opportunities in the Huntley area from operation of the Huntley loadout would be minor over the short term and negligible over the long term.

13. Land Use

a. Impacts to land use in the life-of-mine area from mining-related activities.

- Cropland/Rangeland

  Construction and mining-related activities (primarily subsidence) could progressively disturb 7,041 surface acres of the life-of-mine area. Native grasses, shrubs, and trees would be planted in disturbed areas to restore rangeland. The 17-acre parcel of cropland in the northwest portion of the life-of-mine area may be temporarily disturbed by surface facility construction activities. Disturbed areas should return to equal or better than premining production capacity.

Surface disturbances caused by subsidence should be temporary (1 to 2 years); the possible exception would be any edge-of-subsidence areas where steep slopes created or worsened by subsidence could decrease soil stability and increase the chance of erosion.

The surface of the WDA fill area would remain active for the life-of-mine and therefore, unusable during that time period. After total reclamation, the WDA area should be suitable for use as rangeland.

Water resources at 42 of the 49 springs in the life-of-mine area could be disrupted by mining-related activities (tables III-3 and E-8, Appendix E). Impacts to these resources would be mitigated through the use of interim water supplies, repair of shallow surface fractures, horizontal drains, vertical wells, guzzlers, ponds (reservoirs), and/or supplementation using water distribution systems (Table A-3, Appendix A). Of the 4 springs having a high importance to land use, 2 are predicted to undergo a major impact from subsidence and 2 are predicted to sustain subsidence-induced impacts that have the potential to become major. Of the 14 springs with moderate importance to land use, 2 are predicted to undergo a major impact from subsidence and 2 are predicted to sustain an impact that has the potential to become major (see Table E-8, Appendix E).

- Buildings

Buildings located in areas of subsidence could suffer structural damage. Once subsidence had ended, the surface should have adequate stability for construction or reconstruction of most buildings, except for steep slopes where stability would remain questionable.

The WDA would not be suitable for building during the life-of-mine because of continual use; however, once mining operations ceased and reclamation of the WDA was completed, it should be suitable for construction of most buildings, except where the face of the fill area was too steep.

- Corrals/Fencing

Corrals and fences located in areas of subsidence could be damaged to varying degrees, depending on the amount of subsidence. Once subsidence had ended and reclamation was completed, they could be repaired or rebuilt.

Corrals and fences in areas disturbed by construction activities would be removed and could be rebuilt once reclamation activities were completed.

Fences or corrals could be built in the WDA once waste disposal use of the area ended and reclamation was completed.

- Roads

  Roads located in areas of subsidence would be damaged to varying degrees, depending on the amount of subsidence.

  Surface disturbance, caused by construction activities or subsidence could require that affected roads be relocated or temporarily closed during the period of disturbance. Fattig Creek Road would remain open, providing access through the life-of-mine area. (Sections may be relocated.) Meridian has an agreement with Musselshell County that Meridian would maintain and/or rebuild roads within the life-of-mine area. Once subsidence had ended and disturbed surface areas were reclaimed, roads would be rebuilt.

- Future Development

  A portion (438 acres) of the Yellowstone Basin Properties, Inc. subdivision is located in the north portion of the life-of-mine area, north and west of Fattig Creek. There is no plan to mine this area, therefore continued residential development and use of the subdivision area would not be affected by subsidence or other mining-related activities.

  Land within longwall subsidence areas should generally be suitable for future construction of dwellings or other types of development once subsidence had ended and reclamation was completed. An exception would be those areas where stability would continue to be questionable because of severe slopes.

  Land within the room-and-pillar area (about 240 acres in the south portion of the life-of-mine area) may experience some long-term settling. Because of this potential settling, stability required for structural construction may be affected, thereby impacting future development of this particular area.

  After total reclamation of the WDA had been completed, the surface should be suitable for development, except for the face of the fill area which would be too steep.

  Proposed mitigation measures for the life-of-mine area including topsoil placement or replacement, compaction, hydrologic mitigation, and revegetation are described in Reclamation Plan, Appendix A.

The Agency concludes that impacts to land use other than those associated with springs would be moderate over the short term and minor over the long term.

The Agency concludes that impacts to land use associated with springs in the life-of-mine areas from mining-related activities would be minor to moderate over the short term and minor over the long term.

b. Impacts to land use along the rail spur from construction and operation activities.

- Cropland/Rangeland

  Land traversed by the proposed rail spur right-of-way is primarily cropland or rangeland. Parcels would be split by the right-of-way and land within the right-of-way would be taken out of production (about 1,150 acres outside the life-of-mine area). Proposed road crossings and cattle underpasses would decrease the impact of split parcels in most instances and indirect access from parcel to parcel would cause inconvenience.

  There appear to be 3 parcels that would be split. These are located in section 6, T.4 N., R.25 E. (owners: G.L. and O.J. Morton); N½ Section 1, T.5 N., R.26 E. (owner: Majerus Ranch, Inc.); and S½ Section 1, T.5 N., R.26 E. (owners: G.A. and E.L. Carlson).

- Corrals/Fences

  Fencing would be installed along both sides of the rail spur right-of-way and existing fences removed and/or repaired as required to maintain safety and land use functions.

- Roads

  The proposed rail spur would cross numerous local and County roads and 2 highways. Plans for the proposed rail spur show about 22 crossings of local and County roads. Three of the crossings would be above-grade, the remainder would be at-grade crossings. Montana Route 3 would have an at-grade crossing and U.S. Highway 87 would have an above-grade crossing.

  Once mining operations had ceased, the track was removed, and reclamation completed, direct access between split parcels could be re-established.

- Future Development

  On non-State-owned sections, only limited backfilling and regrading of the railbed is planned and revegetation would be limited to reseeding disturbed areas with crested and intermediate wheatgrass. Re-establishment of shrub and tree communities would be left to natural invasion. On State-owned sections, complete reclamation including regrading to approximate original contours and revegetation to restore the areas to their premine function, would be required.

  The rail spur right-of-way would be too narrow to be effectively developed in and of itself. Some of the divided parcels are also so small that they would not be economically developable. These impacts would remain so long as the rail spur right-of-way was a separate, individual parcel of land.

The Agency concludes that the impacts to land use along the rail spur from construction and operation activities would be moderate in the short and long terms. The loss of agricultural productivity as well as other economic development of the 1,150 acres of rail spur right-of-way could be irretrievable.

14. Visual Resources/Aesthetics

a. Impacts to visual resources/aesthetics in the life-of-mine area from mining-related activities.

The only area with a high sensitivity level near the life-of-mine area is the U.S. Highway 87 corridor. The corridor is highly sensitive because of its high traffic volume. All other areas have a low sensitivity level because of the sparsely-developed nature and low user volume.

During construction, diesel emissions and dust from startup and operation of vehicles and other construction activities would create some haze. However, watering surface construction areas to control the dust, topographic features that screen the mine from areas of high sensitivity, and distance (U.S. Highway 87 is over 1 mile away from the life-of-mine area at its closest point) would limit visual impact. The duration of construction impacts would be temporary.

During operation of the mine, diesel emissions from the startup and operation of vehicles would create some haze. Topographic screening and distance to any highly-sensitive areas would limit the visual impact from this source. Particulate emissions generated by screening, crushing, conveyance, and cleaning operations would be controlled by fabric filters, water sprays, partially enclosed conveyors, and tube stackers. Any coal fires would be promptly extinguished.

There would be several mine-related surface facilities and disturbances that would, to some degree, adversely impact the aesthetic quality of the existing landscape. The PM Mine and Meridian coal test pit have already scarred a portion of the life-of-mine area. Located on about 871 acres, surface facilities would include the main facilities buildings, coal processing facilities, and ancillary facilities. These surface facilities would be removed and the area reclaimed after mining operations had ended. Surface disturbances at the mine include topsoil stockpiles, excess spoil pile, sediment ponds, rock quarry, haul roads, WDA, WDA subsoil pile, and subsidence areas. Subsidence would have the potential to disturb about 6,170 acres of the life-of-mine area. The most substantial surface disturbance would be caused by the WDA, which would cover up to 169 acres and reach a maximum height of 130 feet. Reclamation measures have been proposed that would reduce the long-term impacts of mining-related surface facilities and disturbances, but not totally mitigate them. Some would permanently scar the landscape.

The WDA's surface would remain virtually flat and the face of the fill would have an unnatural uniform slope that would strongly contrast in form and line with the adjacent landscape. Proposed regrading techniques may not leave a topographically-natural appearing landscape, and tree and shrub plantings may not insure that natural vegetation patterns would be duplicated (see Figure A-11, Appendix A). In general, revegetation, especially trees, would take a long period of time to achieve a natural appearance that would blend with vegetation in adjacent areas undisturbed by mining-related activities.

Mining-related surface facilities and surface disturbances would be screened from highly sensitive viewpoints by topographic features. They would be partially visible from some existing residences and local roads adjacent to the life-of-mine area.

The Agency concludes that impacts to the visual resources/aesthetics in the Bull Mountains area from mining-related activities would be minor to moderate in the short and long terms. The visual contrast of the WDA would constitute an irretrievable and irreversable commitment of the visual resources/aesthetics.

b. Impacts to visual resources/aesthetics in the Bull Mountains area from the rail spur.

There are 2 areas with a high sensitivity level in the rail spur viewshed; Montana Route 3 and U.S. Highway 87 corridors. These corridors are highly sensitive because of their high traffic volumes. All other areas have a low sensitivity level because of sparse development and low user volumes.

During construction, diesel emissions and dust from startup and operation of vehicles and other construction activities would create some haze. Additionally, most of the rail spur would be screened from highly-sensitive viewpoints by topographic and vegetative screening. The duration of construction impacts would be temporary.

During operation of the mine, both the rail spur and coal trains would adversely affect the visual resources/aesthetics of the area. The proposed right-of-way would come within 300 to 400 feet of 2 ranch houses, and within one-fourth to one-half mile of several others.

The railbed, extensive cuts-and-fills, County road above-grade crossings, and livestock underpasses would be visible during and after the mine life. All are proposed to remain in-place after the rail spur was abandoned. The proposed revegetation of the rail spur would not match or blend with existing, adjacent vegetation, thereby contrasting in color and texture. Large cuts (some more than 60 feet), with slopes of 2:1 and 3:1, are planned for sections of the eastern one-third of the rail spur. The proposed above-grade crossings would have clearances ranging from 26 to 31 feet high, and would be 140 to 180 feet long. The postmining landscape along the rail spur would be permanently impacted if these features remained in place as proposed. Most of these features would be visible only from viewpoints with low visual sensitivity levels, however, some would be visible from the corridors of U.S. Highway 87 and Montana Route 3 which would have high visual sensitivity levels.

The proposed U.S. Highway 87 above-grade rail crossing would be located in a scenic area of rolling, wooded (pine) hills. The top surface of the bridge would be about 30 feet above U.S. Highway 87. The fill slope for the rail spur east of the highway would exceed 50 feet. The grey concrete of the structure would not blend with or compliment the natural colors of the surrounding area. This would be a massive structure, sharply contrasting with the color, form, line, and texture of the adjacent landscape. The bridge would cross a straight section of highway with long sightlines from both the northbound and southbound lanes. This would make it easily visible from relatively long distances. There are no plans to remove the structure after mine life, therefore the visual resources and aesthetic value of the area would be permanently impacted.

Although only causing temporary impacts, coal trains would be very visible especially in the western two-thirds of the rail spur where the landscape is flat and open. Coal trains sitting on the 6,800-foot siding at the junction of the rail spur and Burlington Northern mainline would be immediately adjacent to Montana Route 3 and very visible, and could possibly be visible from portions of Broadview. Trains presently run through the Broadview area on the Burlington Northern mainline.

The Agency concludes that impacts to the visual resources/aesthetics in the Bull Mountains area from the rail spur would be minor to moderate over short and long terms. The larger cuts-and-fills of the rail spur and the structure over U.S. Highway 87 would constitute irretrievable commitments of visual resources/aesthetics.

c. Impacts to visual resources/aesthetics in Huntley from the Huntley loadout.

Huntley would have a high level of sensitivity because of population density, closeness, and unobstructed views of the proposed loadout facility and operations. Highway 312 would also have a high sensitivity level, although impacts would be lessened by distance (about one-half mile from loadout site) and line-of-sight interference (trees and buildings).

During construction, diesel emissions and dust from the startup and operation of vehicles and other construction activities would create some haze. Watering construction areas to control dust would help reduce the visual impact.

Although located in a rail-oriented industrial area, the proposed facilities and operational activities will lower the scenic quality, increasing the impact created by the existing facilities including the grain elevator, sugar beet stockpile and loading site, and other trains using Montana Rail Link line.

Additional adverse impacts to visual resources and aesthetics would be created by coal trains, haul trucks, and loadout equipment. Each would create dust and particulate emissions as well as adding to the visual clutter. Coal dust emissions were a major complaint of Huntley residents during operation of the loadout related to the Meridian coal test pit. Water spraying and partial enclosure of transfer operations should help reduce coal dust emissions.

The coal stockpile, a dominating feature (which could be 600 feet long, 200 feet wide, and 25 feet high), would greatly impact the aesthetic quality of the area because of its strong contrasts in form, color, and texture to the surrounding landscape. The 8-foot fence proposed to enclose the stockpile would do little to mitigate its visual impact.

The Agency concludes that impacts to visual resources/aesthetics in Huntley from Huntley loadout would be major and significant in the short term, and negligible in the long term.

15. Cultural Resources

a. Impacts to prehistoric and historic resources in the Bull Mountains area from mining-related activities.

Potential adverse effects to prehistoric and historic resources include direct land disturbance due to construction and operations (including subsidence), and unauthorized artifact collecting and vandalism. Degradation of physical integrity occurs at sites exposed to these activities. The loss of physical integrity diminishes research potential which contributes to resource eligibility. Visual intrusions to the setting or environmental context of sites also creates potential adverse effects.

Two NRHP-eligible sites currently identified within the life-of-mine area would be adversely affected by mining and mining-related activities. Four NRHP-eligible lithic scatters may be adversely affected by subsidence, resulting in the mixing of subsurface cultural deposits located at the margins of the subsidence areas. One NRHP-eligible lithic scatter may be adversely affected by construction of the proposed rail spur within the proposed surface facility complex. The potentially NRHP-eligible stone circle site may be adversely affected by construction of hydrological mitigation in the proposed life-of-mine area. About 230 additional NRHP-eligible prehistoric sites may be disturbed during construction and operation of the mine.

Twenty-four NRHP-eligible prehistoric and historic sites located in the proposed rail spur right-of-way, would be adversely affected by railroad construction or operations. Thirteen prehistoric lithic scatters and 11 historic sites (8 homesteads and 3 trash scatters) would be disturbed or destroyed by construction of the proposed rail spur. Two of these homesteads have standing structures. These would also be adversely affected by the presence of the rail spur which would destroy the integrity of site settings. Increased access and traffic to the area by construction workers may also result in unauthorized surface collecting and vandalism of NRHP-eligible sites.

Adverse effects to NRHP-eligible prehistoric and historic sites from mining-related activities would be appropriately mitigated by data recovery techniques. Data recovery may include surface collection, excavation, artifact and feature analysis, architectural documentation, archival research, and construction or operations monitoring. Beneficial impacts may occur from data recovery procedures implemented to mitigate adverse effects to NRHP-eligible sites. Data recovery of NRHP-eligible sites would contribute pertinent information to the regional database.

The Agency concludes that impacts to prehistoric and historic resources in the Bull Mountains area from mining-related activities would be minor and permanent. Loss of NRHP-eligible prehistoric and historic sites would be irretrievable.

b. Impacts to Native American (traditional) resources in the Bull Mountains area from mining-related activities.

Potential adverse effects to Native American resources include direct land disturbance due to construction and operations (including subsidence), visual and noise intrusions on Native American

sensitive sites, reduced access to Native American traditional use areas, and unauthorized artifact collecting and vandalism.

Rock art sites sensitive for Native American groups in the proposed life-of-mine area may be disturbed by subsidence; it may cause scaling and collapse of vertical sandstone outcrops within subsidence areas. Springs may be disturbed or destroyed by construction of wetland enhancement and hydrological mitigation. Other types of sensitive sites may be disturbed directly by construction, or indirectly by visual or noise intrusions from construction and operation of the mine.

Several potentially-sensitive areas within the proposed railroad corridor may be disturbed directly by construction, or indirectly by audio or noise intrusion of rail spur construction and operations.

Impacts to Native American resources may be mitigated by appropriate relocation of human remains (if discovered) according to the Native American Graves Protection and Repatriation Act and the Montana Human Skeletal Remains and Burial Site Protection Act. Reseeding, transplanting, or harvesting sensitive Native American plant resources (if present), or planting vegetation screens to reduce visual and noise intrusions would also provide mitigation. Impacts to some Native American resources, such as sensitive rock art sites, cannot be adequately mitigated, resulting in destruction of the resource.

The Agency concludes that there will be some impacts to Native American resources in the Bull Mountains area from mining-related activities. Because there may be unmitigated and irretrievable loss of some resource types, the impact to Native American resources would have the potential to become significant.

B. IMPACTS OF DISAPPROVAL UNDER ALTERNATIVE 2

1. Assumptions for the Disapproval Alternative

The assumptions used by the Agency to perform the impact analysis for the disapproval alternative (Alternative 2) include:

- The Project would be placed on indefinite hold, and the permit application package (PAP) submitted to Montana DSL would be withdrawn.

- The existing Huntley loadout facility would be reclaimed as scheduled in the approved Meridian coal test pit permit, no. 90017R. This would include: removal of the portable loadout facilities, collection of the remaining coal waste for disposal at the Bull Mountains test pit, and reclamation of the sediment pond after evaporation was complete. (Specific details of the existing Huntley loadout facility are included in Appendix B.)

- Reclamation of Meridian's existing coal test pit would proceed according to the approved plan (MT permit no. 90017R). (Specific details of the existing coal test pit facility are included in Appendix B.)

- The PM Coal Company would continue to operate their existing surface/underground mine in the Bull Mountains area according to the approved permit to mine coal (MT permit no. 79008RI). They would continue to supply truck/package-delivery coal to the local market. (Specific details of the existing PM Mine are included in Appendix B).

- Existing resources in proximity to the Project would not be disrupted by new activity related to coal mining. They would, however, be subject to the continuing human and natural processes, including those uses and management activities currently being applied. To accurately evaluate the impacts of disapproving proposed mining-related activity on these resources, analysis of impacts under this alternative examine, to the extent possible, the effects of current management and natural processes on existing resources through the year 2037, the year assumed for final bond release (1993, plus 44 years).

- The life-of-mine area and associated rail spur would be managed for grazing, agricultural crop production, wildlife habitat, and recreation:

  - Livestock stocking rates and management practices would continue at current, premining levels.

  - Wildlife management and recreation opportunity would correspond to Montana Department of Fish, Wildlife and Parks (DFWP) plans for the area.

  - Cropland would continue to be farmed at current, premining levels.

- The area surrounding the Project would be maintained in its current or proposed use:

  - Coal leasing may continue, but no new mines would be developed.

  - Land currently used for agriculture would remain in that use.

  - Land outside the area of the proposed mine, currently used for residential purposes, would remain in that use. New residential development could occur.

  - State and County roads would be subject to existing maintenance schedules and current use levels.

2. Air Quality

a. Impacts to air quality in and around the surface facility complex associated with disapproval of the proposed Project.

Current air quality impacts would continue to be the result of fugitive dust and vehicle exhaust emissions from operation of the PM Mine. The area should continue to be classified as in attainment for all regulated pollutants.

The Agency concludes that impacts to air quality in and around the surface facility complex associated with disapproval of the proposed Project should be negligible.

b. Impacts to air quality along and around the rail spur associated with disapproval of the proposed Project.

Fugitive dust and vehicle exhaust emissions from agricultural operations and vehicle travel on local roadways would continue to generate air quality impacts. Regular train traffic would continue to pass through the Broadview area, generating diesel emissions. The area along the rail spur right-of-way should continue to be classified as in attainment for all regulated pollutants.

The Agency concludes that impacts to air quality along and around the rail spur associated with disapproval of the proposed Project should be negligible.

c. Impacts to air quality from truck haulage of coal on U.S. Highway 87, Highway 312, and Heath Street.

Re-entrained dust and exhaust emissions from vehicular traffic should continue to constitute the sources for air quality impacts along U.S. Highway 87, Highway 312, and Heath Street. The area along these roadways should continue to be classified as in attainment for all regulated pollutants. However, in 1993 reconstruction of 6.2 miles of U.S. Highway 89 is scheduled several miles south of the south entrance to Old Divide Road. During this 1-year reconstruction period, ambient fugitive dust (PM_{10}) concentrations and NO_2, CO, and particulate concentrations from exhaust emissions would show temporary increases along this portion of U.S. Highway 87.

The Agency concludes that impacts to air quality from truck haulage of coal on U.S. Highway 87, Highway 312, and Heath Street should be negligible to minor.

d. Impacts to air quality in and around the Huntley area associated with disapproval of the proposed Project.

Air quality impacts from fugitive dust and vehicle and locomotive exhaust emissions should continue as a result of regular train traffic and operational activities at the Huntley sugar beet loading site. The Huntley area should continue to be classified as in attainment for all regulated pollutants.

The Agency concludes that impacts to air quality in and around the Huntley area associated with disapproval of the proposed Project should be negligible.

3. Geology

a. Impacts to stability of slopes and sandstone cliffs in and around the life-of-mine area associated with disapproval of the proposed Project.

Natural erosion and weathering will continue to occur with slope failure and rock toppling altering topography and drainage patterns in the area.

The Agency concludes impacts to the stability of slopes and sandstone cliffs in and around the life-of-mine area associated with disapproval of the proposed Project would be negligible.

4. Topography

a. Impacts to topography of the surface facility complex associated with disapproval of the proposed Project.

Reclamation of Meridian's coal test pit would proceed according to the approved plan and the PM Mine would continue to operate according to an approved permit. With reclamation complete, postmining and test pit topography would be similar to adjacent premining topography.

The Agency concludes that impacts to topography of the surface facility complex associated with disapproval of the proposed Project would be negligible.

b. Impacts to topography in and around the life-of-mine area associated with disapproval of the proposed Project.

Natural processes and current management would continue to determine topographic changes in the area.

The Agency concludes that impacts to topography in and around the life-of-mine area associated with disapproval of the proposed Project would be negligible.

c. Impacts to topography along the rail spur associated with disapproval of the proposed Project.

The 33-mile right-of-way would continue to be managed for grazing, crop production, wildlife habitat, and recreation. Natural processes and current management would continue to determine topographic changes in the area.

The Agency concludes that impacts to topography along the rail spur associated with disapproval of the proposed Project would be negligible.

5. Soils

a. Impacts to soil productivity associated with disapproval of the proposed Project.

The Huntley loadout and coal test pit would be reclaimed according to approved plans. The PM Mine would continue to operate, and land in and around the proposed mine would be maintained in current or proposed uses.

The Agency concludes that impacts to soil productivity associated with disapproval of the proposed Project would be negligible.

6. Hydrology

a. Impacts to ground and surface water supplies in and around the life-of-mine area associated with disapproval of the proposed Project.

Ground water and related surface water supplies would continue to be determined by climate, recharge, and natural structural changes in area.

The Agency concludes that impacts to ground and surface water supplies in and around the life-of-mine area associated with disapproval of the proposed Project would be negligible.

b. Impacts to water quality in and around the life-of-mine area associated with disapproval of the proposed Project.

The quality of ground and surface water from spring and seep discharges, would continue to be determined by natural chemical and structural processes in the area.

The Agency concludes that impacts to water quality in and around the life-of-mine area associated with disapproval of the proposed Project would be negligible.

c. Impacts to ground water supplies in and around the life-of-mine area associated with disapproval of the proposed Project.

Ground water supplies in deep aquifers would be impacted only by wells drilled for future development.

The Agency concludes that impacts to ground water supplies in and around the life-of-mine area associated with disapproval of the proposed Project would be negligible.

d. Impacts to ground and surface water quality in sections 12 and 13 associated with disapproval of the proposed Project.

Natural chemical and structural processes in the area would continue to determine the quality of ground and surface water in sections 12 and 13.

The Agency concludes that impacts to ground and surface water in sections 12 and 13 associated with disapproval of the proposed Project would be negligible.

e. Impacts to ground water quality in the Huntley area associated with disapproval of the proposed Project.

The existing Huntley loadout would be reclaimed as planned. Because the facility is located in a commercial/industrial area, future uses could impact ground water quality.

The Agency concludes that impacts to ground water quality in the Huntley area associated with disapproval of the proposed Project would be negligible.

f. Impacts to alluvial ground water supplies in the Huntley area associated with disapproval of the proposed Project.

The existing Huntley loadout would be reclaimed as planned, and operations of the water supply well would depend on the future use of the site.

The Agency concludes that impacts to alluvial ground water supplies in the Huntley area associated with disapproval of the proposed Project would be negligible.

7. Vegetation

a. Impacts to wetland communities in and around the life-of-mine area associated with disapproval of the proposed Project.

Precipitation-dependent wetland communities throughout the area should continue to fluctuate in response to annual moisture patterns and continue to be susceptible to damage from wild and domestic animal grazing and watering.

The Agency concludes that impacts to wetland communities in and around the life-of-mine area associated with disapproval of the proposed Project would be minor.

b. Impacts to wetland communities along the rail spur associated with disapproval of the proposed Project.

The 1-acre precipitation-dependent wetland community in the right-of-way would not be disturbed and would continue to fluctuate in response to annual moisture patterns. New wetland communities would not be established along the proposed rail right-of-way.

The Agency concludes that impacts to wetland communities along the rail spur associated with disapproval of the Project would be negligible.

c. Impacts to the vegetative productivity and community stability along the powerline easement and rail spur associated with disapproval of the proposed Project.

Subdivision of real estate in the Bull Mountains would continue along with extreme overgrazing of some parcels. Increased population levels in the Bull Mountains could require powerline upgrading with or without the proposed Project. Grazing by domestic and wild animals would continue in the Bull Mountains, subject to landowner discretion. Vegetation productivity and stability along the proposed rail spur right-of-way could change radically upon termination of the Federal Conservation Reserve Program.

The Agency concludes that impacts to vegetative productivity and community stability along the powerline easement and rail spur associated with disapproval of the Project would be negligible to minor.

d. Impacts to vegetative productivity and community stability within the surface facility complex and the Huntley loadout associated with disapproval of the proposed Project.

The PM Mine would continue to operate within the terms of its permit and the 101 acres of existing disturbance eventually would be reclaimed. Vegetation productivity of the area would be a function of annual precipitation and landowner management practices. Huntley loadout would remain as a commercial/industrial use area (see Appendix B) after reclamation of the existing pond according to the current permit.

The Agency concludes that impacts to vegetative productivity and community stability within the surface facility complex and Huntley loadout associated with disapproval would be negligible.

8. Wildlife

a. Impacts to tree- and cavity-nesting birds in and around the life-of-mine associated with disapproval of the proposed Project.

Tree- and cavity-nesting birds have an abundance of nesting habitat in the Bull Mountains, both within the life-of-mine area and around it. One hundred-one acres of the surface facility complex is already disturbed by PM Mine, and would be returned to usable habitat under the terms of the present permit.

The Agency concludes that impacts to tree- and cavity-nesting birds in and around the life-of-mine area associated with disapproval of the proposed Project would be negligible.

b. Impacts to sharp-tailed grouse nesting and brood-rearing habitat, turkey-roosting habitat, and mule deer winter range at the WDA associated with disapproval of the proposed Project.

The existing ponderosa pine-mixed grassland of the WDA sites would not be disturbed, and would continue to be used by sharp-tailed grouse for nesting and brood rearing, by wild turkeys for roosting, and by mule deer in winter.

The Agency concludes that impacts to sharp-tailed grouse nesting and brood-rearing habitat, turkey-roosting habitat, and mule deer winter range at the WDA associated with disapproval of the proposed Project would be negligible.

c. Impacts to elk, deer, and antelope in the Bull Mountains area from increased human activity and development associated with disapproval of the proposed Project.

Proliferation of small housing tracts in the Bull Mountains could be a greater deterrent to some wildlife species, such as elk and deer, than a single larger block of human activity. Subdivisions could increase over a wider area. Twenty-acre homesteads, with associated domestic pets and daily traffic,

influence wildlife in an area exceeding 20 acres. Assured water sources for wildlife associated with hydrologic mitigation would not be provided.

The Agency concludes that impacts to elk, deer, and antelope in the Bull Mountains area from increased activity and development associated with disapproval of the proposed Project would be negligible.

d. Impacts to the wildlife productivity within the life-of-mine area associated with disapproval of the proposed Project.

Current wildlife productivity is largely a function of weather (precipitation) patterns, grazing and foraging competition with livestock, and tolerance of landowners for specific species. Certain species also have limited tolerance for human activity. Increased subdivision would continue to affect wildlife. Wildlife populations and distribution would continue similar to present levels, affected primarily by landowner tolerance.

The aquatic animal community in the life-of-mine area would continue to be controlled by the fluctuations in the status of aquatic habitat provided by springs, seeps, and rainfall.

The Agency concludes that impacts to wildlife productivity within the life-of-mine area associated with disapproval of the proposed Project would be negligible.

9. Transportation

a. Impacts to traffic flow and public safety associated with disapproval of the proposed Project.

Truck and other vehicle trips generated by the PM Mine would continue to use Fattig Creek Road, Old Divide Road, and U.S. Highway 87. These vehicles would use a portion of the capacity of the area roadways and intersections.

Traffic volumes should continue to grow with general population increases in the area. More traffic volume and more vehicle-miles of travel would gradually reduce the LOS on area roadways and increase the number of accidents.

Traffic turning from either of the Old Divide Road/U.S. Highway 87 intersections onto U.S. Highway 87 would continue to yield to through traffic. Longer delays would occur at the intersections as a result of both traffic growth on U.S. Highway 87 and the PM Mine trucks turning to and from Old Divide Road. As delays increased, the LOS of the intersections would decrease.

More accidents would occur at the intersections of Old Divide Road with U.S. Highway 87. More vehicles and longer delays in traveling through the intersection would increase the potential for conflicts.

Truck travel along U.S. Highway 87 would slow when going up long, steep grades and would continue to impede traffic. Continued traffic measures combined with the slow trucks could lower the LOS of highway segments and cause more accidents.

Congestion due to highway reconstruction projects on U.S. Highway 87 would occur as vehicles traveled through highway work zones. The number of accidents would increase as vehicles stopped at the reconstruction sites. Reconstruction projects would result in a better roadway surface and shoulders and increase the traffic capacity and safety of the roadway.

The U.S. Highway 87/Highway 312 intersection would continue to be congested during the peak hours of travel. As traffic growth continued, congestion would worsen, reducing both the capacity and LOS of the intersection. Large trucks would continue to have a difficult time turning at the intersection and could further reduce its capacity and LOS. More traffic accidents would occur due to increased traffic and vehicle delays and stops.

The seasonal sugar beet traffic would continue to use Highway 312 and Heath Street to get to the Huntley stockpile facility (see Appendix B). The LOS of the Highway 312/Heath Street intersection could become worse during the short duration of sugar beet deliveries due to continued growth of traffic in the area. More traffic accidents would occur at the intersection due to the increased traffic and vehicle delays and stops.

The number of vehicle trips generated by residents along Heath Street is low. The continuation of sugar beet traffic along this road should create few conflicts and little congestion. Sight distance is good, so cars traveling in the Heath Street area would have adequate resources to avoid accidents with the sugar beet traffic.

The Agency concludes that impacts to traffic flow and public safety associated with disapproval of the proposed Project would be minor.

b. Impacts to traffic flow and public safety on public and private roads between U.S. Highway 87 and Montana Route 3 associated with disapproval of the proposed Project.

Traffic should continue to grow as the general population increases in the area. More traffic would reduce the capacity and potentially increase the number of accidents on public and private roadways between U.S. Highway 87 and Montana Route 3.

County and private roadways between U.S. Highway 87 and Montana Route 3 have low traffic volumes. Increased traffic could reduce the available capacity of these roadways. More traffic accidents would occur along these roadways and at intersections due to the increased traffic volumes.

Congestion due to highway reconstruction projects would occur. More stops and delays would be experienced as increased numbers of vehicles traveled through work zones. Completion of the reconstruction projects would result in a better roadway surface, better shoulders, and increased traffic capacity and safety of the roadway.

The Agency concludes that the impacts to traffic flow and public safety on public and private roads between U.S. Highway 87 and Montana Route 3 associated with disapproval of the proposed Project would be negligible.

c. Impacts to the integrity/stability of County and State roads associated with disapproval of the proposed Project.

Traffic volumes should continue to grow as general population increases in the area. This growth would include automobile and heavy vehicle trips. Truck and vehicle trips generated by the PM Mine would continue to use Fattig Creek Road, Old Divide Road, and U.S. Highway 87. Seasonal sugar beet traffic would continue to use Heath Street and Highway 312.

The volume and makeup of this traffic would generate normal wear on the area road surfaces. This would increase the occurrence of pavement surface and structural failures. The continued growth of traffic on area roads would require increased maintenance and costs.

The continued travel of PM Mine coal trucks on Fattig Creek and Old Divide roads, and sugar beet trucks on Heath Street would continue to degrade road surfaces and structures. Pavement cracking, breakup, potholes, and rutting could be expected.

The Agency concludes that impacts to the integrity/stability of County and State roads from disapproval of the proposed Project would be minor.

d. Impacts to the integrity/stability of County roads from mining-related subsidence associated with disapproval of the proposed Project.

PM Mine would continue to operate within its permitted boundaries. Mining-related subsidence could result in settling of a small section of Fattig Creek roadbed. Subsidence could cause both travel surface and pavement structure failures.

The Agency concludes that impacts to integrity/stability of County roads from mining-related subsidence associated with disapproval of the proposed Project would be negligible.

10. Noise

a. Noise impacts in the Bull Mountains area associated with disapproval of the proposed Project.

Operation of the PM Mine would continue to produce noise levels that are currently experienced in the area. These levels range from about 40 to 72 dBA.

The Agency concludes that noise impacts in the Bull Mountains area associated with disapproval of the proposed Project would be negligible.

b. Noise impacts along the rail spur associated with disapproval of the proposed Project.

Along the proposed rail spur right-of-way, noise levels would remain near current levels. These levels range from 55 to 58 dBA at 1,000 feet from noise sources. In the Broadview area, noise levels would continue to be influenced by Burlington Northern train traffic passing through the area.

The Agency concludes noise impacts along the rail spur associated with disapproval of the proposed Project would be negligible.

c. Noise impacts along the proposed coal transport route associated with disapproval of the proposed Project.

Noise levels along the proposed coal transport route would remain near current levels (i.e., L_{dn} values of 59 dB at a distance of 100 feet from roadways). However, in 1993, reconstruction of 6.2 miles of U.S. Highway 87 is scheduled. During the 1-year reconstruction period, noise levels would increase above current levels along this portion of the highway.

The Agency concludes that noise impacts along the proposed coal transport route associated with disapproval of the proposed Project would be negligible to minor.

d. Noise impacts in the Huntley area associated with disapproval of the proposed Project.

Noise levels in the Huntley area would remain at current levels. L_{dn} values would continue to range from 50 to 55 dBA at residences 100 feet from Heath Street and Northern Avenue. The normal train traffic and the operation of the beet-loading site during the period from October through January, would continue to cause local increases in noise levels.

The Agency concludes that noise impacts in the Huntley area associated with disapproval of the proposed Project would be negligible to minor.

11. Socioeconomics

a. Impacts to employment, personal income, and population associated with disapproval of the proposed Project.

Employment, personal income, and population should increase at rates as described in Chapter III. Local governments, businesses, and residents would not benefit from the projected increase in income and employment opportunities associated with construction and development of the Project.

The Agency concludes that in foregone benefits, impacts on employment, personal income, and population associated with disapproval of the proposed Project would be moderate and negative in Musselshell County and minor and negative in Yellowstone County.

b. Impacts to public sector fiscal conditions associated with disapproval of the proposed Project.

Public sector fiscal conditions should remain at their present level of service as described in Chapter III. Local governments in Montana cannot legally increase property taxation to support additional services without corresponding increases in population or taxable valuation. Local, State, and Federal governments would not benefit from increased tax revenues from the proposed Project nor experience the added expenditures from increased services.

The Agency concludes that in foregone benefits, impacts on public sector fiscal conditions associated with disapproval of the proposed Project would be major and negative in Musselshell County and minor and negative in Yellowstone County.

c. Impacts to law enforcement agencies associated with disapproval of the proposed Project.

Agencies responsible for law enforcement in Roundup, Broadview, Shepherd, Huntley, and Billings areas are understaffed, a condition that would not change with disapproval of the proposed Project.

Other development proposed in the Billings area (see Appendix B) should not affect the Musselshell and Yellowstone County Sheriff's departments; however, the Billings Police Department may experience short-term impacts due to the in-migration of construction workers.

The Agency concludes that impacts to law enforcement agencies with disapproval of the proposed Project would be minor.

d. Impacts to housing in the Roundup and Billings areas associated with disapproval of the proposed Project.

Fewer houses would be rented in the area with disapproval of the proposed Project. Without new development and a subsequent reduction in demand for housing, some homeowners would not be able to rent or sell their houses as readily or obtain higher rental prices due to economic effects of supply and demand.

Other development may increase the shortage of rental housing and temporary living quarters in Billings during construction phases. Construction activities may last through the summer, a time when motels experience higher occupancy rates due to tourist travel. It is possible that construction workers occupying motel rooms over the construction phase would displace tourists seeking motel accommodations.

The Agency concludes that impacts on housing in the Roundup and the Billings areas associated with disapproval of the proposed Project would be minor.

e. Impacts to educational facilities associated with disapproval of the proposed Project.

Roundup Elementary School, Broadview Elementary and High schools, Shepherd Elementary School, and Huntley Project Elementary School are overcrowded. Accreditation standards to be implemented in 1992 will require smaller class sizes in kindergarten through second grade. With or without the Project, these standards may require additional educational facilities if newly-enrolled elementary students are not evenly distributed throughout the elementary grades.

Without the Project, school districts would not have the opportunity to apply for grants for school facility expansion through the Local Impact Assistance Program of the Montana Coal Board. School District officials would need to find other avenues to pay for additional classroom space.

Other development may add to the overcrowded conditions of Shepherd and Huntley school districts. It is expected that few in-migrating construction workers would bring their families with them to live for the short duration of construction activities. In addition, the largest portion of construction activities usually occurs during the warmer months of the year, a time when school usually is not in session.

The Agency concludes that impacts on educational facilities with disapproval of the proposed Project would be minor.

f. Impacts to social well-being in the Bull Mountains area associated with disapproval of the proposed Project.

Individuals perceiving the Project to be a negative influence on the area would view its disapproval positively, whereas those favoring it would perceive disapproval as reducing the potential for increased local income and jobs. Individuals who supported the Project may perceive that their quality of life had been adversely affected by the Project's denial. Anticipation of a much-needed boost to the economy would not be realized and would cause disappointment to many. This loss of an optimistic economic outlook for the community could decrease the feeling of social well-being for some people.

It is likely that community conflict among groups favoring or opposing the Project gradually would subside with no development, but interpersonal polarization would remain for years. Other development should not affect the social well-being in the Bull Mountains area.

The Agency concludes that impacts to social-well being in the Bull Mountains associated with disapproval of the proposed Project would result in moderately negative impacts for those who favor the Project, and moderately positive impacts for those opposing it.

g. Impacts to social well-being in the Huntley area associated with disapproval of the proposed Project.

Individuals perceiving the proposed loadout facility to be a negative influence on the area would view disapproval of the proposed Project positively, whereas those favoring the proposed loadout facility

would perceive disapproval as negative. It is likely that community conflict among groups favoring or opposing the proposed loadout facility gradually would decrease, but interpersonal polarization would remain for years. Other development should not affect the social well-being in the Huntley area.

The Agency concludes that impacts to social-well being in the Huntley area associated with disapproval of the proposed Project would result in moderately negative impacts for those favoring the Project, and moderately positive impacts for those opposing it.

12. Recreation

a. Impacts to outdoor recreational opportunities in the Bull Mountains area associated with disapproval of the proposed Project.

Impacts to outdoor recreation activities currently exist from equipment noise, traffic, dust, and access restrictions in the vicinity of the PM Mine.

Extensive private landownership limits access to much of the Bull Mountains area for outdoor recreation purposes. Montana Department of Fish, Wildlife and Parks' big game hunting regulations warn hunters that access to private land may be difficult to obtain.

The Agency concludes that impacts to outdoor recreation opportunities in the Bull Mountains area associated with disapproval of the proposed Project would be negligible.

b. Impacts to outdoor recreational opportunities in the Huntley area associated with disapproval of the proposed Project.

The noise, dust, and traffic associated with the sugar beet loading site has impacted outdoor recreation activities for residents along the haul route since its inception. Safety for individuals engaging in dispersed recreation activities such as walking, jogging, and bicycling on Heath Street is jeopardized by the heavy truck traffic. Additionally, there is dust and noise associated with the loadout activities and the use of trains for hauling the beets to processing facilities.

The Agency concludes that impacts to outdoor recreation opportunities in the Huntley area associated with disapproval of the proposed Project would be negligible.

13. Land Use

a. Impacts to land use in the life-of-mine area associated with disapproval of the proposed Project.

Impacts to cropland and rangeland in the life-of-mine area would occur if more intensive farming, ranching, timber production, or land development took place. These activities are part of the existing conditions and a substantial increase in activity beyond the existing conditions would not be expected.

No impacts to buildings, corrals, fences, and roads beyond normal wear and tear would be expected.

There would be little impact to future development of the life-of-mine area beyond the existing constraints of topography, soils, utility availability, and access. Operations at the PM Mine would continue. PM Mine eventually would be reclaimed under conditions of its permit and returned to agricultural use. Subsidence would continue to occur, but on a smaller area than the proposed Project.

The Agency concludes that the impacts to land use in the life-of-mine area associated with disapproval of the proposed Project would be negligible.

b. Impacts to land use along the rail spur associated with disapproval of the proposed Project.

Impacts to cropland and rangeland in the rail spur right-of-way would only occur if more intensive farming, ranching, timber production, or land development took place. A substantial increase in activity beyond the existing conditions would not be expected. No impacts to corrals, fencing, and roads beyond normal wear and tear would be expected.

There would be little impact to future development of land along the rail spur right-of-way beyond existing conditions.

The Agency concludes that the impacts to land use along the rail spur associated with disapproval of the proposed Project would be negligible.

14. Visual Resources/Aesthetics

a. Impacts to visual resources/aesthetics in the life-of-mine area associated with disapproval of the proposed Project.

Impacts to visual resources/aesthetics could occur as a result of natural processes, such as fire, and human activities, such as increased ranching, farming, timber production, or land development. Substantial increases in human activities in the life-of-mine area would not be expected. PM Mine facilities would continue to impact the visual resources/aesthetics until it was reclaimed.

The Agency concludes that impacts to visual resources/ aesthetics in the proposed life-of-mine area associated with disapproval of the proposed Project would be negligible.

b. Impacts to visual resources/aesthetics in the rail spur right-of-way associated with disapproval of the proposed Project.

Impacts on visual resources/aesthetics could occur as a result of natural processes, such as fire; and human activities, such as increased ranching, farming, timber production; or land development. Substantial increases in human activities in the rail spur right-of-way would not be expected. Trains would continue to operate on the Burlington Northern mainline through Broadview.

The Agency concludes that impacts to visual resources/aesthetics in the proposed rail spur right-of-way associated with the disapproval of the proposed Project would be negligible.

c. Impacts to visual resources/aesthetics in Huntley associated with disapproval of the proposed Project.

The proposed loadout site, located in a rail-served industrial area, could be developed for some other industrial use. If and how the area would be developed would determine the degree of impact to visual resources/aesthetics. The existing sugar beet loading site and rail line would remain in operation and would continue to impact the visual resources/aesthetics of the area.

The Agency concludes that the impact to visual resources/aesthetics in Huntley associated with disapproval of proposed Project could range from negligible to moderate.

15. Cultural Resources

a. Impacts to prehistoric and historic resources in the Bull Mountains area associated with disapproval of the proposed Project.

Prehistoric and historic resources are currently affected by natural processes such as erosion and fires; greater effects occur where human activities accelerate the natural processes. Deforestation and intensive cultivation of agricultural land are examples of activities contributing to resource disturbance. Minor vandalism and some unauthorized artifact collecting would also continue to affect the resource base. However, such processes are a part of the present conditions and no demonstrable effects beyond the present conditions would be expected.

The Agency concludes that impacts to prehistoric and historic resources in the Bull Mountains associated with disapproval of the proposed Project would be negligible.

b. Impacts to Native American (traditional) resources in the Bull Mountains area associated with the disapproval of the proposed Project.

Native American resources are currently affected by natural processes such as erosion and fires; greater effects occur where human activities accelerate the natural processes. Intensive cultivation of agricultural land would contribute to resource disturbance. Minor vandalism at rock art sites would also continue to affect the resource base. However, such processes are a part of the present conditions and no demonstrable effects beyond the present conditions would be expected.

The Agency concludes that impacts to Native American (traditional) resources in the Bull Mountains associated with disapproval of the proposed Project would be negligible.

C. COMPARISON OF ALTERNATIVES

Table IV-5 compares the Agency's conclusions regarding the intensity and duration of the Project's site-specific and cumulative impacts with those of the disapproval alternative.

TABLE IV-5
Impacts Comparison by Alternative
For Bull Mountains Mine No. 1

IMPACT TOPIC	ALTERNATIVE 1	ALTERNATIVE 2
AIR QUALITY		
Impacts to air quality in/around the surface facility complex.	Minor over short term and negligible over long term.	Negligible impacts.
Impacts to air quality along/around rail spur.	Minor over short term and negligible over long term.	Negligible impacts.
Impacts to air quality from coal trucks on U.S. Highway 87, Highway 312, and Heath Street.	Minor to moderate over short term and negligible over long term.	Negligible impacts.
Impacts to air quality in/around Huntley area from the Huntley loadout.	Minor to moderate over short term and negligible over long term.	Negligible impacts.
GEOLOGY		
Impacts to stability of slopes and sandstone cliffs in/around life-of-mine area.	Minor over short term and negligible over long term.	Negligible impacts.
TOPOGRAPHY		
Impacts to the topography of surface facility complex.	Moderate to major over short term and minor to negligible over long term. Irretrievable loss of topographical diversity due to WDA.	Negligible impacts.
Impacts to topography in/around life-of-mine area.	Minor over short term and negligible over long term.	Negligible impacts.
Impacts to topography along the rail spur.	Moderate over short and long terms.	Negligible impacts.
SOILS		
Impacts to soil productivity in areas of mining-related surface disturbance.	Moderate to major over short term and minor over long term. Productivity losses under track ballast would be irretrievable.	Negligible impacts.

TABLE IV-5 (Continued)

IMPACT TOPIC	ALTERNATIVE 1	ALTERNATIVE 2
HYDROLOGY		
Impacts to ground and surface water supplies in/around life-of-mine area from mining-related subsidence.	Minor to moderate over short and long terms.	Negligible impacts.
Impacts to water quality in/around the life-of-mine area from subsidence.	Negligible to minor over short and long terms.	Negligible impacts.
Impact to ground water quality and quantity in/around life-of-mine area from well operation.	Minor over short term and negligible over long term.	Negligible impacts.
Impacts to ground and surface water quality in sections 12 and 13 from mine waste disposal.	Negligible to minor over short and long terms.	Negligible impacts.
Impacts to ground water quality in the Huntley area from loadout operation.	Negligible over short and long terms.	Negligible impacts.
Impacts to alluvial ground water supplies in the Huntley area from water supply well at the loadout.	Negligible over short and long terms.	Negligible impacts.
VEGETATION		
Impacts to wetlands in/around life-of mine area.	Moderate over short term and minor over long term.	Minor impacts.
Impacts to wetlands along rail spur.	Minor over short term and negligible over long term.	Negligible impacts.
Impacts to vegetative productivity and stability along powerline and rail corridors.	Moderate to major over short term depending on revegetation success and weed invasion and negligible over long term. Irretrievable loss of productivity until reclamation was successful.	Negligible to minor impacts.
Impacts to vegetative productivity and stability within the surface facility complex and Huntley loadout.	Moderate over short term and negligible over long term. Irretrievable loss of productivity until reclamation succeeded.	Negligible impacts.

TABLE IV-5 (Continued)

IMPACT TOPIC	ALTERNATIVE 1	ALTERNATIVE 2
WILDLIFE		
Impacts to tree- and cavity-nesting birds in/around life-of-mine area from subsidence.	Minor over short term and negligible over long term.	Negligible impacts.
Impacts to sharp-tailed grouse nesting and brood-rearing habitat, turkey habitat, and mule deer winter range from the WDA.	Minor over short term and negligible over long term.	Negligible impacts.
Impacts to elk, deer, and antelope in Bull Mountains area from increased human activity and mining-related activity.	Minor over short term and negligible over long term.	Negligible impacts.
Impacts to wildlife productivity within life-of-mine area from mining-related subsidence.	Minor over short term and negligible over long term. For aquatic animals, minor to moderate over short term and minor over long term.	Negligible impacts.
TRANSPORTATION		
Impacts to traffic flow and public safety along public highways from mining-related traffic.	Moderate and potentially significant in first 2 to 3 years. Negligible over long term.	Minor impacts.
Impacts to traffic flow and public safety from coal train traffic crossing roads.	Minor over short term and negligible over long term.	Negligible impacts.
Impacts to the integrity/ stability of County and State roads from coal trucks.	Major and significant over short term and minor to moderate over long term.	Minor impacts.
Impacts to integrity/stability of County roads in the life-of mine area from mining-related subsidence.	Minor over the short term and negligible over long term.	Negligible impacts.

TABLE IV-5 (Continued)

IMPACT TOPIC	ALTERNATIVE 1	ALTERNATIVE 2
NOISE		
Impacts to Bull Mountains area from noise.	Minor over short term and negligible over long term.	Negligible impacts.
Impacts along the rails spur from construction and train noise.	Minor over short term and negligible over long term.	Negligible impacts.
Impacts from coal truck noise along the coal-hauling route.	Minor to moderate over short term and negligible over long term.	Negligible to minor impacts.
Impacts to the Huntley area residents from noise due to construction and operation of Huntley loadout.	Minor to moderate over short term and negligible over long term.	Negligible to minor impacts.

TABLE IV-5 (Continued)

IMPACT TOPIC	ALTERNATIVE 1	ALTERNATIVE 2
SOCIOECONOMICS		
Impacts to employment, personal income, and population.	Moderate and beneficial to Musselshell County and minor and beneficial to Yellowstone County over short term. Over long term, moderate and negative to Musselshell County and minor and negative to Yellowstone County.	In foregone benefits, moderate and negative in Musselshell County and minor and negative in Yellowstone County.
Impacts to public sector fiscal conditions.	Major and beneficial to Musselshell County and minor and beneficial to Yellowstone County over short term. Over long term, major and negative to Musselshell County and minor and negative to Yellowstone County.	In foregone benefits, major and negative in Musselshell County and minor and negative in Yellowstone County.
Impacts to law enforcement agencies.	Moderate during coal hauling to Huntley and then minor over short term. Negligible long term.	Minor impacts.
Impacts to housing in Roundup and Billings.	Minor over short term and negligible over long term.	Minor impacts.
Impacts to educational facilities.	Moderate and potentially significant over short term and negligible over long term.	Minor impacts.
Impacts to social well-being in Bull Mountains area.	Moderate and potentially significant over short term and minor long term.	Moderately negative impacts for those favoring the Project and moderately positive impacts for those opposing it.
Impacts to social well-being in Huntley area.	Moderate and potentially significant over short term and moderately positive over long term.	Moderately negative impacts for those favoring the Project and moderately positive impacts for those opposing it.

TABLE IV-5 (Continued)

IMPACT TOPIC	ALTERNATIVE 1	ALTERNATIVE 2
RECREATION		
Impacts to outdoor recreational opportunities in the Bull Mountains.	Minor over short term and negligible over long term.	Negligible impacts.
Impacts to outdoor recreational opportunities in the Huntley area from Huntley loadout.	Minor over short term and negligible over long term.	Negligible impacts.
LAND USE		
Impacts to land use in the life-of-mine area.	Moderate over short term and minor over long term. For springs, minor to moderate over short term and minor over long term.	Negligible impacts.
Impacts to land use along the rail spur from construction and train traffic.	Moderate over short and long terms. Loss of agricultural productivity and other development would be irretrievable.	Negligible impacts.
VISUAL RESOURCE/AESTHETICS		
Impacts to visuals/aesthetics in the Bull Mountains area.	Minor to moderate over short and long terms. WDA would constitute an irretrievable and irreversable commitment of visual/aesthetic resources.	Negligible impacts.
Impacts to visual/aesthetics in the Bull Mountains area from the rail spur.	Minor to moderate over short and long terms. Cuts-and-fills and structures would constitute an irretrievable and irreversable commitment of visual/aesthetic resources.	Negligible impacts.
Impacts to visual/aesthetics from Huntley loadout.	Major and significant over short term and negligible over long term.	Negligible to moderate.

TABLE IV-5 (Continued)

IMPACT TOPIC	ALTERNATIVE 1	ALTERNATIVE 2
CULTURAL RESOURCES		
Impacts to prehistoric and historic resources.	Impacts minor and permanent. Loss of NHRP-eligible sites would be irretrievable. Data recovery could be beneficial.	Negligible impacts.
Impacts to Native American resources.	Impacts minor, permanent, and potentially significant. Some potentially sensitive areas may be irretrievably disturbed.	Negligible impacts.

CHAPTER V

CONSULTATION AND COORDINATION, PUBLIC PARTICIPATION, AND REVIEW

A. CONSULTATION AND COORDINATION

In the course of processing Meridian's application for its proposed Bull Mountains Mine No. 1, the Agency consulted or coordinated with a variety of State, Federal, and local agencies.

- Montana Department of Fish, Wildlife and Parks was contacted to provide consultation on wildlife matters.
- Montana State Historic Preservation Officer was contacted regarding cultural and historic resources in the area.
- Montana Department of Transportation, Rural Planning Section, was contacted regarding impacts to roadways and transportation corridors.
- Montana Department of Health and Environmental Sciences was contacted regarding air and water quality issues.
- Montana Department of Labor and Industry, Billings Job Service Office, was consulted regarding labor statistics in the Project area.
- The Endangered Species Field Office (Helena, Montana), U.S. Fish and Wildlife Service (USFWS), was contacted regarding Federal threatened and endangered species that could inhabit or otherwise use the proposed Meridian mine permit, rail spur, and power line areas.
- Musselshell and Yellowstone County Sheriff's departments, Billings Police Department and Montana Department of Justice, Highway Patrol Division, were contacted regarding law enforcement and traffic impacts.
- School districts in Musselshell and Yellowstone counties were contacted regarding the impact of additional students to area schools and times of school bus routes on roadways proposed for use in hauling coal.
- Yellowstone County and the cities of Billings and Roundup were contacted regarding public works capacities and recreational facilities.
- Montana Department of State Lands, Hard Rock Bureau was consulted regarding the operation of the rock quarry.

- U.S. Department of the Interior, Bureau of Land Management (BLM) was contacted about land use permitting requirements within the WDA and coal-mining issues in the Bull Mountains area.

- U.S. Department of the Interior, Office of Surface Mining (OSM) was consulted about the Project in general, Federal jurisdictions, and NEPA requirements.

- Montana Department of Natural Resources and Conservation was consulted about compliance with the Montana Major Facility Siting Act and other powerline issues.

- Montana Department of Justice, Fire Prevention and Investigation Bureau, State Fire Marshal was contacted regarding fire safety issues in and around the surface facility complex.

- Interstate Commerce Commission (ICC), Section of Energy and Environment, was contacted about regulatory requirements for the rail spur.

B. PUBLIC PARTICIPATION

A formal period for submitting written comments on the scope of the EIS analysis occurred from May 9, 1990, through July 9, 1990. A notice of intent to prepare an EIS on the Bull Mountains Mine No. 1 proposal was published in the May 9, 1990, Federal Register (55 F.R. 19365) and the Agency mailed 3000 brochures to households in the Roundup, Huntley and Broadview area. The notice and brochures included a description of the proposed Project, and a request for public participation in determining the scope of the issues to be addressed in the EIS. Seventy-nine comment letters on the scope of the EIS analysis were received. The Agency held two public meetings to obtain public input on the scoping process. Twenty people attended the first public meeting in Billings, Montana on June 11, 1990. Seventy-seven attended the second meeting, in Roundup, Montana on June 12, 1990.

Huntley Community Club sponsored 3 public meetings in Huntley, Montana to discuss various aspects of the proposal. Eighty-two people attended the first meeting, January 31, 1991. Montana DSL made a presentation and held a discussion on the permitting and EIS processes and the Project including the use of the Huntley loadout. Fifty-three people attended the second meeting, May 29, 1991. This meeting featured a presentation by Montana Department of Transportation on issues related to coal truck traffic, subsequent highway degradation, and use of the Huntley loadout. Fifty-eight people, including the Yellowstone County Commissioners, attended the third public meeting July 31, 1991. Montana DSL made a presentation, and discussion focused on the use of tax revenue for road maintenance, the use of the Huntley loadout, air quality, and general aspects of the Project.

The House Natural Resources Committee of the Montana House of Representatives held hearings on the Project in Helena, Montana on April 22, 1991, and January 9, 1992.

Numerous impact topics regarding Meridian's proposal were identified during these scoping activities. Many of these topics were evaluated as part of the impact analyses of the EIS in Chapter IV. Those topics not formally addressed are discussed in the following sections of this chapter along with the Agency's rationale for not including them in Chapter IV.

After the date of publication of the draft EIS, on August 31, 1992, the Agency opened a 35-day comment period during which it received public comments on, and review of, the draft EIS. Written comments on the draft EIS were accepted at the Agency's address shown on the cover sheet.

Public meetings were held in Huntley, Montana on September 22, 1992, in Billings, Montana, on September 23, 1992, and in Roundup, Montana, on September 24, 1992, to receive comments on the draft EIS.

The final EIS will be available for public review at the Helena and Billings offices of Montana DSL. The addresses of these offices are listed on the cover sheet and in Chapter I.

This final EIS presents revisions to and clarifications within the text, and public comments on the raft EIS and responses to those comments.

Montana DSL can make a decision whether to approve or disapprove Meridian's proposed Project no sooner than 15 days following public release of this final EIS.

C. PUBLIC ISSUES CONSIDERED BUT ELIMINATED FROM FURTHER ANALYSIS

For various reasons, the Agency evaluated but determined not to address a few topics concerning the applicant's proposal that were identified by the public during scoping activities. A list of these topics, along with the Agency's rationale for not analyzing them, follows:

- Endangered or threatened wildlife or plant species protected by the Endangered Species Act of 1973.--

  On June 21, 1990, consultation was initiated with USFWS, regarding Meridian's permit application, by requesting a list of protected species from USFWS that could occur in the vicinity of the proposed Project. On June 29, 1990, USFWS responded with a list indicating that the Bald Eagle (Haliaeetus leucocephalus,) Peregrine Falcon (Falco peregrinus,) and Black-footed Ferret (Mustela nigripes) constitute the protected species that could occur within and near the Project life-of-mine area, rail spur right-of-way, powerline easement, and Huntley loadout. An updated species list was requested on November 20, 1991, and USFWS confirmed the original list on December 13, 1991. On February 21, 1992, a biological assessment of these species was prepared. The assessment concluded that the proposed Project would not affect protected species named on USFWS's list. On March 3, 1992, USFWS concurred with the determination of no effect. Because no endangered or threatened wildlife or plant species would be affected by developing the proposed Project, the Agency did not identify and analyze probable impacts to such species.

- Permitting of coal-mining activity under the Montana Strip and Underground Mine Reclamation Act (MSUMRA) of 1973 as amended.--

  The public expressed concern about the adequacy of the proposal, including the overall reclamation plan, the enforcement of reclamation after mining ceased, the monitoring of surface and ground water, and the replacement of water resources. These concerns were eliminated from specific analysis in this EIS because existing provisions in State law address each of the issues, and because the permit application package submitted by Meridian is assumed to be in compliance with all applicable State and Federal laws (see Chapter IV, Assumptions for Alternative 1).

  MSUMRA was enacted on March 16, 1973 by the Montana State Legislature for the purpose of protecting the environment, conserving natural resources, demanding effective reclamation of all lands disturbed by the taking of natural resources, setting effective requirements and standards, providing for orderly development of coal resources, and providing proper State administration and enforcement in order to achieve these objectives. The Act requires that an operator desiring a permit shall file an application which shall contain a complete and detailed plan for the mining, reclamation, revegetation, and rehabilitation of the land and water to be affected by the operation. Such a plan must also provide a determination of the probable hydrologic consequences of coal mining and reclamation operations, both on and off the mine site, with respect to the hydrologic regime. Sufficient data on the mine site and surrounding areas must also be collected so that cumulative impacts on hydrology can be determined.

  The Act also specifies that each applicant for a coal mining permit must file a surety bond payable to the State of Montana conditioned upon the faithful performance of the requirements set forth in the Act and in an amount not less than the total estimated cost to the State of completing the work described in the reclamation plan. Each operator granted a permit is required to reclaim and revegetate the land affected by an operation. As a condition to all mining permits, the Act also gives the regulatory agency the right of entry to all mining areas for the purpose of inspecting records, operations and monitoring equipment, as well as the authority to take appropriate enforcement actions if a coal-mining operation is found to be in violation of the Act. The specific roles and responsibilities of various State and Federal agencies involved in Project approval are described in Appendix D.

- Future coal markets for coal from the Bull Mountains Mine No. 1.--

  The public expressed some concerns about the coal market and its relation to Bull Mountains coal. Specifically they were concerned about the applicability of Federal "monopoly restrictions" to Meridian's mining activities, the potential markets for Bull Mountains coal, and the impacts of the western coal glut on the economic feasibility of underground coal mining in the Bull Mountains over the next 40 years. After identifying these issues, the Agency decided to eliminate them from further consideration because they relate to larger national issues that pertain to coal supply, demand, production or a

competitive market system beyond the scope of this EIS. See Chapter I for a description of the scope of the EIS analysis.

- The Bull Mountains coal for land exchange.--

  Issues associated with the approval or disapproval of the Bull Mountains land exchange were analyzed in the BLM's Bull Mountains Exchange Final EIS (Bureau of Land Management 1990b). This EIS addressed the proposed exchange of 3,674.36 acres of Federal coal estate for 9,873.18 acres of high-value recreation and wildlife lands. The analysis also covered concerns the public had expressed regarding impacts to State royalty revenue losses if the proposed land exchange were finalized. BLM selected the proposed exchange action as its preferred alternative.

  The Administrative Rules of Montana directs agencies to "tier" from program, policy, or plan EISs of broad scope to those of a narrower scope, to eliminate repetitive discussions, and to exclude issues already decided. Therefore, since the BLM's Bull Mountains Exchange Final EIS previously addressed issues associated with the land exchange and subsequent development of Federal coal resources in a large portion of the Bull Mountains area, the Agency has eliminated such issues from the current EIS analysis. See Chapter I for a more detailed description of the scope of the EIS analysis.

- Whitney Benefits Inc. and Peter Kiewit Sons' Company vs. U.S.--

  The public raised the question of whether the Whitney Benefits legal decision applied to mining activity in the Bull Mountains. The legal decision addressed the issue of whether the U.S. Claims Court correctly concluded that the enactment of Surface Mining Control and Reclamation Act's (SMCRA) prohibition of surface mining of alluvial valley floors (AVFs) constituted a taking of the Whitney Benefits coal property in Sheridan County, Wyoming. The case dates from 1973 when Peter Kiewit Sons' Co. offered to buy mining rights to Whitney Benefits coal under an AVF. In December 1974 the 2 companies signed a lease giving Peter Kiewit Sons' the right to mine the coal in exchange for royalties. Peter Kiewit Sons' filed a permit application with the Wyoming Department of Environmental Quality.

  The enactment of SMCRA on August 3, 1977 contained provisions specifying that surface mining could not "interrupt, discontinue, or preclude farming on AVFs that are irrigated or naturally subirrigated." Wyoming denied the permit application with the explanation that a large portion of the coal was under an AVF. After failing to agree on an acceptable exchange of lands with the U.S. Department of the Interior, the companies filed a complaint with the U.S. Claims Court, charging that SMCRA had deprived them of "all economically viable use" of their property. The Court ruled in favor of the companies and awarded them damages, finding that SMCRA "had a devastating economic impact on the companies' property." The decision was appealed unsuccessfully by the Federal Government.

After considering this issue, the Agency eliminated it from further analysis because the legal case of Whitney Benefits Inc. and Peter Kiewit Sons' Company vs. U. S. pertained to a government "taking" of coal property involving an alluvial valley floor, which related to a permitting application that happened to be pending at the time of the SMCRA enactment. The Whitney Benefits case is not believed applicable to mining activity in the Bull Mountains and, therefore, its impact is beyond the scope of the current EIS.

- Fiscal management of State and County governments in Montana.--

  The public voiced some concerns about the effect of the proposed Bull Mountains mining operation on State and County governments. These concerns related to whether the State would receive adequate reimbursement for the removal of coal from the region; whether staffing/pay levels at the Department of State Lands were adequate to ensure proper monitoring of the mining activity; and whether County operational problems, particularly in regard to road repair, would be exacerbated by the proposed mining activity. The Agency concluded that concerns of this type are related to the fiscal management of State and County governments rather than to the specific proposal to mine coal in the Bull Mountains. Nothing in the proposed action would affect how the respective levels of government staff their departments, maintain pay scales, or budget and disburse funds for particular projects. Therefore, since all of these issues are beyond the scope of analysis for this EIS, the Agency did not attempt to identify and analyze associated impacts. See Chapter I for a full description of the scope of the EIS analysis.

- Management of private lands controlled by Meridian.--

  The public raised some concerns about Meridian's past, present, and future land management and development policies, along with concerns about economic impacts to local ranchers if Meridian canceled lease agreements. Reclamation and land use requirements set forth in MSUMRA provide adequate regulation of land management and development of disturbed land within the mine permit area during mine life. MSUMRA requires that postmining land use for a permit area must be: grazing land for livestock and wildlife, fish and wildlife habitat, or both, unless alternate reclamation is approved by the regulatory authority. Meridian's future development and management of land that has not been disturbed within the permit area, and plans for privately controlled land outside of the proposed permit area, are unrelated to the proposed Bull Mountains Mine No. 1 and beyond the scope of the EIS analysis.

- Future development of the Bull Mountains Mine No. 1 life-of-mine area.--

  The public expressed concerns that future development of the Bull Mountains Mine No. 1 life-of-mine area could result in unanticipated environmental impacts. The concerns included questions about the disposal of fly/bottom ash and other hazardous waste material at the mine site, the impact if a mouth-of-the-mine power plant is constructed in the future, the impact if coal is mined elsewhere in the region from the same coal deposit, and the possible impacts from future petroleum exploration and extraction

projects that might occur in the region. The majority of these concerns were found to be of a speculative nature, unconnected to any part of the proposed mining plan or to any event likely to occur in the foreseeable future.

The environmental impact of handling and disposing of mine wastes in an unanticipated manner was considered as an alternative in Chapter II, but then eliminated from further analysis since it was found to be economically impractical and generally incompatible with the longwall method of coal removal. The construction of a power plant at the mine mouth was also dropped from the current analysis of issues since it is only speculation at the present time, and any future action regarding a power plant would require formal State and Federal approval and additional permits. The Agency could find no evidence to suggest that other operators intend to mine coal from the same deposits in the foreseeable future, so this issue was eliminated from further consideration. The concern about future petroleum exploration and extraction in the region was determined to bear little relevance to the proposed mining action and was also eliminated from further consideration. In summary, the Agency determined that there was insufficient evidence to suggest that any of these events might occur in the reasonably foreseeable future in or near the life-of-mine area and that an analysis of the potential impacts was beyond the scope of this EIS. See Chapter IV and Appendix B for a list of cumulative assumptions used by the Agency to perform the impact analysis. New projects would have to comply with all State and Federal laws including MEPA. Cumulative impacts of these projects would be addressed during environmental review.

- Future development of a chrome refinery by the Chrome Corporation of America and other mineral activity in the area.--

The Agency considered public concerns about impacts associated with the chrome refinery proposed to be built by the Chrome Corporation of America, east of Huntley, and also about impacts associated with an increase in other mining activity in Stillwater County. A preliminary analysis determined that the only measurable impact from either of these developments would be socioeconomic factors that could occur in the Billings area if related construction of facilities occurred at the same time as construction of the Project. If either or both of the other projects were concurrent with the construction of Bull Mountains Mine No. 1, there would be an increase in local population growth that could potentially impact social services, housing availability, school capacity, and other resources. However, construction of the chrome refinery is merely a proposal rather than a reality, and any concerns about the resulting impacts are based on speculation rather than fact. The Agency found no evidence to suggest that any increase in other mineral activity in Stillwater County is likely during the construction of proposed Bull Mountains Mine No. 1. Because these concerns are unrelated to the proposed mining plan or to events that are likely to occur in the reasonably foreseeable future, the Agency determined them to be beyond the scope of the EIS analysis.

D. REVIEW

This EIS has been mailed to all parties who have expressed an interest in receiving it. Additional copies of the document are available on request from Montana DSL addresses shown on the cover sheet. Copies of the EIS were mailed to the following State and Federal agencies:

Montana College of Mineral Science & Technology

Montana State University

Montana Bureau of Mines & Geology

Montana Department of Agriculture

Montana Department of Commerce, Montana Coal Board

Montana Department of Fish, Wildlife & Parks

Montana Governor's Office

Montana Environmental Quality Council

Montana Intergovernmental Review Clearinghouse

Montana Department of Health and Environmental Sciences

Montana State Historic Preservation Office

Montana Department of Natural Resources and Conservation

Montana Department of Revenue

Montana Department of Transportation

University of Montana

Montana State Library

U.S. Bonneville Power Administration

U.S. Bureau of Indian Affairs

U.S. Bureau of Land Management

U.S. Bureau of Mines

U.S. Forest Service

U.S. Office of Surface Mining

U.S. Soil Conservation Service

U.S. Bureau of Indian Affairs

U.S. Fish & Wildlife Service

U.S. Geological Survey

U.S. Interstate Commerce Commission

U.S. Environmental Protection Agency

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CHAPTER VIII

GLOSSARY

Above-grade crossing: Railroad route that runs via an overpass or bridge above a motor vehicle route.

Alluvial: Pertaining to material or processes associated with transportation or deposition by running water.

Angle of draw: In mining, the angle between limit line and a vertical reference line drawn from the edge of the mine area. The angle of draw is used to calculate the limit of subsidence beyond the boundaries of the mined area and is expressed in degrees from vertical above the edge of the mined area.

ANFO: Ammonia Nitrate Fuel Oil, used as a blasting compound in coal mining.

Annuals: Plants that complete their life cycle and die in 1 year or less.

Aquifer: A water-bearing layer of permeable rock, sand, or gravel.

At-grade crossing: An intersection of railroad and motor vehicle routes at ground level.

Backfilling and grading: The operation of refilling an excavation and finishing the surface.

Backstowing: The process whereby waste product from the mineral benefication plant (wash plant) is hauled or piped back into the underground voids created by mining. To place the coal waste rock back underground in the abandoned mine working.

Baghouse: An air pollution abatement device used to trap particulates by filtering gas streams through large fabric bags, usually made of glass fibers.

Bench face: The surface of an excavated area at some point between the material being mined and the original surface of the ground on which equipment can be set, moved, or operated.

Bentonite: A highly plastic clay that swells extensively when wet.

Berm: A strip of coal left in place temporarily for use in hauling or stripping, or a layer of large rock or other relatively heavy, stable material placed at the outside bottom of the spoil pile to help hold the pile in position. Also a mound of dirt to contain, control, or delineate.

Bond release: Return of a performance bond to the coal operator after the regulatory agency has inspected and evaluated the completed reclamation operations and determined that all regulatory requirements have been satisfied.

Borrow materials: Soil or rock dug from 1 location to provide fill at another location.

Borrow or fill areas: Places where earth material is removed or added for construction purposes.

Broadcast seeding: Scattering seed on the surface of the soil.

Bulkhead: A structure or partition to resist pressure. A wall.

Catchment: A reservoir or basin developed for flood control or water management for livestock and/or wildlife.

Clean coal: Coal that has been processed to remove impurities.

Coal jig: A device that separates coal from foreign matter by means of their difference in specific gravity in a water medium.

Coal loadout: Area/facility where coal is loaded onto some form of transport for delivery to market.

Coal preparation plant: A facility where coal is sized, cleaned and prepared for transport.

Coal refuse pile: Storage mound of coal waste material.

Coal reserve: The quantity of recoverable coal that is calculated to lie within given boundaries.

Coal rider seams: Thin, unmovable seam closely above a thicker, minable coal body normally only a few inches thick.

Coal waste: All the coal refuse from a mine.

Compressional recovery: As overburden rocks flex downward into the mined area they are acted on by tensile stress, which can cause elongation and cracking. As the mining face passes away from a point, the area of tensile stress moves away as well. As settling occurs, overburden rocks are acted on by compressional stress, which can cause shortening and closing of tensional phase cracks. Compressional recovery is the return of the rock column to its approximate state of premining stress and strain.

Continuous miner: A machine with a continuous excavating drum, used to extract coal from the face in room-and-pillar mining. It also loads that coal into cars or conveyors without the use of cutting machines, drills, or explosives.

Deformation zone: The uppermost zone of subsidence-related deformation that can develop above a mined area is called the "deformation zone". The overburden rocks in this zone sag downward without major fracturing, thus their lateral continuity is maintained. The rocks can pull apart or separate along bedding planes. The deformation zone generally extends from the top of the fractured zone to the ground surface.

Detonating cord: A cord manufactured by explosives companies that burns at a rate of thousands of feet per second, creating the effect of an explosion (violent shock and loud report).

Disturbed area: An area where vegetation, topsoil, or overburden is removed or upon which topsoil, spoil, and processed waste is placed as a result of mining.

Diurnal: Relating to or occurring in the daytime.

Dozer-tracked: Having operated a bulldozer on the surface of an area for the purpose of packing down the soil to firm the seedbed, to cover seed, and to impede wind erosion.

Drill seeding: A mechanical means of planting seed in relatively narrow rows.

Drop trailers: Trailers that are loaded with supplies and deposited at locations where the supplies will be used. The trailers serve as storage units on site until a time when supplies are used, and then are retrieved.

Edaphic: Having to do with the influence of soils on living things, particularly plants, including human use of land for plant growth.

Effluent limitations: Regulatory standards that apply to the discharge or outflow of water from ground or subsurface storage.

Energy dissipators: Device/structure used to reduce the velocity/energy of flowing water.

Ephemeral stream: A stream that flows only in direct response to rainfall and snowmelt events; having no baseflow.

Evaporation pond: An impoundment area where water is retained and allowed to evaporate.

Exploration holes: Boreholes drilled into the ground while searching for coal deposits.

Extensometers: An instrument for measuring minute deformations of test specimens caused by tension, compression, bending, or twisting.

Eyrie: The nest of a bird on a cliff or mountain top.

Fractured zone: The intermediate zone of subsidence-related deformation that can develop above a mined area is called the "fractured zone". Overburden rocks in this zone fracture and deform as they sag downward into the mined area, but still maintain their lateral continuity. Rocks can pull apart or separate along bedding planes. The fractured zone can extend upward above the mined area to a height that is 50 times greater than mining height.

Fragmented zone: The zone of subsidence-related deformation that can develop immediately above and within a mined area is called the "fragmented zone". Overburden rocks in this zone fragment, cave, and rotate as they collapse into the mined area. The fragmented zone can extend upward above the mined area to a height that is 10 times greater than mining height.

Full-seam recovery: Entire section of seam is dislodged by mechanical mining methods and the coal is separated from the rock outside of the mine by the cleaning plant.

Geotechnical responses: Processes which change the properties of soils, including compaction, freezing, groundwater lowering, and injection.

Grubbing: Removing vegetation and other material from a surface area prior to mining or mining-related disturbance.

Harrowed: Cultivated and smoothed soil done with an implement equipped with spikes, teeth, or disks.

Head of fill: Upper limit of a material fill.

Head-of-hollow filling: The placement of overburden material from mines in compacted layers in narrow, steep-sided hollows so that surface drainage is possible.

Heavy media bath: Dense chemical solution used to remove rock contaminants while cleaning coal.

Heterogeneities: Dissimilar ingredients or constituents.

Highwall: The unexcavated face of exposed overburden and mineral on the bank of the uphill side of a strip-mining excavation.

Horizonation: See definition of soil horizon.

Hydraulic conductivity: A measure of the ease with which water moves through soil or rock; permeability.

Incised: Having a margin that is deeply and sharply notched.

Joint: Fracture in rock, generally more or less vertical or transverse (lying across), along which no movement has occurred.

Lek: An assembly area where animals, especially grouse, carry on display and courtship behavior.

Life-of-mine: Length of time from permitting to final bond release during which coal can be extracted and mine-related activities can occur.

Limit line: The limit line is a straight line drawn from the edge of the mine area to the limit of measurable subsidence at ground surface.

Longwall mining: A method of mining whereby most of the coal is mined and the roof is allowed to cave in behind the miners as work progresses.

Longwall panel: The vertical face that is left intact as longwall mining work progresses toward the boundary of the mine.

Mass wasting: A general term for a variety of processes by which large masses of earth material are moved by gravity either slowly or quickly.

Mesic: Moderately moist.

Micro climate: The essentially uniform climate of a small site or place.

Micro relief: Small topography.

Mine waste disposal area: Designated place within the mine permit area, and approved by the regulatory authority, where coal processing waste and underground development waste is disposed of in a controlled manner.

Mitigation: Rectifying an impact by repairing, rehabilitating, or restoring the affected environment.

Natural reinvasion of species: The migration and re-establishment of organisms into former habitat, without human assistance.

Net swell factor: "Net swell factor" or "bulking factor" is the volumetric increase of fragmented rocks relative to their undisturbed and in-place volume. The bulking factor is controlled by the size and shape of broken rocks, geometry of the cave zones, contact stresses among rock fragments, and relative strengths of affected rocks.

Nonerodible velocities: The speed at which water can travel without surface erosion.

Non-slaking rock: Earth material that does not crumble and disintegrate when exposed to air or moisture.

O and M: Operation and maintenance.

Opportunistic species: A species that can adapt to, and take advantage of, a variety of habitats or situations. This ability provides a benefit to the species in its distribution, numbers, and survival during changing conditions.

Overburden: Material of any nature that overlies a coal deposit, excluding topsoil.

Particulate emissions: Finely divided solid or liquid particles discharged into the air in the form of dust, smoke, fumes, mist, spray or fog.

Pascal: A pascal is a unit of pressure in the metric system and is defined as a newton/meter^2, where newton is a unit of force with units of kilogram x meter/second^2.

Passerine: The largest order of birds, including most songbirds.

Perched water table: Ground water contained above an impermeable bed and underlain by an unsaturated zone.

Perennial stream: A stream that flows throughout the year.

Perennials: Plants that live longer than two years.

Permanent seed mixes: Blends of seeds used to revegetate an area for final reclamation.

Portal: The entrance to a mine.

Postmining land use: The specific use or management related activity to which a disturbed area is restored after completion of mining and reclamation.

Postmining topography: The relief and contour of the land that remains after mining has been completed.

Potentiometric surface: An imaginary surface representing the total head of ground water and defined by the level to which water will rise in a well. A water table is a particular potentiometric surface.

Precipitation event: A quantity of water resulting from drizzle, rain, snow, sleet, or hail, in a limited period of time.

Propagule: A cutting, seed, or spore from which a plant grows.

Radial stacker: A machine used to stack coal in a radial arc.

Raise boring: The process of drilling (boring) a raise (vertical shaft) from the bottom up. First a vertical hole is drilled from the surface down into the mine workings. The cutter heads (boring machine) are brought into the underground mine workings. The rotary table (rotating mechanism) is placed over the hole at the surface, and the cutter heads are connected to the rotary table by a long pipe. As the cutting heads are rotated and pulled upward, earth is cut and falls back into the underground mine workings where it is hauled out to the surface or placed somewhere else in the mine.

Raptors: Birds of prey (e.g., hawks, owls, vultures, eagles).

Reclaim system: A system of tunnels and conveyor belts built beneath the coal storage pile for moving the coal out of the pile and onto transport units (trains or trucks).

Reclaim tunnel: A tunnel used to retrieve coal from storage above.

Recontouring: The movement of quantities of earth, usually by mechanical means, to reconfigure the relief and contour of the land.

Replacement wetlands: Lands created through human intervention to replicate the original wetland area, where the water table is usually at or near the surface.

Revegetation: Plant growth that replaces original ground cover following land disturbance.

Ripping: The act of mechanically breaking compacted soils or rock into pieces small enough to be economically transported by other equipment such as a scraper or dozer.

Riprap: A layer of broken rock, cobbles, boulders, or fragments of sufficient size and thickness to resist the erosive forces of flowing water.

Rock check dams: A dam of loose rock usually dumped in place, often with the upstream part constructed of hand-placed or derrick-placed rock and faced with rolled earth or with an impervious surface of concrete, timber, or steel.

Room-and-pillar mining: A method of mining that involves mining out rooms and leaving pillars of coal for overhead support.

Run-of-mine (ROM): Pieces of unprocessed coal removed from a mine.

Salvaging depth: The distance below land surface from which soil can be retrieved.

Sandstone lenses: Many of the sandstones associated with coal seams were deposited by fluvial (river) processes. This type of sandstone tends to be longer in one direction than in the other. The elongated axis is parallel to, while the shorter axis is perpendicular to, the direction of water flow in the ancient river. In cross section, fluvial sandstones appear to be lens-shaped and often are surrounded by finer-grained rocks such as siltstones and shales.

Scoria (clinker): Baked and fused rock resulting from in-place burning of coal deposits.

Sedimentation pond: A structure such as a barrier, dam, or excavated depression that slows down runoff for the purpose of allowing sediment to settle out.

Seep: An extensive line or surface seam where water emerges from the ground as contrasted with a spring where water emerges from a localized spot.

Seral stage: Developmental stage in the natural sequence of plant communities.

Small depressions: Shallow basins of limited size on the land surface that may retain moisture.

Soil Horizon: A distinct layer of soil, approximately parallel to the land surface, and differing from adjacent genetically related layers in physical, chemical, and biological properties or characteristics.

Spoil stockpile: A supply of waste material that is gradually accumulated as overburden is removed during mining.

Spring enhancement: A process that improves the quality/quantity of a source of water issuing from the ground.

Stilling basin: An open structure or excavation at the foot of an overfall, chute, drop, or spillway to reduce the energy of the descending stream.

Strain: Deformation resulting from an applied force. In mining, strain is one type of deformation caused by the downwarping of overburden rocks into the mined area. Horizontal strain is the ratio of the change in length of the ground surface to its original length that is caused by curvature. This can be extended (defined as positive) or shortening (described as negative). Surface strain caused by subsidence is one of the primary causes of damage to structures at the surface.

Strata: A single sedimentary bed or layer, of any thickness.

Stratabound: A mineral deposit confined to a single layer, bed, or stratum.

Subsidence: A surface depression over, and created by, underground mining.

Syncline: A trough of stratified rock in which the beds dip toward each other from either side.

Temporary seed mixes: Blends of seeds used to revegetate an area for a limited period of time prior to final reclamation.

Tensile strain: A normal stress that tends to pull apart materials on opposite sides of a real or imaginary plane.

Tilt: In mining, tilt (or change of slope) is one type of deformation caused by the downwarping of overburden rocks into the mined area. Tilt is the change of vertical displacement with respect to unit horizontal distance of the original ground surface. Tilt between two points of measurement along a subsidence profile can be calculated using data collected by subsidence monitoring and the following equation:

$$M_t = \frac{S_{t+1} - S_t}{X_{t+1} - X_1} = \frac{\Delta S_1}{1}$$

where X_{t+1} and X_1 are the two points, Δ is the first descending finite difference of tabulated vertical displacements at these two points and 1 is the distance between the two points, which is a constant that is small enough such that the curved surface over the interval can be approximated by a straight line. Tilt caused by subsidence is one of the primary causes of damage to structures at the surface.

Toe of the final slope: Bottom portion of an incline after mining-related disturbance has been completed.

Topsoil/subsoil stockpile: Soils that are removed prior to mining and gradually accumulated for reclamation and revegetation once mining is completed.

Tube stacker: A machine that stacks coal in a conical pile.

Underburden: Material of any nature, consolidated or unconsolidated, that underlies a coal deposit, excluding topsoil.

Underground reclaim: A tunnel that is used for removing waste material from a mine.

Ungulate: An animal having hooves.

Unit train: Generally, a train of 100 coal cars. Each car holds 100 tons for a total of 10,000 tons being moved in each unit train.

Unsuitable material: Material that fails Montana DSL standards for use in reclamation, or placement within an aquifer.

Vegetation sampling: The selection of a number of plants (a sample) from a larger number of plants (the universe).

Wildlife habitat: A geographical area that can provide for the key activities of wildlife.

Windrow: A row of hay raked up to dry before baling.

APPENDIX A

SUMMARY DESCRIPTION OF THE PROPOSED BULL MOUNTAINS MINE NO. 1 AND ASSOCIATED FACILITIES

A. INTRODUCTION

Meridian Minerals Company (Meridian) proposes to develop the Bull Mountains Mine No. 1, an underground coal mine located along the southern boundary of Musselshell County, about 35 miles northeast of Billings, Montana, and 16 miles southeast of Roundup, Montana (see Figure I-1). Support facilities for the proposed mine would be located throughout Musselshell and Yellowstone counties. The proposed Project has 5 elements: 1) the mine; 2) a temporary upgrade of the existing Montana Rail Link rail loadout near Huntley; 3) a proposed 33-mile rail spur from the Burlington Northern mainline south of Broadview; 4) a 17-mile upgrade and extension of the Fergus Electric Cooperative power transmission line from the City of Roundup; and 5) limited wetland enhancement activities outside the mine area (see Figure I-2). The Bull Mountains Mine No. 1 and its support facilities (the Project) , would occupy about 12,115 acres, and would eventually disturb about 8,250 of those acres. (Table I-1).

The proposed mining operation would convert the existing PM Coal Mine and portions of the adjacent coal test pit site into a full-scale underground mining facility. (Specific details of the existing PM Mine facility and coal test pit are included in Appendix B.) The total life of the proposed mine (life-of-mine) would be about 44 years: 2 to 3 years for premining development, rail spur construction, equipment installation, and limited coal production; 30 years to recover about 100 million tons of clean coal; 1 year to complete reclamation activities; and 10 years to obtain final bond release (Table I-2). The majority of the production, varying from 0.5 to 3.3 million tons of clean coal per year, would be shipped to both domestic and foreign consumers. In addition, the mine would continue to supply the small, local market currently served by the PM Mine.

(Table A-1 contains legal descriptions for Project components.)

1. Bull Mountains Mine No. 1

The life-of-mine area for the proposed mine would contain a total of 10,859 acres of private, State, and Federal lands (Table I-1), of which 7,041 surface acres could be disturbed by mining-related activities.

About 871 acres of the life-of-mine area would be occupied by a surface facility complex to service the mining operation. The facility would disturb 770 acres beyond the 101 acres previously disturbed by the PM Mine and coal test pit.

About 6,154 acres of the life-of-mine area could experience some surface subsidence caused by proposed underground mining activities. About 93 acres, potentially affected by subsidence, would also be disturbed by exploratory drilling (50 acres), hydrologic mitigation (43 acres) activities, and associated temporary road construction.

Outside the area subject to disturbance from subsidence, an additional 6 acres of the life-of-mine area would be disturbed by ventilation shaft installation and another 10 acres would be disturbed by hydrologic mitigation activities.

TABLE A-1

Legal Descriptions of the Proposed Bull Mountains Mine No. 1 and Associated Facilities

1. Bull Mountains Mine No. 1 *

Township 6 North, Range 26 East, Montana Principal Meridian: sections 12 through 14; and
Township 6 North, Range 27 East, Montana Principal Meridian: sections 3 through 5, 7 through 11, and 14 through 23.

2. Huntley loadout

Township 2 North, Range 27 East, Montana Principal Meridian: section 25.

3. Bull Mountains rail spur **

Township 4 North, Range 23 East, Montana Principal Meridian: sections 13, 14, 22, 23, 26, 27 and 34;
Township 4 North, Range 24 East, Montana Principal Meridian: sections 12 through 18;
Township 4 North, Range 25 East, Montana Principal Meridian: sections 5 through 7;
Township 5 North, Range 25 East, Montana Principal Meridian: sections 1 through 3, 9, 10, 16, 21, 28, 29, 31, and 32;
Township 5 North, Range 26 East, Montana Principal Meridian: Section 6; and
Township 6 North, Range 26 East, Montana Principal Meridian: sections 15, 20 through 22, 29, 31, and 32.

4. Fergus Electric power transmission line **

Township 6 North, Range 26 East, Montana Principal Meridian: sections 3, 4, 10, 11, 13, and 14;
Township 7 North, Range 25 East, Montana Principal Meridian: sections 1 and 12;
Township 7 North, Range 26 East, Montana Principal Meridian: sections 7, 8, 17, 20, 21, 28, 32, and 33; and
Township 8 North, Range 25 East, Montana Principal Meridian: sections 22, 23, 26, 27, 35, and 36.

5. Wetland enhancement activities **

Township 6 North, Range 27 East, Montana Principal Meridian: section 5, 7, 13, 23, 25, 27 and 29; and
Township 7 North, Range 27 East, Montana Principal Meridian: Section 35

* = Figures include rail and powerline acreages inside the life-of-mine area.
** = Figures reflect only those acreages outside of the life-of-mine area.

Mining operations could eventually employ 300 workers (Table I-3). Construction activities would employ about 38 workers over a 2- to 3-year period.

2. Huntley Truck Haul and Loadout

Proposed construction at Huntley would expand the capability of the existing low-volume coal loadout. Coal would be temporarily stockpiled and loaded; up to 1.1 million tons of clean coal per year during the 2- to 3-year period of permanent facility and rail spur construction at the proposed mine. The existing loadout occupies about 6 acres of private land (Table I-1) adjacent to the Montana Rail Link mainline. (Specific details of the existing Huntley loadout facility are included in Appendix B.) The expanded activities at the facility would not disturb any more acreage. Coal would be hauled by truck about 41 miles over County and State roadways from the proposed mine to the upgraded loadout.

Loadout activities could eventually employ 12 workers, and truck-haul operations, 50 workers (Table I-3). Expansion (construction) activities would employ about 12 workers over a 2- to 3-month period.

3. Bull Mountains Rail Spur

The proposed 33-mile rail spur and associated right-of-way outside the life-of-mine area, would occupy about 1,160 acres of private and State land (Table I-1) between the Burlington Northern mainline and the proposed mine. Proposed road relocation activities would involve about 10 acres of new road construction within the rail right-of-way and abandonment of about 5 acres of existing roadbed outside the rail right-of-way.

Rail spur construction activities would employ about 26 workers over about a 2-year period (Table I-3).

4. Fergus Electric Power Transmission Line

The 10-mile easement for the existing Fergus Electric power transmission line, between the city of Roundup and the Roundup substation, occupies about 36 acres of private and State lands (Table I-1). Three acres of this land could be disturbed when the existing line was upgraded to 69 Kv. The 7-mile right-of-way for the installation of new 69 Kv powerline from the Roundup substation to the proposed coal mine occupies about 27 acres of private and State land outside the life-of-mine area (Table I-1). About 13 of these acres could be affected by upgrade/extension activities. Fergus Electric Cooperative and would employ about 12 workers over a 2- to 3-month period for this work (Table I-3).

5. Wetland Enhancement Outside the Mine Area

Wetland enhancement activities are proposed at certain water sources outside the life-of-mine area, away from the mine site and associated disruptive activities (see Wetland Mitigation and Enhancement). These would constitute a 9-acre enhancement "bank" of wetland resources to temporarily mitigate Project-related wetland losses during mining operations. Impacts to existing springs and seeps

and associated wetlands that might result from mining-related subsidence, would be mitigated gradually as reclamation operations progressed. The enhancement "bank" may remain as postmining wetland acreage even though other wetlands had been re-established. Enhancement activities outside the life-of-mine area would disturb about 22 acres of private land (Table I-1). Construction activities for wetland enhancement would occur throughout the mine life, using existing mine employees. The employees used should receive certified wetland restoration/construction training.

B. SURFACE FACILITIES AT THE MINE

The majority of surface facilities for the proposed mine would be centrally located on 391 acres of private land in sections 13 and 14 of T. 6 N., R. 26 E. in the western portion of the life-of- mine area (see figures I-3 and A-1). A mine waste disposal area (WDA) and its associated roads, stockpiles, and sediment ponds would be developed on an additional 480 acres of both private (379 acres) and Federal (101 acres) lands in sections 12 and 13, north and east of the main facilities area. A proposed 9-acre rock quarry would be developed in Section 12 within the boundary of the WDA. Ventilation shafts would be developed on 6 acres of private land in sections 11, 19, and 23 of T. 6. N., R. 27 E., west of the main facilities area.

Mine development and coal production would occur in 2 phases, each with its own processing facility requirements. Existing coal processing facilities for the PM Mine and Huntley loadout would be upgraded over an initial, 2- to 3-month period to support initial mine development activities and limited (Phase 1) coal production. Installation of the permanent (Phase 2) support facilities would begin after completion of Phase 1 and would require about 2 years to complete.

1. Main Facilities Buildings

A limited amount of coal would be removed during early development (Phase 1) of the mine (about 0.5 to 1.1 million tons of clean coal per year). This coal would be processed at the existing PM Mine facilities and shipped from the Huntley loadout. Three to 4 custom mobile trailer units would be transported to the mine site to house temporary office administration, warehouse, and training facilities.

Phase 2 production would require the construction of a variety of pre-engineered steel and/or concrete block structures located on concrete foundations (see Figure A-1). A combined administration office, training facility, and bathhouse would occupy a single building in the central portion of the main facilities area. A combined shop and warehouse building would be designed to provide large and small equipment repair with inside storage of spare parts. A mine rescue and ambulance building would include a training center for emergency-response personnel and parking for an ambulance and emergency fire fighting equipment. An annex (storage) building would provide covered storage for large parts and bulk materials along with a fenced storage yard. Other equipment parking and storage would be provided throughout the area. A single, coal-fired boiler, centrally located in the office/training/bathhouse building, would supply space heating and hot water for that building as well as the shop/warehouse, mine rescue/ambulance, and preparation plant buildings. Heating and hot water in other areas of the mine complex would be supplied with individual electric or propane units.

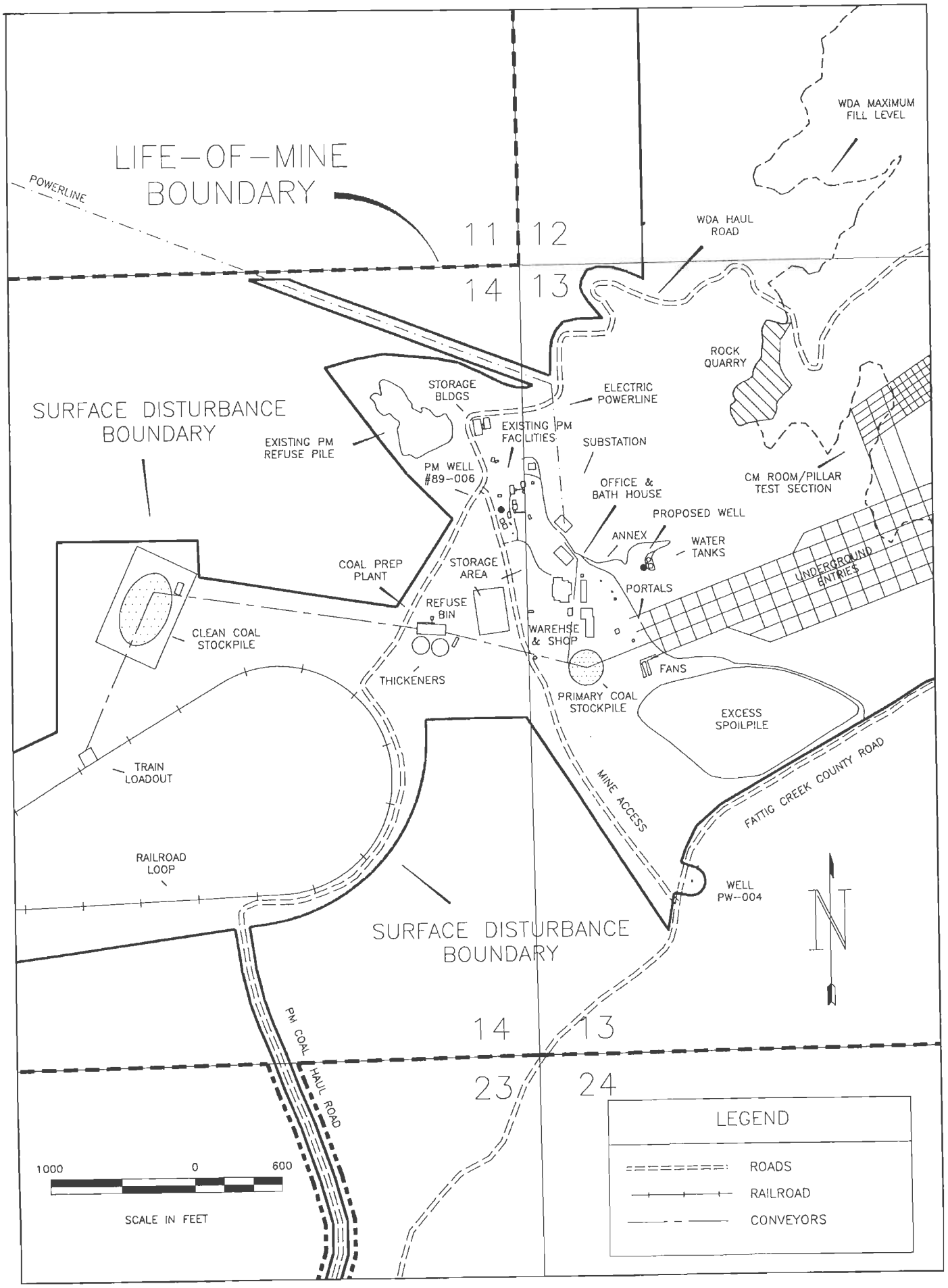


Figure A-1 Phase 2 production facilities

2. Coal Processing Facilities

Phase 1 coal handling would use all of the existing facilities from the PM Mine. Coal would be conveyed from the mine to a 30,000-ton run-of-mine (ROM) stockpile near the portal area. Initially, coal would be transferred from the ROM stockpile to a raw coal stockpile near the preparation plant with front-end loaders and haul trucks. Eventually, as production levels increased and Phase 2 schedules allowed, the underground reclaim system and covered conveyor would replace the front-end loader/truck haul operation. Coal would be washed at the preparation plant and stored in an adjacent stockpile. Coal would be weighed at the mine before shipment.

Phase 2 coal-handling activities would use new, high-volume facilities. As in Phase 1, coal would be conveyed from the mine to the 30,000-ton ROM stockpile near the portal area. An underground reclaim would transfer the coal to a covered conveyor for transport to a 1,200 ton-per-hour (TPH) preparation plant. Coal preparation would begin by crushing the ROM material to 4-inch size; waste material would be removed by heavy media separation. A covered conveyor would transfer the clean coal to a 100,000-ton capacity storage area. Two underground reclaim systems would transfer clean coal to a covered conveyor for transport to the unit-train loadout facility. Waste material would be stored in an 700-ton bin at the coal preparation plant before being transported by truck to the WDA.

Particulate emissions generated by the screening, crushing, and cleaning operations in the coal preparation plant would be controlled by fabric filters in the baghouse, during both phases 1 and 2. Water sprays would be installed on all coal crushing equipment and at all conveyor transfer points. All permanent conveyors outside the mine portal would be partially enclosed to limit particulate dispersion by wind. In order to control both dust and spillage in the coal stockpiles, the feed conveyors would discharge to tube stackers. Open coal stockpiles would be sprayed with water as necessary. Any coal stockpile fires would be extinguished promptly.

3. Ancillary Facilities

Ancillary facilities would include fuel and lube oil storage, explosives storage, wastewater treatment, power transmission, and solid waste storage. They would also include communications, water supply and distribution, and fresh air ventilation.

The fuel and lube oil storage system includes 4 refueling stations and 3 service centers located throughout the main facilities area. Refueling stations would consist of elevated diesel and/or gasoline fuel tanks installed within a concrete structure or berm made of impermeable material for spill containment. The containment structures would be capable of holding the entire tank volume, plus 25 percent.

Explosives used at the mine would include stick dynamite, boosters, ANFO, blasting delays, blasting caps and detonating cord. A secured explosives storage area would be located near the Administration Annex building. Equipment would include drop trailers for transport of the blasting agents and 2 skid-mounted explosive magazines, with dynamite and blasting caps safely separated.

Electric power used by mining equipment and coal-handling facilities would be delivered to an electrical substation located in the eastern portion of the main facilities area by Fergus Electric Cooperative. The substation would include dual transformers (1 for standby) and switchgear to convert incoming 69 Kv supply to lower voltages used throughout the facilities and mine area.

The communications network would include telephone service to the main facilities area furnished by U.S. West Communications. A private mine communications network would be installed throughout the mine operations area. Underground telephone service, currently located on the north shoulder of Fattig Creek Road, south of the main facilities area, would be extended along the access road to the mine. Where appropriate, both telephone and mine communication distribution lines would be installed parallel to the mine's electric distribution network.

The water supply and distribution system would be designed to furnish up to 400,000 gallons of water per day (gpd), at a maximum rate of 400 gallons of water per minute (gpm), for operational water requirements. It would also furnish up to 10,000 gpd, at a maximum 100 gpm, for potable water requirements at the mine. The operational supply system would consist of two 8,000-foot wells (1 operational and 1 standby) drilled into the Madison Formation in the eastern portion of the main facilities area, a deep well pump, two 100,000-gallon raw water storage tanks, a high-pressure pump station, and a watermain network. The potable supply system would use 4 existing, shallow (less than 200-feet deep) wells drilled into the Fort Union Formation by the PM Mining Company in the central and southern portion of the main facilities area, and a 10,000-gallon potable water treatment system and storage tank. Potable water for personnel would be transported throughout the mine in small containers.

The wastewater system would include facilities for the collection and treatment of sewage and washwater. Sewage effluent flow at the mine during full production is estimated to be less than 20,000 gallon per day (gal/d). Wastewater would be treated at a 20,000 gal/d package waste treatment plant located in the central portion of the main facilities area. Wastewater would be delivered to the treatment plant via pressurized pipes. Treated effluent would be discharged into the raw-water storage tanks for use at the mine facilities. Washdown waters from the facilities and suspension waters and coal dust washwaters would be collected in the evaporation ponds located throughout the main facilities area. Solids would be removed from the ponds and transported by truck to the WDA, as needed.

Ventilation facilities for the mine would involve 2 main fans (1 operational and 1 standby) capable of delivering up to 475,000 cubic feet of fresh air per minute throughout the mine. The air supply system would use the main mine entries in the portal area and 3 fresh air ventilation shafts to the surface, located throughout the life-of-mine area. Each shaft, equipped with water-tight linings, would require up to 2 acres of surface disturbance. Excavated materials would be removed through the mine by raise boring and stored in an excess waste pile. The entire disturbed area would be enclosed by a 7-foot, chainlink fence. These shafts would be equipped to serve as emergency escapeways for workers.

Solid waste would be stored temporarily throughout the main facilities area. Waste lumber, garbage, and other debris would be placed in covered storage containers for periodic disposal at a licensed commercial solid waste disposal facility. Waste grease, lubricants, paints, and flammable liquids

would be stored in steel drums near the shop/warehouse for periodic disposal at a licensed and bonded liquid waste disposal facility.

The entire surface facility complex would be surrounded by barbed-wire fencing to limit public access. Existing fences would be used as much as possible. About one-half mile of new fence would be constructed along the north side of Fattig Creek Road in Section 13. Another 1 mile of new fence would be constructed in Section 12 around the WDA.

4. Storm Water and Sediment Control Facilities

a. Sedimentation ponds

Nine temporary sedimentation ponds would be constructed throughout the surface facility complex to contain runoff from mine development and production activities (see Figure A-2). The main facilities area would have 6 ponds; 2 near the ROM coal stockpile, 2 in the facilities area, 1 near the coal preparation plant, and 1 below the clean coal stockpile. The WDA would have 2 ponds, and the rock quarry 1 pond. Drainage areas above the temporary ponds in the main facilities area and the rock quarry would range from 3 to 39 acres. Drainage areas above the 2 WDA ponds would be 206 acres and 66 acres, respectively.

All sedimentation ponds would be designed to contain runoff from disturbed areas during a 10-year, 24-hour precipitation event.

They would be self-dewatering through the use of weep holes that would allow inflow to accumulate, suspended solids to settle, and water to discharge slowly, with an average containment time greater than 24 hours. Temporary impoundment spillways would be designed to safely pass the excess water flow from a 25-year, 24-hour runoff event, depending on the purpose of the impoundment. Accumulated sediment would be removed from ponds when sediment storage capacities were filled to 60 percent.

Ponds would be removed and reclaimed within 1 year after the areas they controlled achieved sufficient revegetation to make the ponds unnecessary.

b. Diversion ditches

Temporary diversion ditches (channels) would be used to route natural runoff around active mine support areas (including ventilation shaft facilities) and to collect and intercept runoff from disturbed areas for routing to either sedimentation ponds or into natural drainages, as appropriate. Side ditches would be used along the roads, conveyor corridors, and other linear structures (such as the rail spur). All channels would be grass-lined, trapezoidal or triangular, generally at slopes of one-half to 1 percent, and sized to safely pass the water flow from a 10-year, 24-hour precipitation event.

Temporary sand bags, straw bales, or rock check dams would be placed in ditches and other drainages to reduce flow velocities and minimize erosion. More durable riprap, energy dissipators, and

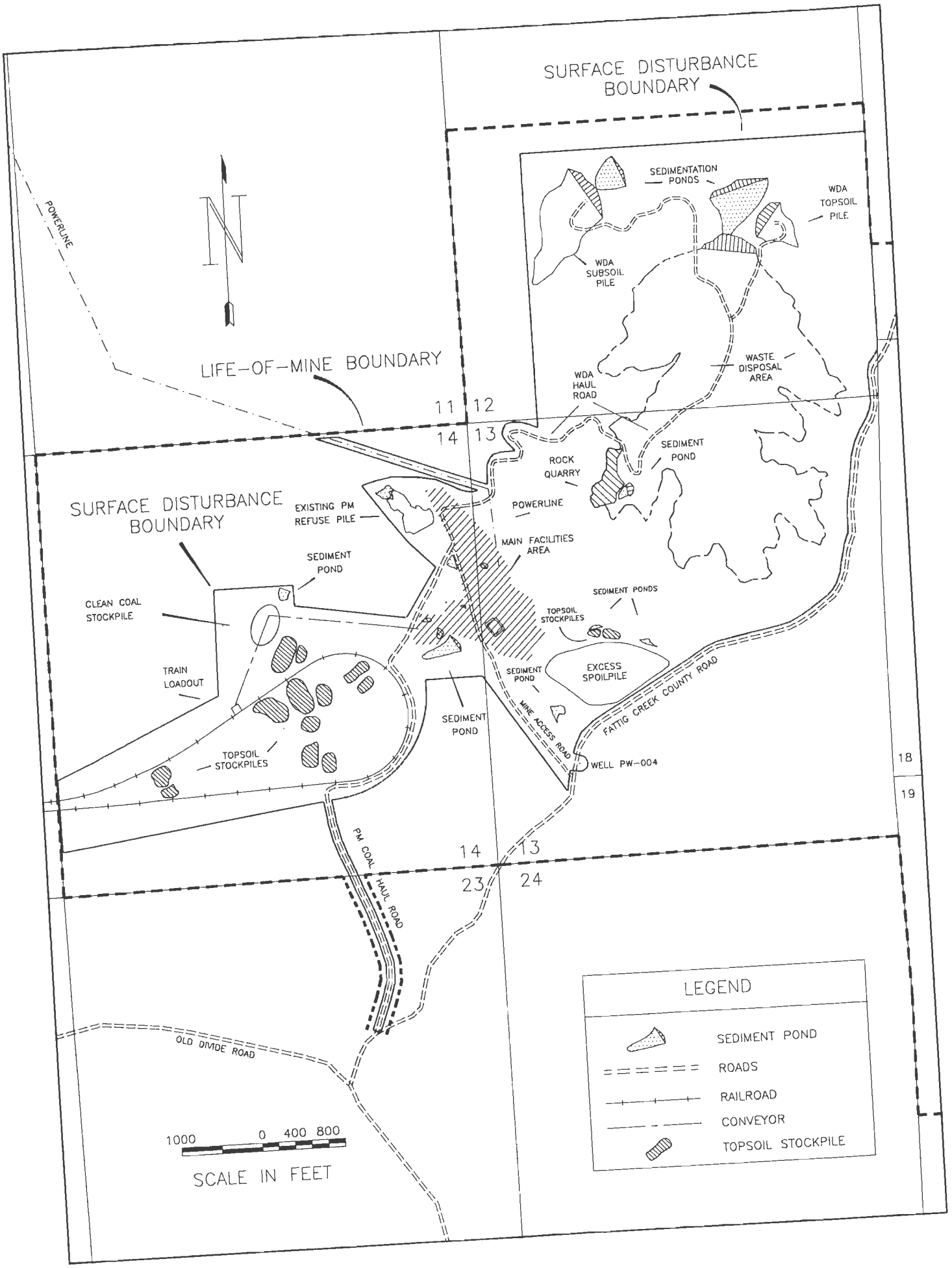


Figure A-2 Surface facility complex

stilling basins would be used in steeper sections where additional erosion protection may be required. Corrugated metal pipe or concrete culverts would be used at all diversion channels and natural drainage crossings (e.g., access and mine roads and the rail spur). All culverts would be designed to safely pass water flow from a 10-year, 24-hour precipitation event.

5. Material Borrow and Disposal Facilities

a. Waste disposal area

A WDA for mine development and coal waste from the preparation plant would be developed on 480 acres north and east of the main facilities area (see Figure A-2). Eventually, the WDA would cover 169 acres, containing about 19,000,000 tons of waste material. About 19 percent of the ROM coal removed during the first 2 to 3 years of Phase 1 coal production is expected to be waste (258,000 tons per year), while 13 percent of the ROM coal removed during the 30 years of Phase 2 coal production is expected to be waste (493,000 tons per year). (NOTE: Increased efficiency of Phase 2 coal preparation facilities compared to Phase 1 facilities decreases the amount (percentage) of waste material per ton of ROM coal.) Mine development waste, not related to that from the coal preparation plant, is expected to represent less than 10 percent of the total waste that would be deposited in the WDA over mine life.

Constructing and filling the WDA would occur throughout the 33-year period of active mining. An underdrain system, of non-slaking, rock 16-feet deep and 16-feet wide, would be installed along the natural drainage from the head of the fill to the toe of the final slope. Rock side drains, 8-feet deep and 16-feet wide, would be installed throughout the WDA to direct flows to the main underdrain. Waste material would be spread over the area in maximum 2-foot lifts and compacted to at least 90 percent dry density (90% of maximum density at optimal moisture conditions). Coal processing waste, due to its high moisture content, would be allowed to air dry prior to compaction. Material eventually would reach a maximum height of about 140 feet at some locations within the WDA. After final elevations were reached, topsoil would be respread and the entire area revegetated.

b. Rock quarry

A rock quarry would be developed on about 9 acres within the WDA (see Figure A-2). The quarry would supply about 150,000 cubic yards of material for the underdrain at the WDA and for surfacing the roads throughout the active mine area. Rock would be mined by drilling and blasting. Dozers would move it to a small, portable, crushing facility for proper crushing and sizing. Material would be transferred to the WDA with front-end loaders and haul trucks.

C. OTHER FACILITIES

1. The Huntley Loadout

The proposed coal-loadout activities at Huntley would use the existing power, water, and road facilities from the Montana Rail Link operation. (Specific details of the existing Huntley loadout facility are included in Appendix B.)

Haul trucks would dump clean coal from the proposed mine into a 50-ton hoppered product bin (truck dump bin). The coal would be transferred from the bin to the main stockpile by a medium-capacity radial stacker using a 250-foot belt conveyor and flexible chute. The 30,000-ton stockpile (about 600 feet long, 200 feet wide, and 25 feet high) would parallel the railroad tracks (see Figure A-3). Coal would be transferred into rail cars through a 375-foot reclaim tunnel, using a medium-capacity, 25-foot by 100-foot belt conveyor and flexible chute.

A mobile trailer unit may be placed on the site to house temporary office facilities. Potable water would be provided from the existing Huntley water line on the property. An existing, 20-foot well drilled into the unconsolidated alluvial deposits would be used to furnish up to 30,000 gal/d of raw water for equipment washdown, service water for machines, and dust control. A water spray system would be installed to control dust on the access roads and coal stockpile. Electrical power would be provided from existing powerlines on the property. An existing pole-mounted transformer would be upgraded to accommodate increased power requirements. Chemical toilets, regularly serviced by an authorized sanitation company, would be provided for use by the staff. Equipment would be maintained and refueled off site. This site would be enclosed on 3 sides with an 8-foot wood or wood-like fence to limit vehicular and pedestrian access. Access along the south side of the operations area would be limited by the rail siding. Gates would be closed and the area patrolled during prolonged idle periods.

2. The Fergus Electric Power Transmission Line

The proposed upgrade and extension of the Fergus Electric power distribution network would use the existing facilities as much as possible. (Specific details of the existing Fergus Electric system are included in Appendix B.)

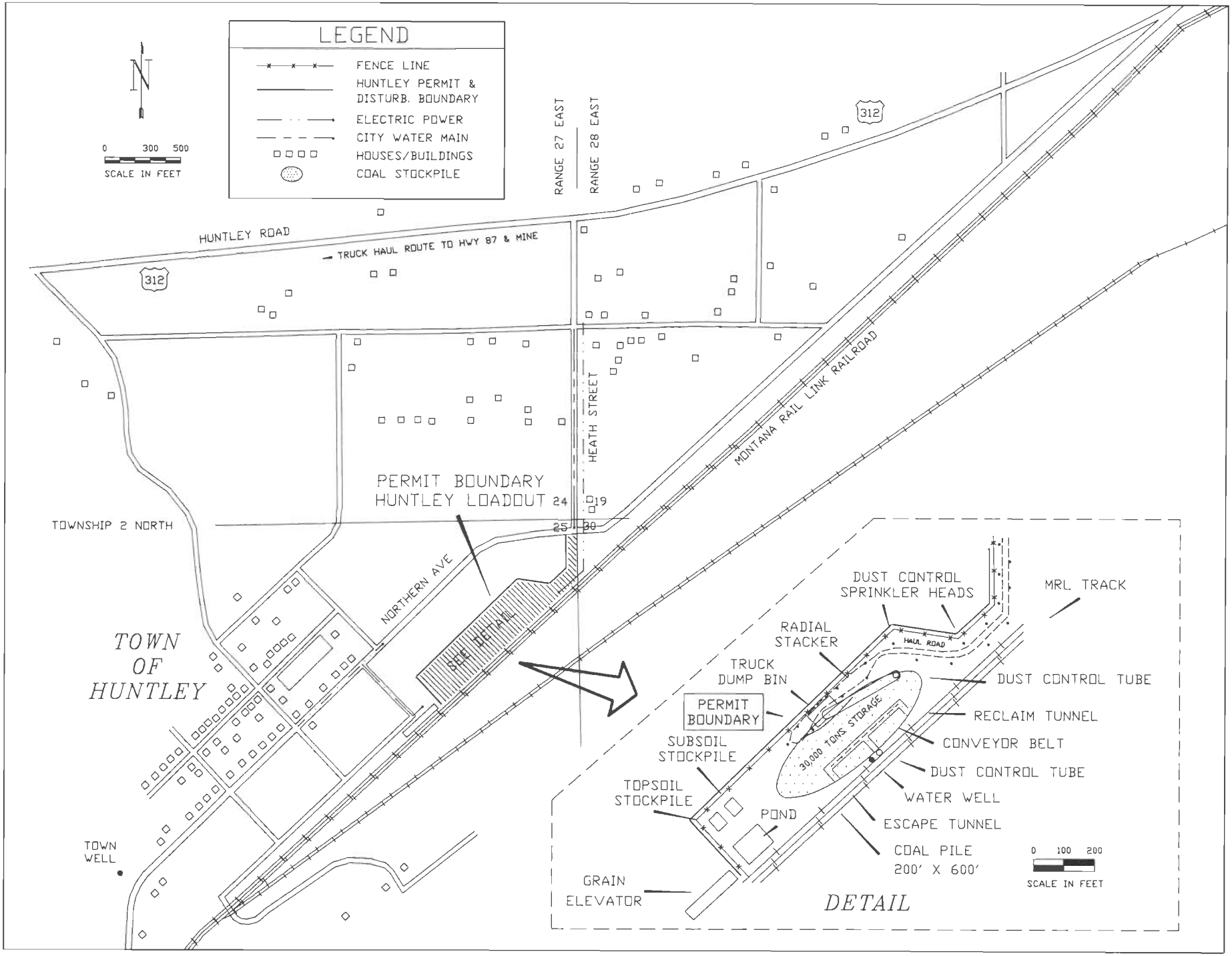
About 10 miles of the existing 50 Kv power distribution system between Roundup and the Roundup substation would be upgraded to 69 Kv service (see Figure I-2). The Roundup substation is located in Section 21 of T. 7 N., R. 26 E. along U.S. Highway 87, northwest of the main facilities area for the Project. The upgrade would include replacement of the 50 Kv wire and insulators. About 15 support poles would be replaced or modified within the 30-foot easement and a new transformer and new switchgear would be installed at the substation.

About 7 miles of new single-pole, overhead power transmission line would be built to extend 69 Kv service to the proposed mine from the Roundup substation (see Figure I-2). This extension would require the use of rubber-tired tractors and backhoes to install new, 40-foot support poles within the 30-foot easement and string the new powerline. The existing 7.2-Kv local distribution line would be maintained throughout the route, with new 69 Kv service placed at the top of the new poles and the existing service built beneath.

D. ROADS AND RAILROADS

Travel within the life-of-mine area and along the rail spur right-of-way would be restricted to established roads, except where necessary for maintenance, safety, and exploration work. Speed would be limited to 25 miles per hour (MPH) on all roads. All mine-facility roads and parking areas would

Figure A-3 Upgraded Huntley loadout



receive regular applications of water or other approved dust suppressants. Yard areas and parking lots would be graveled or paved.

1. Primary Access Roads

The proposed mine complex would be accessible from the north and south by U.S. Highway 87, a 2-lane paved road that connects U.S. Highway 12 (near Roundup) to the Billings area. (Specific details of U.S. Highway 87 and proposed reconstruction activities are included in Appendix B.) Old Divide Road, a 2-lane paved County road that makes an approximate 7-mile loop to the east off of U.S. Highway 87, and Fattig Creek Road, a 2-lane, all-weather-gravel County road, provide primary access to the Project area (see Figure I-2).

2. Main Access Roads

The mine access road would connect the surface facility complex to Fatting Creek Road about 1.5 miles east of its junction with Old Divide Road (see Figure A-2). For security purposes, this road would be the only public access to the mine complex and would be controlled by a gate at its junction with Fatting Creek Road. The 36-foot-wide gravel road would be designed to carry daily volumes of up to 300 passenger vehicles and 100 commercial vehicles at speeds of up to 25 MPH.

Heavy service vehicles may occasionally use the existing PM Coal Road to reach the main facility complex (see Figure A-1). This road would be controlled by a gate at Fattig Creek Road.

3. The WDA Haul Road

A 2-mile gravel road would connect the main facilities area with the rock quarry and WDA (see Figure A-2). Off-road, 50-ton, end-dump trucks would be used to transport waste material to the WDA and rock from the quarry. The 36-foot-wide road would be designed with 15-foot-wide shoulders to carry daily volumes of up to 30 trucks at speeds of up to 25 MPH. Four-foot rock berms would be installed at the edge of fill/drop sections of the road. Shoulder width would increase to 25 feet when substantial cuts-and-fills were required for road construction.

4. Light-use Roads

Existing light-use gravel roads and 2-track trails would be used for mining-related activities, as necessary. Temporary roads would be constructed throughout the life-of-mine area for specific activities such as exploratory drilling, ventilation-shaft construction, pond and ditch maintenance, hydrologic mitigation, monitoring, reclamation, and inspection. These roads, when requiring formal construction or upgrade, could have a road surface up to 10 feet wide, with shoulders up to 10 feet wide on each side. After completion of a specific activity, these roads would be reclaimed by backfilling and regrading stored topsoil material, and reseeding.

5. The Bull Mountains Rail Spur

A proposed 33-mile rail spur would be used to connect the mine to the existing Burlington Northern rail system (see Figure I-2). (Specific details of the existing Burlington Northern system are included in Appendix B.)

Meridian proposes to purchase private lands for the right-of-way and secure use agreements for State parcels. Right-of-way for the rail spur would range from 150 to 500 feet wide, including a 10-foot fire guard on each side of the track. Public access would be controlled along the entire right-of-way, outside the life-of-mine area, with barbed-wire fences on both sides. The loadout loop at the mine and the mainline siding at Broadview are within secured areas and would not be directly fenced. Construction design calls for an equal balance of cut-and-fill, requiring about 6 million cubic yards of excavation. No other supplementary borrow or fill areas are proposed.

The proposed rail spur design includes 2 highway crossings: an "above-grade" crossing (see Figure A-4) of U.S. 87, near its junction with Majerus and Old Divide roads; and an "at-grade" crossing (see Figure A-5) of Montana Route 3, about 2 miles south of Broadview. In addition, existing County and private use roads in the area would be crossed 24 times: 4 County roads would be crossed "above-grade" (see Figure A-6) and the remaining 20 roads (6 County roads) would be crossed "at-grade". Sixteen "at-grade" light-use (2-track) vehicle crossings, including 7 "at-grade" fence/cattle guard crossings, would be constructed on private lands along the rail spur right-of-way. In addition, twenty-two 5-foot by 8-foot, livestock "underpasses" would be developed (see Figure A-7).

The proposed design includes 2 relocations of Majerus Road: about 2,250 feet in Section 2 T. 5 N., R. 26 E., and 500 feet in Section 29 T. 6 N., R. 26 E. 4,100 feet of Old Divide Road in sections 15, 16, and 22 T. 6 N., R. 26 E. would be relocated. About 11,250 feet of 2-track road would be relocated for private "at-grade" crossings. Two existing, underground, gas pipelines would be encased and about 750 feet of ephemeral drainage would be relocated. The majority of road and drainage relocations (about 10 acres) would be accommodated within the rail spur right-of-way (Table I-1). New road construction would cause the abandonment of about 5 acres of old County road.

A 6,800-foot siding would be constructed at the junction of the rail spur and mainline to accommodate a full-length unit train of 115 rail cars, 5 engines, and a caboose. The siding length would allow a coal train to clear the highway as quickly as possible regardless of train traffic conditions on the mainline track. The average train traveling to or from the coal mine should require less than 10 minutes to cross Montana Route 3. A 7,200-foot rail loop, also designed to accommodate a full-length unit train, would be constructed within the main facilities area at the coal mine (see Figure A-1). In addition, 6,900 feet of dual track would be constructed immediately outside the life-of-mine area for the rail loop/train loadout facility.

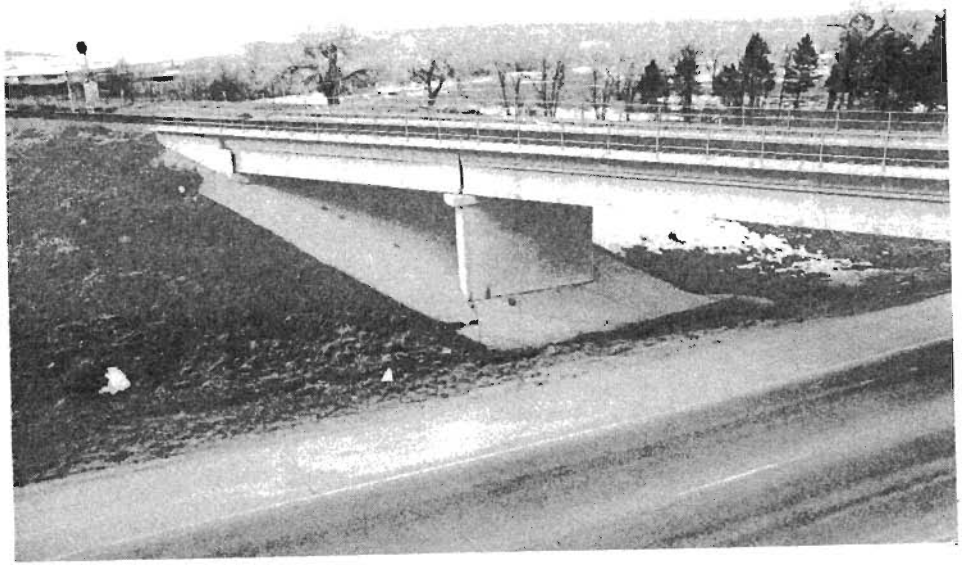


Figure A-4 Typical above-grade highway/ rail crossing

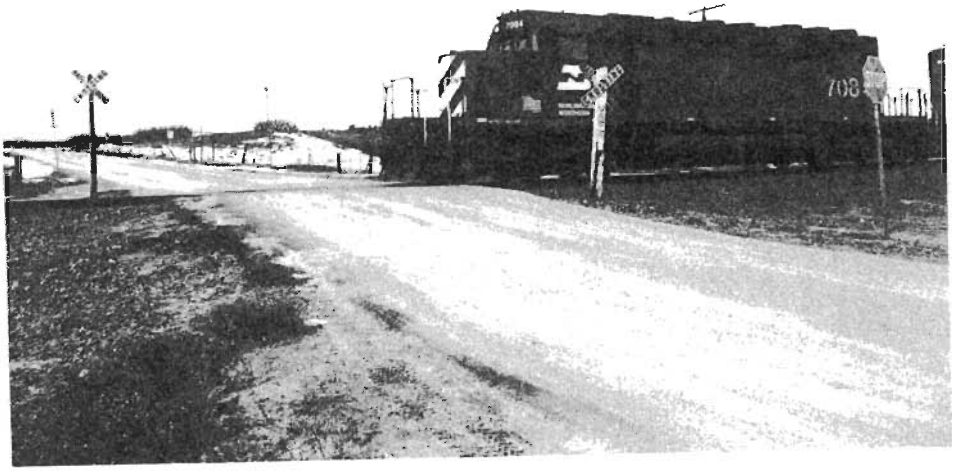


Figure A-5 Typical at-grade highway/ rail crossing



Figure A-6 Typical above-grade county road/ rail crossing



Figure A-7 Livestock underpass

E. FACILITY CONSTRUCTION AND MINING

1. Facility Construction

Development of temporary (Phase 1) production facilities would occur on 101 acres previously disturbed by operations at the PM Mine and the coal test pit. Development of permanent (Phase 2) support facilities, hydrologic mitigation activities, wetland enhancement activities, the rail spur, the powerline upgrade/extension, and other mining-related construction would generally involve new surface disturbance.

a. Clearing and grubbing

Before starting topsoil salvage in newly disturbed areas, surfaces would be cleared and very large shrubs or trees that would interfere with topsoil stripping would be removed to an approved disposal site.

b. Topsoil and excess spoil operations

Suitable topsoil and subsoils would be removed from disturbance areas prior to beginning construction activities. The soil salvage would be conducted in two separate activities that would segregate the topsoil and subsoil. Prior to actual topsoil removal operations, proper salvaging depth would be identified and staked under the supervision of a qualified person.

Soil material salvaged at the surface facility complex, about 1.4 million cubic yards, would be stored at one of the 12 nearby stockpiles. About 500,000 cubic yards of excess spoil material, excavated during initial portal development, would be stored in a designated stockpile located near the portal area (see Figure A-1). The spoil stockpile and the majority of topsoil/subsoil stockpiles associated with the surface facility complex would remain in place for the 33-year life of the support facilities. The topsoil/subsoil stockpiles are expected to occupy 45 of 871 acres of the surface facility complex. The spoil stockpile is expected to occupy 23 of the 871 acres.

Soil material salvaged from the rail spur right-of-way (about 1 million cubic yards), and other limited disturbance areas including the hydrologic mitigation and wetland enhancement sites, would be temporarily stored in numerous small stockpiles close to sites from which it was removed. Soils would not be salvaged along the powerline easement.

About 2,000 cubic yards of salvaged soils from construction of the sediment pond at the Huntley loadout were stockpiled in the southwest corner of the facility in 1989. This stockpile is anticipated to remain in place for the entire 2-year period of Phase 1 truck haul activities. The stockpile occupies 0.2 of the 6.1 acres for the loadout. (Specific details of the existing Huntley loadout facility are included in Appendix B.)

2. Coal Removal

Coal would be removed using both room-and-pillar and longwall methods. Room-and-pillar mining is generally defined as "a system of mining in which part of the coal is left in place as pillars for support", and longwall, "a system of mining whereby most of the coal is mined and the roof over the worked out area is allowed to cave" (Stout 1980). (A complete discussion of room-and-pillar and longwall mining methods is included in Appendix C.) Longwall methods would be used where possible within the mine. Room-and-pillar methods would be used to rework the portals, to develop the main entry and longwall panels, and to mine those irregularly-shaped areas too small to be practical for longwall mining. (See Figure A-8 for a map of longwall/room-and-pillar areas within the mine.)

a. Coal operations during limited production

Phase 1 mine development and limited coal production would begin after completion of the temporary (Phase 1) production facilities and continue through the 2-year period of permanent (Phase 2) support facility construction.

Existing portals into the coal seam at the PM Mine would be used as 4 primary entries for the proposed mine. New portal work would include the installation of additional protective tunnel liners and the addition/upgrade of bulkheads to protect and stabilize portal areas. Once the 4 primary entries had progressed 1,500 feet into the mine, they would be expanded into 7 mainline entries, using a single continuous miner. Three of these entries would provide travelways for workers, materials, and ventilation intake. Another 3 entries would be used only for ventilation return. An isolated belt entry located between the intakes and returns would be used to transport mined coal to the ROM stockpile outside the main portal.

Development of mainline entries would be followed by development of a room-and-pillar panel in the northern half of Section 13 (see Figure A-8) to serve as a test area for equipment performance. It would also provide verification of expected geotechnical responses to mining operations, provide experience in panel development techniques, and increase the operator's knowledge of how support pillars would behave.

When development of longwall panel entries began (about 6 months later), a second continuous miner would be added. The first longwall panel would begin in the southeast portion of Section 19 (see Figure A-8). Longwall mining equipment would be installed in preparation for full production mining about 12 months after work on the panel entries began.

During the first 2 years of limited production, ROM coal removal would increase from an initial rate of 0.62 million tons per year (0.50 million tons of clean coal), to a maximum rate of 1.36 million tons per year (1.10 million tons of clean coal). With a 24-hour workday and 340 workdays per year, maximum production during phase 1 would require about 167 tons of ROM coal to be mined each hour (4,000 tons per day).

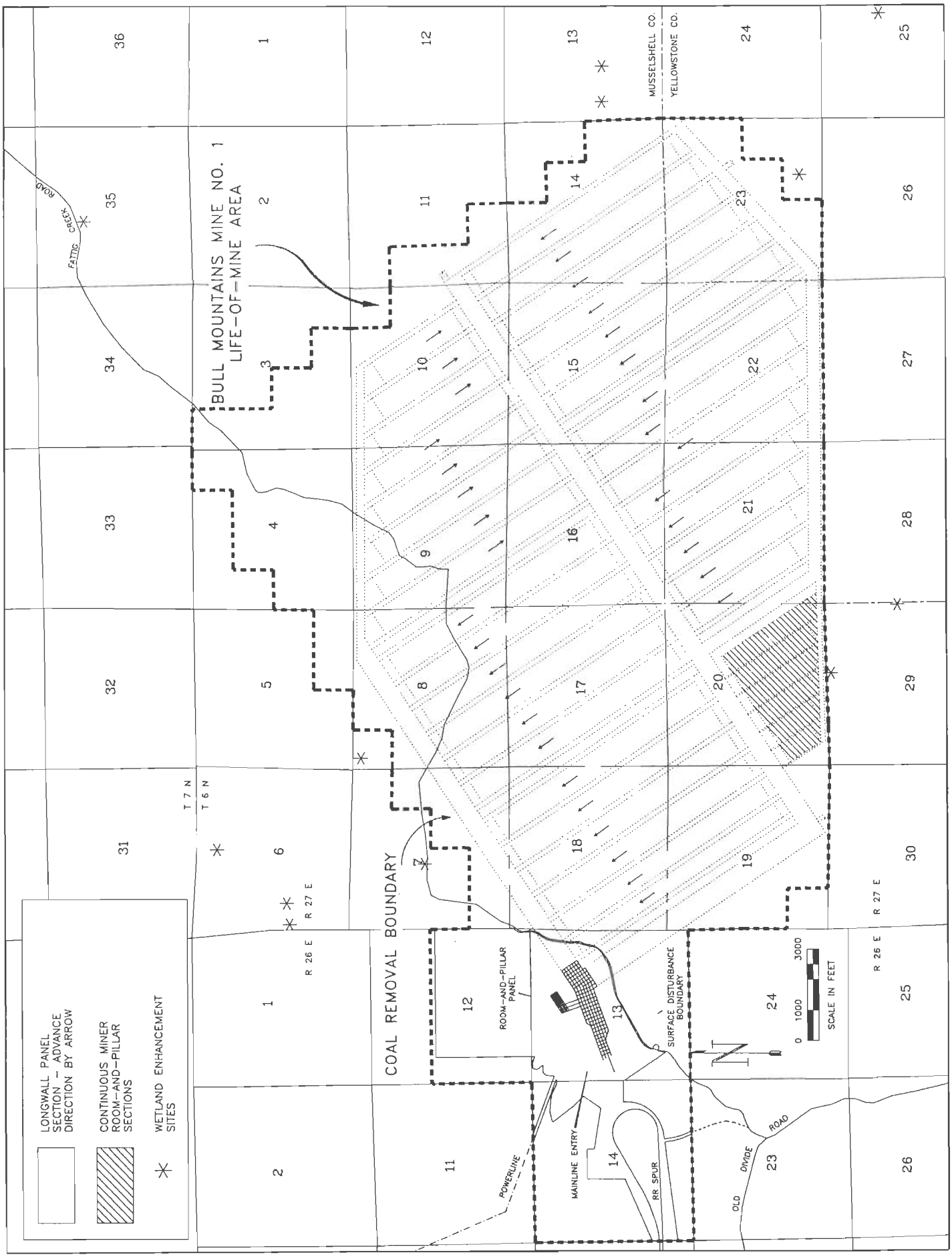


Figure A-8 Life-of-mine area, underground workings, room-and-pillar, and longwall areas

b. Coal operations during full production

Full-scale coal production would begin after installation of longwall mining equipment and completion of permanent (Phase 2) support facilities, including the Fergus Electric powerline upgrade/extension and the 33-mile rail spur.

Mining activity would progress from one longwall panel to the next, in a northeasterly direction until reaching the edge of the life-of-mine area. Mining would then shift to the south and progress from one longwall panel to the next (see Figure A-8) in a southwesterly direction until the entire life-of-mine area was mined. It is anticipated that panels 2 to 20 would be mined in years 3 to 21 and panels 21 to 35 would be mined in years 21 to 33 (see Figure A-9).

Proposed longwall panel design requires 3 entries per panel to allow for intake air and access, conveyor belts (coal haulage), and air return. Two 60- to 80-foot pillars would be retained between the 3 entries with cross-cuts about every 120 feet for access. Panel size would range from 550 feet to 820 feet wide and from 4,000 to 8,000 feet long. Longwall equipment would remove the full coal seam up to either 12 or 14 feet.

Six additional room-and-pillar panels would be developed over mine life to maximize recovery of the coal reserve in those portions of the mine too small to accommodate longwall mining techniques (i.e., in the southwest portion of the life-of-mine area). The continuous miner would remove the full coal seam up to 12 feet.

The transfer of coal from mining sections (both room-and-pillar and longwall) to the ROM coal stockpile outside the main portal would be accomplished by using multiple conveyor belt installations that would form a network extending throughout the mine.

During the 30 years of full coal production, ROM coal removal would increase from the initial rate of 1.36 million tons per year (1.18 million tons of clean coal), to a maximum rate of 3.79 million tons per year (3.30 million tons of clean coal). (NOTE: the increased efficiency of Phase 2 coal preparation facilities compared to the Phase 1 facilities would increase the amount of clean coal per ton of ROM coal.) With a 24-hour workday and 340 workdays per year, maximum production during full-scale operations would require about 465 tons of ROM coal to be mined each hour (11,156 tons per day).

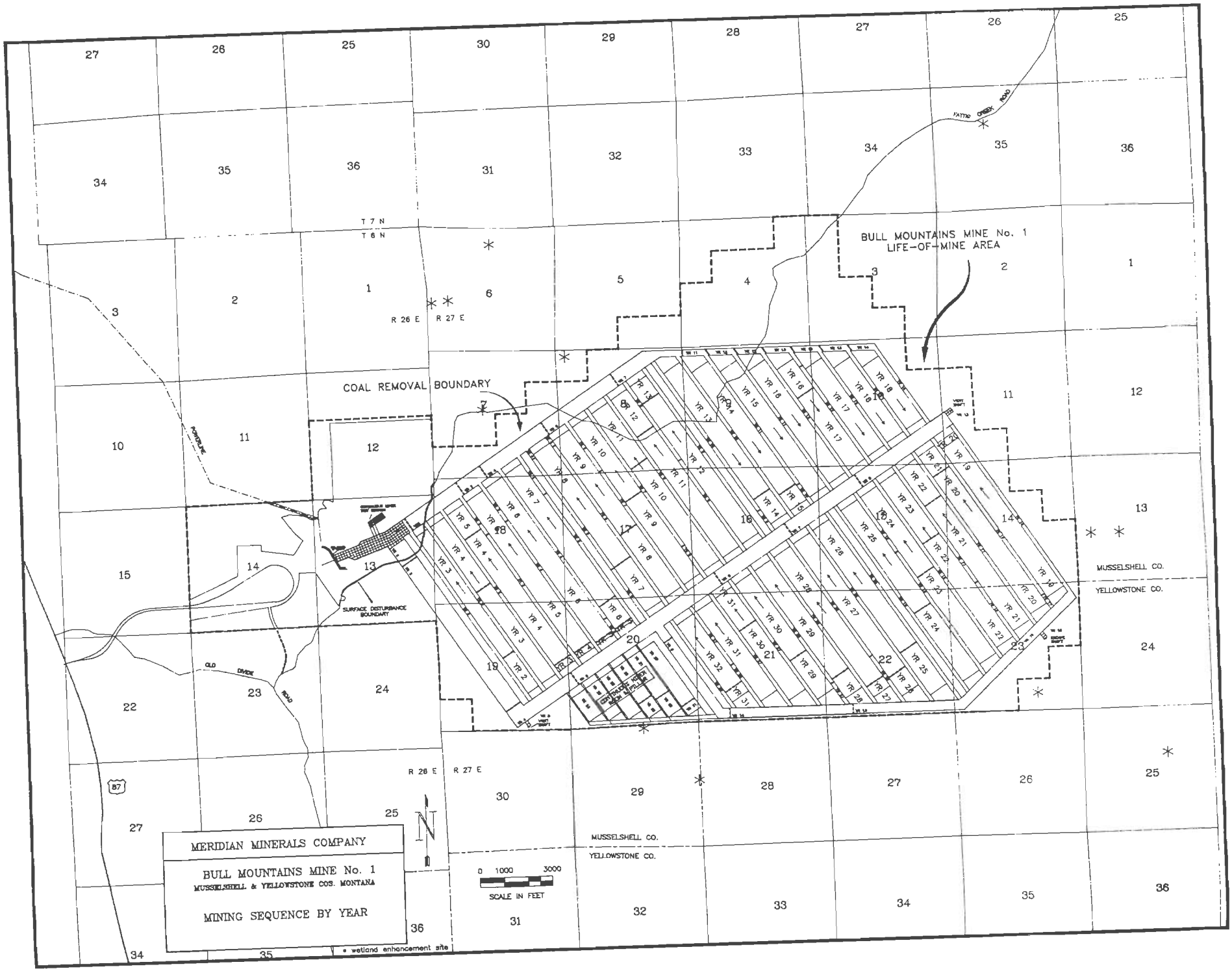
3. Coal Transportation

a. Temporary truck haul to the Huntley loadout

During Phase 1 mining activities (the approximate 2-year period of permanent facility and rail spur construction) coal would be hauled 41.1 miles over County and State roads to the upgraded Montana Rail Link loadout facility near Huntley.

Haul trucks would travel along Fattig Creek Road from the mine and then down Old Divide Road to its southern intersection with U.S. 87 (see Figure I-2). They would follow U.S. Highway 87 south

Figure A-9 Mining sequence by year



to Highway 312, then east to Huntley. In Huntley, trucks would proceed south along Heath Street to the loadout site (see Figure A-3).

Loadout capacity at the upgraded Huntley facility (750 tons per hour) would allow one 115-car unit train to be loaded in 16 hours. With an average capacity of 11,500 tons of coal per train (100 tons per car), maximum production would require 95 unit trains to be loaded each year (1 train every 3 to 4 days).

Twelve highway-rated trucks with tandem trailers would operate 24 hours per day, 340 days per year. With an average capacity of 37.8 tons of coal per truck, maximum production would require 29,100 loads to be trucked to the Huntley loadout each year. The 82-mile round trip to the loadout is expected to take at least 2.2 hours to complete, requiring each truck to make 7 to 8 trips each day (1 truck every 15 to 17 minutes). Coal-related traffic along Heath Street in Huntley would be restricted to a maximum speed of 15 MPH, all truckloads would be protected from wind using tarps and/or special trailer designs, and, to minimize noise, the use of "jake" brakes would be prohibited. Pending formal regulatory approval by the U.S. Mine Safety and Health Administration (MSHA), the bulldozer and loader used in coal-handling operations would be equipped with strobe warning systems, replacing the standard backup alarm, to minimize noise during night operations. Night-hauling operations could be increased for short periods of time during heavy traffic periods (i.e., during beet harvesting) to reduce the overall levels of daytime traffic.

b. Full production train delivery of coal

During Phase 2, after permanent processing and rail spur facilities had been constructed, coal from the proposed mine would be loaded directly into trains at the main facilities area. Activities at the coal loadout in Huntley would be phased out and the facility closed.

The unit train loadout station would consist of a 300 ton surge bin with an automatic weighing system for accurately loading rail cars. Coal would discharge into the surge bin from the clean coal stockpile conveyor and pass through gates to a 100-ton weigh bin. The weigh bin would discharge through a loading chute directly to the rail cars.

The loadout capacity at the rail loop facility would allow one 115-car, unit train to be loaded in 2 to 3 hours (5000 tons per hour). With an average capacity of 11,500 tons of coal per train (100 tons per car), maximum production would require 287 unit trains to be loaded each year (1 train every 1 to 2 days).

c. Local market truck/package delivery of coal

Throughout the 33 years of coal production, coal would continue to be supplied to those local markets currently served by PM Mine. Truck/package coal delivery during Phase 1 of mining activity (the first 2 years of permanent, Phase 2, facility construction) would use existing PM Mine facilities. Phase 2 package delivery would use a newly-constructed series of 20-ton bins along one side of the coal preparation plant to store various product mixes according to demand. Clean coal would be transferred

to the appropriate bin by an in-plant conveyor system and customer haul trucks would drive under the bin for loading. A weigh scale would record the truck's weight both before and after loading for billing purposes.

F. RECLAMATION PLAN

Development, mining, and reclamation plans are interdependent to assure that reclamation for each component of the Project might be performed at the earliest possible time. Reclamation activities fall into one of 2 categories: interim (temporary) and final (permanent). Interim activities are those intended to stabilize an area during its short-term use in the mining operation, while final activities are those intended to return the area to its long-term condition before releasing a company's responsibility.

Interim reclamation activities would occur primarily during the first 3 years of the mine, after premining development was complete. They would occur on a smaller scale throughout the remainder of the mine life, as other components of the Project came into play. Final reclamation activities would begin immediately after the need for a particular Project component was over. In the case of the powerline upgrade/extension and other temporary disturbance activities (e.g., exploratory drilling activities, hydrologic mitigation activities, wetland enhancement), final reclamation would occur immediately after construction activities were complete. This would occur in year 1 of the mine for the powerline upgrade/extension. Final reclamation would occur in year 3 of the Project for the Huntley loadout, the rail spur right-of-way outside the roadbed and adjoining fire guards, and those portions of the PM Mine operation not being used for Phase 2 coal production. Final reclamation at the WDA would occur in stages, as portions of the area reached final grade (possibly as early as year 9 of the mine). Final reclamation of all remaining mining-related disturbances (i.e., the main facilities, the WDA, the mine portals, the rail spur right-of-way) would not begin until the end of underground mining activities in year 33 of the mine.

Interim/final reclamation and bond release would proceed as follows:

Year 0	- End of the useful service life for a particular Project component, or portion thereof.
Year 1	- Backfilling; regrading; topsoil replacement; recontouring; drainage control; revegetation; and bond release, when appropriate (up to 60 percent of original bond amount for that component).
Year 3	- Vegetation established; and bond release, when appropriate (that portion of the original bond amount for topsoil replacement).
Year 11+	- Vegetation sampling; and bond release, when appropriate (remaining bond amounts for that component, if reclamation was successful and bond release requirements were fully met).

1. Postmining Land Use

Primary historical land uses for the Bull Mountains area, including the area of the proposed rail spur, have been cattle production and year-round wildlife habitat. Other land uses have been hay production, timber production, coal mining, and recreation. Reclamation efforts throughout the life-of-mine area, and on outlying wetland enhancement areas, would return most postmining surface uses to livestock grazing and wildlife habitat.

Some ranching operations would be eliminated during the period of active mining operations. This would occur within the surface facility complex (including the WDA), along the rail spur right-of-way, and in other small areas designated for hydrologic mitigation, wetland enhancement, or other revegetation mitigation. Ranching operations along the powerline easement would be temporarily disrupted during the actual upgrade and extension activities. Other ranching operations within the life-of-mine area should continue uninterrupted. Revegetated areas that were judged to be capable of withstanding grazing pressures would again be incorporated into ranching activities.

Other than a small acreage of improved pastureland associated with past reclamation at the PM Mine, and a small area in the proposed WDA, there are no improved rangelands, croplands, or pasturelands within the proposed life-of-mine area. Neither are any proposed for postmining land use. Croplands and pasturelands disturbed along the rail spur right-of-way would not be replaced since the spur would be reclaimed in place after the end of mine service.

Industrial development has been the historical land use at the Huntley loadout. Use would continue according to the long-term plans of Montana Rail Link after proposed coal loadout operations had been completed.

2. Postmining Topography

Premining elevations in the proposed life-of-mine area range from 3,790 to 4,710 feet above mean sea level. Premining elevations in the WDA range from 3,850 to 4,050 feet, while elevations in the rock quarry range from 3,990 to 4,050 feet. Premining elevations in the main facilities area, including the existing PM Mine, range from 3,800 to 3,970 feet.

Postmining elevations in the WDA (including the rock quarry) are expected to rise from 0 to 130 feet -- to a maximum 4,050 feet above sea level. This reflects the net raising of the landscape resulting from "head of hollow" filling that would take place. All regraded areas in the WDA would be constructed with maximum slopes of 3 horizontal to 1 vertical (3h:1v), except for the bench faces which would be constructed with maximum 5h:1v slopes. New drainage patterns, channels, and floodplains in the WDA would be constructed with sufficient capacity to carry flow from a 100-year, 24-hour precipitation event at nonerodible velocities. Additional channel stability would be achieved through a high degree of compaction and revegetation. Figure A-10 shows premining topography and slopes of the WDA. Figure A-11 shows postmining topography, slopes, and vegetation after backfilling and regrading.



Figure A-10 An isometric view of premining topography in the waste disposal area



Figure A-11 An isometric view of postmining topography in the waste disposal area

Postmining elevations in the main facilities area would be expected to approximate original elevations and contours except in the area of the existing PM Mine. Elevations in the area of the old surface mine pit would rise about 60 feet from backfilling and regrading. Drainage channels and floodplains would be re-established throughout the area with sufficient capacity to carry flow from a 100-year, 24-hour precipitation event at nonerodible velocities. Postmining contours in this area would also blend with adjacent premining topography as much as possible.

Elevations in coal removal and buffer areas of the life-of-mine area would essentially remain unchanged, although local surface impacts from mining-related subsidence are expected in the coal removal area. Postmining contours in those areas where limited surface disturbance is proposed (i.e., for access roads, ventilation shafts, exploration drill holes, hydrologic mitigation, and wetland enhancement) would approximate original contours at or near original elevations. Drainage channels and floodplains would be re-established throughout each disturbance area with capacity to carry flow from a 100-year, 24-hour precipitation event at nonerodible velocities.

Postmining topography on private land along the rail spur right-of-way would be changed permanently since the roadbed would be abandoned in place after the removal of the rail, ties, and road ballast. State parcels would be regraded to approximate original contours and completely revegetated to Montana DSL Land Division standards.

All newly-constructed roads, including the WDA haul road and the various light use/temporary roads, would be reclaimed and road surface materials salvaged. Fill portions would be regraded into cut areas, subsoil and topsoil would be replaced, and the disturbed areas reseeded. Existing roads/trails would be restored to original condition and reseeded at the end of their use.

All exploration holes, wells, ventilation shafts, and other exposed underground openings would be permanently sealed or plugged when no longer needed for mine operation. Any mine entry that was temporarily inactive but had future useful life would be protected by barricades or other covering devices, fenced, and posted with signs to prevent access and to identify the hazard.

Facilities for hydrologic mitigation and wetland enhancement programs would be left intact and operational. Final disposal of those portions of the rail spur right-of-way outside the life-of-mine area and not on State-owned land would involve removal and salvage of the ties, rail, and ballast. Fill material used to prepare the base grade for the rail spur would be abandoned in place.

3. Backfilling and Grading

Rough backfilling and grading would be completed on all disturbed areas within the life-of-mine area and at the Huntley loadout, as soon as possible after they were determined unnecessary for mining-related activities. During the period of active mining operations, backfilling and grading would be required only in those disturbed lands at the PM Mine unnecessary for Phase 2 operations, the WDA, or in temporary-use areas. After ending mining operations, backfilling and grading would be required for all disturbed areas within the life-of-mine area not already included in the reclamation program.

Access roads, haul roads, and the rail loop would be regraded by pushing the fill portion of each area into the cut portion. Highwalls throughout the life-of-mine area would be all but eliminated by backfill operations with contours established so that slopes were less than 3h:1v. The highwall portion of the surface facilities area would be eliminated after the portals had been plugged. The majority of the excess spoil pile would be graded into the cut area, against the highwall. Reclamation grading plans would be designed based on a net swell factor of 10 percent, allowing for recompaction during grading by reclamation equipment.

No permanent sedimentation impoundments are proposed to remain after reclamation operations. Sediment and storage ponds would be backfilled and graded upon final reclamation.

Rough grading of those portions of the rail spur outside the life-of-mine area between the fire control barrier and the edge of the right-of-way would occur immediately after construction activities were complete. Limited backfilling and grading would occur on those portions being used as railbed and fire barrier upon final reclamation.

The grading program would be designed to create an undulating topography. Dozers and scrapers would be used to backfill and rough-grade and finish-grade each area to about 1 foot below the postmining contour to approximate premining contour. The ground would be ripped both before and after the subsoil and topsoil had been redistributed. Ripping would be performed on the contour where possible, and to a minimum depth of 12 inches. A ripper or deep shank plow would be used.

Within the life-of-mine area and at the Huntley loadout, the top 4 feet of overburden/backfilled material would be composed of material suitable for revegetation. In addition, all slopes of reclaimed areas would be constructed compatibly with adjoining undisturbed areas and postmining land use.

4. Backfilling (Special Handling)

Certain unsuitable material in the spoil (e.g., highly carbonaceous units, acid-forming material, coal rider seams) would be selectively handled. This material would be placed below the vegetation rooting zone, above the ground water potentiometric surface, and outside the area of drainage channels or their floodplains. Regraded spoil in the main facilities area and mine portal area would be sampled to a depth of 8 feet (0 to 4 feet and 4 to 8 feet) at a density of 1 hole per 300 feet on a square grid basis. The regraded spoil samples would identify any spoil materials considered unsuitable for vegetation establishment.

Unsuitable mine development and coal-processing waste (e.g., coal fines, rock) would be placed in the WDA. Sampling for potential "hot spots" would precede soil laydown. Following compaction, the waste material in the WDA would be sampled to a depth of 4 feet at 1 hole per 150 feet on a square grid basis. It would be covered by a 4-foot layer of topsoil and subsoil material.

Regraded spoil and WDA waste material samples would be analyzed for unsuitable material using a saturated paste extract. Should any sampled materials prove unsuitable for revegetation, additional

sampling would locate the exact area of unsuitable material. These areas would be eliminated by either deep ripping and blending, adding supplements, or removing the unsuitable material and replacing it.

5. Topsoil Replacement

Topsoil would be spread uniformly across all disturbed life-of-mine areas to a depth of about 15 inches, after backfilled material had been graded to slightly more that 1 foot below final elevation, and deep ripped on the contour. Topsoil/subsoil stockpiled at the Huntley loadout would be used to backfill the sediment pond.

Along those portions of the rail spur right-of-way outside the life-of-mine area, available topsoil would be respread over graded, unripped slopes between the fire control barrier and the edge of the right-of-way immediately after construction. No topsoil would be replaced on those portions being used as railbed and fire barrier during final reclamation except on State-owned parcels.

After being respread, topsoil would be graded to final contours required to establish the postmining topography. Replacement would be accomplished by scrapers and/or dozers, and grading by rubber-tire graders. To prepare an adequate seedbed, the soil would be tilled after final grading.

6. Revegetation Operations

All lands disturbed within the life-of-mine area, Huntley loadout, and State-owned portions of the rail spur right-of-way would be revegetated. Seven postmine vegetation communities (grassland, shrub, ponderosa pine, mixed grassland-shrub, improved pasture, agriculture, and wetlands) would be re-established, where appropriate, within the life-of-mine area. The mixed grassland-shrub vegetation type would be re-established in the area of the regraded sedimentation pond at the Huntley loadout. The improved pasture and other appropriate vegetation types would be established along the proposed rail spur right-of-way outside the life-of-mine area.

No revegetation activities are proposed along the powerline easement, outside of the life-of-mine area. Final revegetation would rely on the natural invasion of species from nearby undisturbed communities.

All seedings would take place within 90 days of soil replacement if possible. Otherwise they would occur immediately prior to, or during, the most favorable period for plant growth. To take advantage of late fall, winter, and early spring moisture, fall seedings would take place from October 1 to freeze-up. Spring seedings would begin after spring thaw and continue until early May. Both drill seeding and broadcast seeding would be used, depending upon time of year, soil texture, vegetation species, and slope. Rates for drill seeding would range from 15 to 35 pounds of pure live seed per acre, or at least 30 seeds per square foot. Where broadcast seeding was used, seeding rates would double the rates used for drilling. If an area were not ready for revegetation in the early spring or late fall, it would be rough-tilled and mulched. Cover crops of annual grain may be planted at rates of from 10 to 15 pounds per acre in conjunction with seedings of perennials.

Mulch would be used at reclaimed sites, as needed. Straw mulch would be used at a rate of 1.5 tons of clean straw or hay per acre and anchored by a crimper. Artificial mulches, such as hydromulch, rock riprap, jute netting, excelsior, and paper-net mulch, would be used when stubble or straw mulch was not sufficient.

A total of 8 seed mixtures are proposed for use in revegetation activities. The first 7 mixes would provide the basis for the permanent re-establishment of major premining vegetative communities in the life-of-mine area, the Huntley loadout, and State-owned portions of the rail spur. Mixture No. 5 is proposed for the permanent stabilization of non-State-owned portions of the rail spur right-of-way outside the life-of-mine area. Mixture No. 8 is proposed for use in temporary revegetation and stabilization throughout the Project area.

Seed mixture No. 1, the grassland revegetation mixture, would be used to restore the disturbed, premine green needlegrass/western wheatgrass, needle-and-thread grass/western wheatgrass, bluebunch wheatgrass/needle-and-thread grass, and little bluestem/prairie sandreed communities throughout the area. It would consist of: thickspike, western, and slender wheatgrass, blue grama, prairie junegrass, Sandberg bluegrass, needle-and-thread grass, green needlegrass, common yarrow, purple prairie clover, spotted gayfeather, Lewis flax, prairie coneflower, and scarlet globemallow. (Note: Scientific names for all of the proposed revegetation species can be found in Table A-2.)

Seed mixture No. 2, the shrub revegetation mixture would be used to restore the disturbed, premine fragrant sumac/bluebunch wheatgrass, silver sagebrush/green needlegrass, and western snowberry/green needlegrass communities throughout the area. It would consist of: thickspike, western, and slender wheatgrass, blue grama, Sandberg bluegrass, needle-and-thread grass, green needlegrass, common yarrow, Lewis flax, prairie coneflower, scarlet globemallow, silver sagebrush, Wood's rose, and western snowberry.

Seed mixture No. 3, the ponderosa pine revegetation mixture, would primarily be used to restore the disturbed, premine ponderosa pine/bluebunch wheatgrass and ponderosa pine/western snowberry communities throughout the area. It would consist of: thickspike and slender wheatgrass, Indian ricegrass, Sandberg bluegrass, needle-and-thread grass, green needlegrass, common yarrow, Lewis flax, arrowleaf balsamroot, prairie coneflower, scarlet globemallow, Wood's rose, and western snowberry. Ponderosa pine seedlings would be planted in association with this mixture to re-establish the tree component of these communities.

Seed mixture No. 4, the mixed grassland/shrub revegetation mixture, would primarily be used to restore the disturbed, premine burned ponderosa pine community throughout the area. It would consist of: thickspike, western, and bluebunch wheatgrass, little bluestem, prairie sandreed, Indian ricegrass, green needlegrass, needle-and-thread grass, common yarrow, Lewis flax, arrowleaf balsamroot, spotted gayfeather, Wood's rose, and fragrant sumac.

Seed mixture No. 5, the improved pasture revegetation mixture, would be used to restore disturbed, premine tame pastureland community within the life-of-mine area and those portions of the rail

TABLE A-2

Revegetation Species for the Proposed Bull Mountains Mine No. 1 and Associated Facilities

Grasses:		Forbs:	
Agropyron cristatum	crested wheatgrass	Achillea millefolium	common yarrow
Agropyron dasystachym	thickspike wheatgrass	Balsamorhize saqittata	arrowleaf balsamroot
Agropyron intermedium	intermediate wheatgrass	Dalea purpurea	purple prairie clover
Agropyron smithii	western wheatgrass	Liatrus punctata	spotted gayfeather
Agropyron spicatum	bluebunch wheatgrass	Linum lewisii	Lewis flax
Agropyron trachycaulum	slender wheatgrass	Medicago sativa	alfalfa
Agrostis stolonifera	red-top grass	Ratibida columnaris	prairie coneflower
Bouteloua gracilis	blue grama	Sphaeralcea coccinea	scarlet globemallow
Calamovilfa longifolia	prairie sandreed		
Koleria cristata	prairie junegrass	**Shrubs:**	
Lolium multiflorum	Italian ryegrass	Artemisia cana	silver sagebrush
Oryzopsis hymenoides	Indian ricegrass	Rhus trilobata	fragrant sumac
Poa sandbergii	Sandberg bluegrass	Rosa woodsii	Wood's rose
Andropogon scoparius	little bluestem	Symphoricarpos occidentalis	western snowberry
Stipa comata	needle-and-thread grass		
		Trees:	
Grass-like:		Pinus ponderosa	ponderosa pine
Carex nebraskensis	Nebraska sedge		
Carex vulpinoidea	unnamed sedge		
Eleocharis palvstris	spikerush		
Scripus volidus	soft-stem bulrush		
Typha latifolia	broad-leaved cattail		

spur right-of-way that lie outside the life-of-mine area. It would consist of: crested and intermediate wheatgrass.

Seed mixture No. 6, the agriculture revegetation mixture, would be used to restore disturbed, premine agricultural lands intensively managed for forage crops within the life-of-mine area. It would consist of: alfalfa.

Seed mixture No. 7, the wetland mixture, would be used for the restoration of the wetland communities throughout the area, particularly the hydrologic mitigation and wetland enhancement sites. It would consist of: red-top grass, Nebraska sedge, an unnamed sedge, fowl mannagrass, spikerush, softstem bulrush and broadleaf cattail.

Seed mixture No. 8, the interim revegetation mixture, is made up of rapidly-establishing, drought-tolerant grasses. It would be used as a temporary cover for stabilization purposes around facilities, on settling ponds, and on topsoil/spoil stockpiles with a life of more than 6 months. This mix would consist of: thickspike, western, and slender wheatgrass, and Italian ryegrass.

Natural invasion and/or seeding would be used to re-establish the shrub components of the premine communities within the life-of-mine area. Ponderosa pine seedlings would be planted in pockets to re-establish the tree component of the disturbed, premine ponderosa pine/bluebunch wheatgrass and ponderosa pine/western snowberry communities, including the north face and top of the WDA. Natural invasion would be used to re-establish the shrub/tree components of those communities disturbed by linear facility development (e.g., rail spur construction, County road abandonment, powerline upgrade/extension) outside the life-of-mine area.

7. Revegetation Enhancement

Fertilization would occur during seeding operations, as needed. Before reseeding, routine representative soil samples would be taken to determine fertilization rates.

Where possible, broadcast-seeded areas would be chained, harrowed, multi-packed, or dozer-tracked to firm the seedbed and cover seed.

Weeds and pests would be controlled whenever they became a major problem. Herbicides could be used, but mowing of weeds before seed maturity would be the preferred control method.

Snow fences would be temporarily installed on sites tending to be dry or subject to wind erosion (i.e, tops of hills and windward slopes) and on sites where species diversity and seedling establishment could be aided by the concentration of winter moisture.

Final grading would include occasional use of small depressions to minimize erosion, trap sediment, conserve moisture and promote vegetation. These depressions would be field located during reclamation activities and would not restrict normal access through the reclaimed areas or constitute a hazard.

To the extent possible, soil materials would not be handled under unduly moist or wet conditions in order to avoid compaction. Similarly, soil handling would be avoided during extremely dry conditions to reduce the potential for excessive erosion. Topsoil would be hauled directly from the stripping area to the final revegetation site, when possible.

Contour furrows would be employed along the highwall reclamation area, and installed prior to seeding.

Alternative erosion control techniques would include use of barriers, check dams, erosion stops, matting and roughened surfaces. These treatments can be implemented with various kinds of straw bales, netting, and matting to effectively reduce overland flow. If gullies deeper than 9 inches should form, the gullies would be blocked with one of the above-mentioned treatments and given the opportunity to stabilize naturally, by vegetation growth.

Temporary fences would ensure protection from trampling and grazing by cattle for all areas that had been revegetated, until the plant communities were mature enough to withstand grazing pressure. Grazing would occur at least 2 years during the last 5 years of responsibility for vegetative establishment. Permanent postmining fences would be built to achieve the goals of future land management systems.

8. Hydrologic Mitigation

Water resources at 42 of the 130 existing springs and seeps in the Bull Mountains area could be disrupted by mining-related subsidence (Table III-3). Impacts to these resources would be mitigated through the use of interim water supplies, repair of shallow surface fractures, horizontal drains, vertical wells, guzzlers (see Guzzlers, below), ponds (reservoirs), and/or supplementation using water distribution systems (see Table A-3). The selection of mitigation techniques would depend on 7 factors: 1) Current management of the resource, 2) existing level and mode of development, 3) water source(s) (alluvium, shallow bedrock, deep bedrock), 4) seasonality of water availability and flow volume, 5) topographic characteristics, 6) mitigation goals, and 7) potential for mitigation success.

Short-term, temporary, and long-term/permanent mitigations are included in the overall plan. Short-term mitigation would include those activities conducted prior to impact, and as immediate responses to impacts. Temporary mitigation would phase into long term/permanent mitigation depending on the success of a particular technique employed. Mitigation plans at these springs would follow a multi-step process, initiated in separate phases throughout mine life: 1) an interim water supply would be established; 2) shallow surface fractures affecting the existing hydrologic feature would be repaired, when appropriate; and, if necessary, 3) a permanent replacement or supplemental water source would be developed. Horizontal drains would be installed at most springs, but vertical wells, ponds, or water distribution systems would be used as needed.

The 88 remaining springs or seeps that are not believed to be at substantial risk would be monitored for mining-related effects (see Hydrologic Monitoring and Table A-3). Monitoring would be implemented during premining, mining, postmining, and reclamation phases to measure mining related effects and mitigation success. If monitoring indicated that any of those springs were impacted by

TABLE A-3

Bull Mountains Mine No. 1
Hydrologic Mitigation Plan

Station	Surface Fracture Repair	Pond Repair	Pond Enlarge	Pond New	Horizontal Drain	Shallow Well	Deep Well	Guzzler	Distribution System	Comments
14115					X					
14155					X					
14165				X					X	From Spring 14155
14255	X	X							X	From Spring 14115
14325	X	X							X	From Spring 14115
14415	X		X							
14535	X	X							X	From Spring 14115
14555	X				X					
16135					X					
16145					X					
16165					X					
16255	X								X	From Spring 16135
16275	X	X			X					
16355	X								X	From Spring 16135
16365	X			X					X	From Spring 16135
16625	X				X					
16655	X	X							X	From Spring 16135
16755	X							X		
16855	X							X		
16955	X			X						
17415	X	X					X			
17515	X	X							X	From Spring 17415

TABLE A-3 (Continued)

Station	Surface Fracture Repair	Pond Repair	Pond Enlarge	Pond New	Horizontal Drain	Shallow Well	Deep Well	Guzzler	Distribution System	Comments
17635		X			X					
17655	X	X					X			
17685	X	X							X	From Spring 17655
52125	X	X			X					
52145	X	X			X					
52225	X	X			X					
52235	X				X					
52255	X				X					
53115	X					X				
53125	X					X				
53145	X				X					
53155	X				X					
53175	X	X							X	From Spring 53115
53225	X				X					
53245	X				X					
53525	X				X					
53535	X	X			X					
53545	X			X						
71115	X				X					
71125					X					
Maximum Cumulative										
Numbers	34	15	1	4	22	2	2	2	11	
Acres	3.4	15.0	1.0	4.0	2.2	2.0	6.0	4.0	15.0	52.6 Acres

mining-related activities, an appropriate mitigation method would be implemented in consultation with Montana Department of State Lands (DSL).

Wells, springs, ponds, and distribution systems would require maintenance, repair, and replacement, to varying degrees. These would be provided for by creation of a permanent trust funded by Meridian and guaranteed by the reclamation bond. The trust principal would be deposited in an account in the State non-expendable trust fund. The principal of the trust would be established in an amount projected to ensure that maintenance, repair, replacement, and operating costs could be paid from trust income. In addition, a portion of the income would be dedicated to the principal in an amount projected to be sufficient to maintain the real value of the principal. The trust would be administered by Montana DSL or any successor agency.

a. Interim water supply

Livestock and wildlife drinking water would be replaced on an interim basis when a negative change in water quantity affecting the hydrologic function was detected at a spring, wetland, and/or pond as a result of mining-related activities. Water would be hauled by truck to temporary or existing stock tanks as needed to insure uninterrupted water supplies. Depending on the land use of the impacted area, some other rapid response approach may be implemented, as approved by Montana DSL. To minimize disturbance, temporary stock tanks would be located near the disrupted water source.

b. Fracture repairs

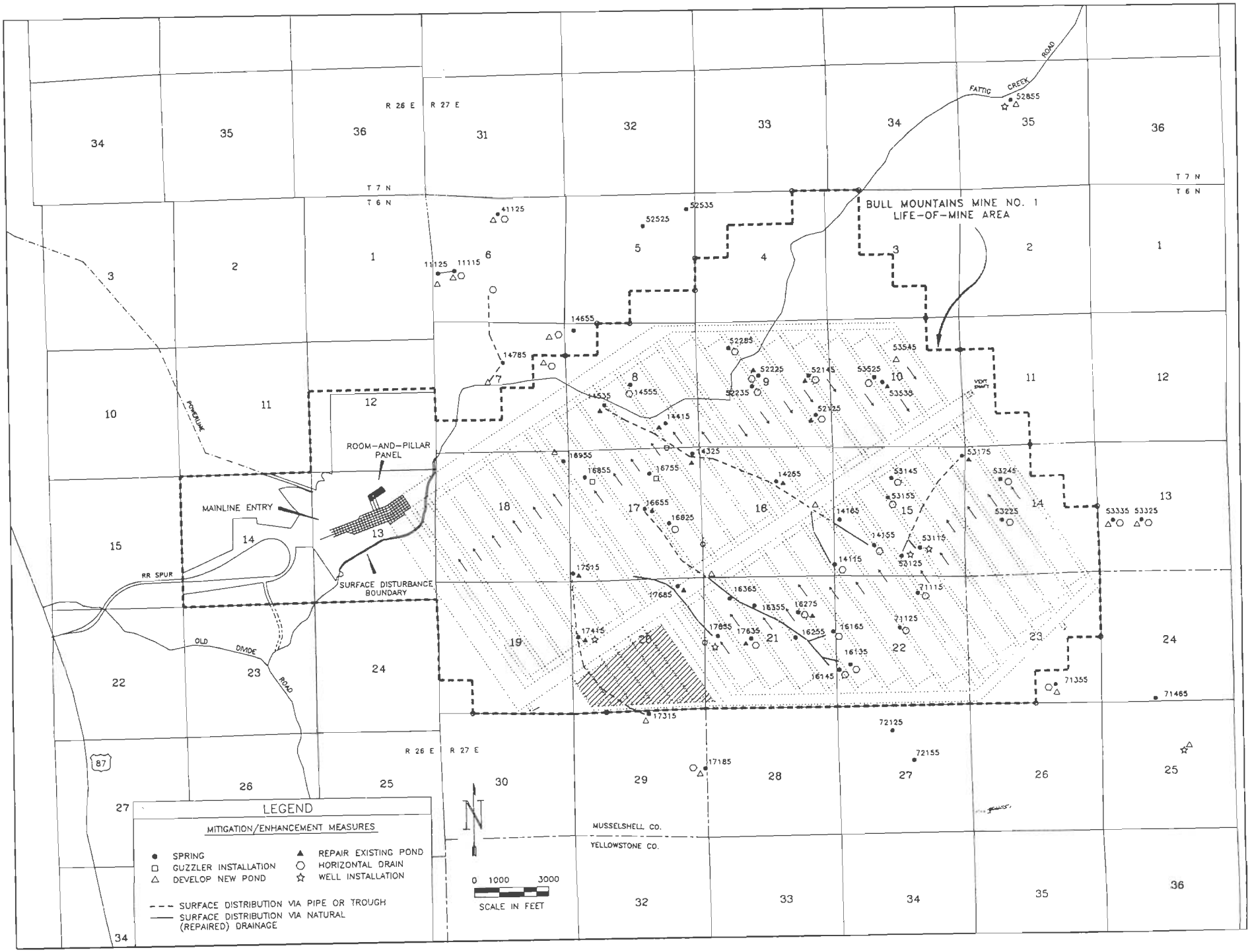
When negative changes in water quantity were associated with shallow, surface-subsidence fractures or cracks, the damage would be repaired, as appropriate. Depending on the type of spring or seep involved, low-permeability fill material, synthetic pond liners, porous gravel filter material, perforated pipe, or native material would be installed. About 0.1 acre would be disturbed during the fracture repair operation at each spring. Since fracture repair could occur at 34 springs/seeps, the maximum cumulative disturbance associated with fracture repair would be 3.4 acres.

c. Horizontal drains

New horizontal drains would be used to mitigate impacts at 22 springs and seeps (see Table A-3 and Figure A-12). Targeted springs are those located in the higher portions of the drainage basins where horizontal drains could tap the shallow fractured and weathered bedrock zone. They would range in length from about 50 to 250 feet and would be constructed with 2-inch, PVC pipe or other suitable material. About 0.1 acre would be disturbed during the installation of each drain. The maximum cumulative disturbance associated with drain development would be about 2.2 acres. Water storage and delivery systems would be built with each drain. Cut-and-fill material for drain development would be equally balanced to eliminate excess material. The disturbed area would be immediately revegetated and enclosed with barbed-wire fencing to limit public/livestock access.

Figure A-12

Hydrologic mitigation and wetlands enhancement program



d. Wells

New vertical wells would be used to mitigate impacts at 4 springs and seeps (see Table A-3 and Figure A-12). Two shallow wells, ranging from 50 to 100 feet, would tap the shallow fractured and weathered bedrock in those areas where access or topography preclude the use of horizontal drains. Two deep wells, ranging in depth from 600 to 700 feet, would tap the underburden sandstones below the Mammoth coal seam, in those areas where subsidence-related fracturing had dewatered the shallow ground water system.

Disturbance associated with shallow well development would range from 0.25 to 1 acre per site. The deep wells could disturb as much as 3 acres during installation activities. The maximum cumulative disturbance associated with well development would be about 8 acres. Cut-and-fill material from well development would be equally balanced to eliminate excess material. The disturbed area would be immediately revegetated and enclosed with barbed-wire fencing to limit public/livestock access.

If appropriate, wells would be located along fencelines to provide maximum flexibility for livestock operators. All wells would be drilled and cased with 4.5- to 5-inch (inside diameter), steel, PVC, or other suitable pipe. Electric pumps would be used on the 2 deep wells and windmills would be used on the 2 shallow wells. Water storage and delivery systems would be built for each well.

e. Guzzlers

Newly-constructed guzzlers would be used to mitigate impacts at 2 isolated springs (see Table A-3 and Figure A-12). Guzzlers are permanent, self-filling water devices that catch and store rain water in a manner similar to a cistern. Installation of a guzzler would consist of a collecting apron, an enclosed, watertight storage tank, and a water-delivery system. Guzzlers would provide limited quantities of water in those areas where historic spring flow has been minimal and seasonal.

They are generally located in areas with gentle slopes and deep soil to permit burial of the storage tank. Collecting aprons consist of about 1,000 to 5,000 square feet of corrugated fiberglass or galvanized steel, elevated about 1 foot above the ground on a wooden or metal framework. Rainwater would be intercepted and drained from the sheeting into a collecting trough. It would then be piped into a large, 10,000 to 20,000 gallon, buried fiberglass storage tank. When needed, the stored water would be piped downslope from the tank by gravity flow to a small, 100-gallon trough/drinking pan, placed at ground level. The actual release of water into the trough would be controlled by a float-and-foot valve installed in the water line between the storage tank and the trough.

Disturbance from guzzler construction would range from one-half to 2 acres per site for a maximum cumulative disturbance of about 4 acres. Cut-and-fill material associated with guzzler development would be equally balanced to eliminate excess material. The disturbed area would be revegetated immediately and enclosed with barbed-wire fencing to limit public/livestock access.

f. Ponds (Reservoirs)

Newly-constructed ponds or reservoirs would be used to mitigate impacts at or near 4 springs and seeps. In addition, the existing pond at spring 14415 would be enlarged, and the existing ponds at 15 other springs may require repair (see Table A-3 and Figure A-12). Ponds would be used to collect and store surface water from direct runoff and from discharge from horizontal drains or vertical wells. Stored water would be used for replacement and augmentation of both spring flow and wetlands.

New ponds would be developed by excavating and constructing a dam or embankment directly across the drainage. Enlargement or repair of existing ponds would be accomplished by excavation and repair of the existing structure or the placement of a new dam across the valley bottom.

Disturbance from pond construction or repair would range from 0.1 to 1.0 acres per site, with a maximum cumulative disturbance at 20 sites of about 20 acres. All new embankments would be constructed by excavating a core trench into alluvial/colluvial material and compacting the backfill in 2-foot lifts. Water-holding capacity of all reservoirs (ponds) would be enhanced by deepening catchment or by installing diversion trenches to direct surface runoff waters into the basin. New construction or excavation would also incorporate the use of bentonite to reduce seepage loss. All impoundment designs would include spillways constructed to safely pass the excess water flow from the 100-year, 24-hour runoff event. Cut-and-fill material from pond development would be equally balanced to eliminate excess material. A water delivery system would be built with each pond. Disturbed area would be revegetated immediately and certain portions enclosed with barbed-wire fencing to limit public/livestock access.

g. Water distribution systems

Newly-constructed pipelines, irrigation troughs, or natural drainages would deliver excess water supplies throughout the life-of-mine area. A total of 4.0 miles of pipelines and/or irrigation troughs and 3.5 miles of repaired natural drainages would be used to supplement interrupted water supplies at 11 springs and seeps (see Table A-3 and Figure A-12).

In the steeper portions of basins where there is historic, perennial flow, the natural stream channel would be used to distribute water to downstream ponds or reservoirs. If necessary, the flow system within the drainage would be enhanced and, where appropriate, shallow surface-subsidence cracks would be repaired to ensure water delivery.

Buried pipelines would be used to supply water to secondary sites in those areas where a horizontal drain, vertical well, or pond had been developed nearby, where sufficient unconsolidated material existed to allow easy excavation and minimal disturbance, and where a natural drainage could not be used. Irrigation troughs would be used in place of buried pipe where terrain or thin unconsolidated material was present. An advantage of pipelines and irrigation troughs is that they allow for the passage of water over subsidence cracks without loss. Each pipeline installation would consist of flexible pipe, buried at least 3 feet below the ground surface. Each irrigation trough installation would consist of an above-ground, open or closed pipe. Each secondary site would be developed with water storage and delivery systems as if it had a water source.

Individual pipeline/irrigation trough lengths range from a few hundred feet to a several thousand feet. Disturbance from water distribution activities would range from 1.5 to 2.0 acres per mile of distribution system. The maximum cumulative disturbance would be about 15 acres. Cut-and-fill material would be equally balanced to eliminate excess material. Disturbed areas would be revegetated immediately and, where appropriate, enclosed with barbed-wire fencing to limit public/livestock access.

9. Wetland Mitigation and Enhancement

Wetlands and associated vegetation disrupted as a result of mining-related subsidence (about 15 acres within the life-of-mine area) would be replaced as water sources were repaired, redirected, and/or developed (see Hydrologic Mitigation). While hydrologic development activities have the primary purpose of replacing water, wetland replacement would be a secondary benefit.

About 1 acre of scattered wetlands would be disrupted during construction activities along the proposed rail spur right-of-way. To mitigate this wetland loss, natural depressions along the right-of-way would be enlarged and graded to spread the water at a shallow depth across the depression.

In addition, wetland enhancement activities are proposed at certain water sources outside the life-of-mine area. These areas could eventually make up a 9-acre enhancement "bank" of wetland resources to temporarily mitigate Project-related wetland losses inside the life-of-mine area until scheduled wetland mitigation activities were complete. The "bank" of wetlands would be created on private lands in areas away from the mine site and its disruptive activities. These wetlands could serve wildlife and offer protection through topographic or vegetative features such as wind breaks or shading (see Table A-4). Selected wetland locations would be optimized for water-holding capacity and water-level maintenance. The enhancement "bank" may remain as wetland acreage after mine life even though other wetlands had been re-established.

About 2.5 acres of wetland enhancement would be initiated at 3 springs during Phase 1 mine development activities (see Table A-4 and Figure A-12). New ponds and associated wetlands would be developed in the vicinity of springs 11115 and 11125. A gravel pit located 1000 feet southwest of spring number 14785 would be enlarged and developed into a pond/wetland area. Horizontal drains would be established at spring 11115 and near spring 14785 to enhance the basic water supplies. Distribution systems would be installed to convey the excess water from spring 11115 to spring 11125 and from the horizontal drain near spring 14785 to a new pond at the gravel pit. The maximum cumulative disturbance from Phase 1 wetland enhancement would be 4 acres.

An additional 6.5 acres of wetland enhancement would be initiated at 13 other springs during Phase 2 mining activities (throughout the remainder of mine life). Enhancement activities at these springs would include enlargement of 5 existing ponds, creation of 9 new ponds, and drilling of 10 horizontal drains and 3 shallow wells (see Table A-4 and Figure A-12). Maximum cumulative disturbance from Phase 2 wetland enhancement would be 18 acres.

Cut-and-fill material associated with wetland enhancement activities would be equally balanced to eliminate excess material, as with all proposed spring development. A water delivery system would

TABLE A-4

Bull Mountains Mine No. 1
Wetland Enhancement Plan

Station	Surface Fracture Repair	Pond Repair	Pond Enlarge	Pond New	Horizontal Drain	Shallow Well	Deep Well	Guzzler	Distribution System	Comments
11115				X	X					
11125				X					X	From Spring 11115
14655			X X		X X					Develop Two Sites
14785			X		X				X	From Horizontal Drain and Spring 14785 to Enlarged Pond
17185			X			X				
17315			X							
41125			X		X					
52525				X	X					
52535				X	X					
52855				X		X				
53325				X	X					
53335				X	X					
71355				X	X					
71465				X		X				
72125				X	X					
72155				X	X					
Maximum Cumulative										
Numbers	0	0	6	11	12	3	0	0	2	
Acres	0.0	0.0	6.0	11.0	1.2	3.0	0.0	0.0	0.4	21.6 Acres

Footnote: Columns for surface fracture repair, pond repair, deep wells, and guzzlers were included on this table to maintain consistency with Table A-3 even though none of these measures have been proposed for wetland enhancement.

be developed for each site, and the disturbed area immediately revegetated. Certain portions of the disturbed area would be enclosed with barbed-wire fencing to limit public/livestock access.

10. Wildlife Mitigation

a. Wildlife habitat

Reclamation activities throughout the life-of-mine area would mitigate impacts to existing wildlife habitats by creating similar habitats in form and function. Vegetation species in proposed revegetation seed mixtures include 4 native shrub species selected for their palatability, and nutritional and cover values for locally-identified wildlife species (see Revegetation Operations). Native shrub seed and tree seedlings would be planted in concentrated pockets of varying sizes and shapes for use as wildlife forage and cover, respectively.

Undulations and small hills would be designed into the regraded final topography to enhance habitat diversity. In addition, 10-foot terraces, would be used on the north face of the WDA and ponderosa pine seedlings would be used to provide visual cover during wildlife movement.

Rock piles would be placed throughout the reclaimed surface facility complex, including the WDA, at a density of about 10 to 15 rock piles per 640-acre section, depending on the availability of material. Rock piles as large as 1,000 square feet would be placed along ridges, in bottomlands, and near stock ponds to mitigate the loss of rock outcrops that are used for raptor perching and mammal dens.

Fifteen acres of wetland habitat disturbed by subsidence would be replaced. One acre of scattered wetland habitat disrupted during rail spur construction would be replaced. In addition, an enhancement "bank" of wetland resources would be created outside the life-of-mine area to temporarily mitigate up to 9 acres of anticipated Project-related wetland loss during mine life (see Wetland Mitigation and Enhancement).

b. Hydrologic structures

Water delivery systems, consisting of either freeze-proof piping and watering troughs or some other appropriate mechanism, would be installed at each horizontal drain, vertical well, guzzler, and pond development to supply drinking water to wildlife and livestock.

Shorelines associated with pond (reservoir) construction or repair would be designed to provide easy access for wildlife and revegetated to ensure adequate wildlife cover and forage.

All horizontal drain, well, guzzler, and pond developments would be fenced to prevent habitat degradation by livestock. Design overflow areas would be maintained within the enclosure fence to preserve their availability for small game.

c. Other mitigation

Appropriate Federal and State wildlife agencies would be immediately contacted should any Federal- or State-listed endangered or threatened species, or golden eagles, consistently occupy the various Project areas or immediately adjacent areas.

All powerlines constructed for mining-related operations, would be designed to minimize collisions and electrocutions of raptors, waterfowl, and other wildlife species. Powerlines would be constructed in accordance with Rural Electric Association standards designed to reduce risk of electrocution to raptors (Ollendorff 1981).

Fences throughout the life-of-mine area and along the rail spur right-of-way would be constructed with steel posts and 3-strands of barbed wire. In hazardous or critical, newly-seeded areas, a 6- or 8-foot, woven-wire fence would be used to keep out wildlife. Otherwise, barbed wire would be spaced to ensure that fences would not restrict wildlife movements and migration. Sedimentation ponds associated with the surface facility complex would not be covered or enclosed by fencing that could deter wildlife.

Rock piles, brush, and other natural barrier materials would be used to supplement fencing and to create small mammal habitat and cover while still blocking livestock access around springs, guzzlers, ponds, and well development areas when topography and materials allowed.

Speed limits on all access roads would be restricted to 25 MPH to reduce wildlife/vehicle collisions.

Employees would be informed about Montana game laws and cautioned not to harass or poach game animals.

11. Environmental Monitoring

Environmental monitoring would be conducted on a regular basis to further define premining baseline environmental conditions and to detect mining-related changes from the baseline values. Operational and postmining data would be compared with premining data collected for the permit application. These comparisons would be used to design corrective measures during mine life, as needed.

In addition to vegetation, wildlife, subsidence, and hydro-logic data collection, monitoring would be conducted for undetected cultural resources/Native American resources, airborne particulates, and soil suitability.

a. Vegetation

Monitoring would be conducted to assess the success of revegetation efforts in all disturbed areas within the life-of-mine area and the Huntley loadout. Revegetated areas would be evaluated for cover and density during the first 2 seasons following seeding or planting to determine initial revegetation success. Prior to application for bond release (in years 3, 5, 7, 9, and 10 following seeding or planting),

revegetated areas would be evaluated for cover, density, production, and species diversity. If vegetation monitoring showed that corrective action was needed, then reclamation techniques and seed mixes would be revised to address the specific revegetation concerns.

b. Wildlife

Monitoring would be conducted to detect changes in wildlife concentrations or habitats during the mine life. This would include variations in species distribution or relative abundance and degradation of habitats for elk, mule deer, raptors, turkeys, and sharp-tailed grouse. Wetland and aquatic habitats would also be monitored. Monitoring activities would include field surveys, data compilation, impact assessment, and report preparation.

Field surveys would consist of aerial, vehicular, and footpath surveys. Censuses would be both visual and auditory. Seven aerial field surveys would be conducted annually; 2 in each of the fall, winter and spring seasons, and 1 during the summer. Footpath surveys in each of the 4 seasons, and vehicular and footpath surveys targeted at specific census targets and locations, would also be conducted.

The presence and distribution of breeding raptors in the area would be monitored annually. Observations of species or their sign would be recorded. Previously recorded nests would be examined for occupancy during the aerial surveys. In addition, each nest would be checked from the ground. All active nests would be monitored throughout the breeding season to determine success and production. Opportunistic observations made during aerial and ground surveys would be used to identify pairs of raptors not affiliated with a known nest in the area. If such a pair was located, the birds would be followed in an attempt to locate their nest. New nests would be monitored along with all other recorded nests.

Auditory censuses would be used each spring to assess the distribution and relative abundance of turkeys and breeding sharp-tailed grouse. The censuses would be conducted in the same manner as baseline data collection. Observation made during the aerial, vehicle, and footpath surveys would add to census results and provide incidental habitat use information. Although sharp-tailed grouse occurred in the area during the baseline data collection, only 1 lek was located. To ensure that other leks were not missed, auditory censuses would be conducted each spring. Attendance at each identified lek would be monitored annually for the duration of mining activities. This monitoring would consist of counting the number of male and female grouse attending each lek over 3 consecutive mornings.

c. Subsidence

Monitoring would be conducted to detect movements in the land surface. Monument grids would be placed over the mining panels, extending over the solid coal block, and surveyed to detect ground movements. The subsidence monitoring grid consists of 3 lines of monuments at 50-foot spacing across a portion of the first panel. Additional monuments, located at the center of other panels, would be spaced at 1,000 to 2,000 feet. All monuments would be constructed to ensure that they would not be affected by movements unrelated to subsidence, such as soil heave due to freezing.

Instrumentation for the first series of panels would include a precision level to measure vertical settlement and a steel tape extensometer to measure horizontal strain. Automatic data recording equipment would be used to take a continuous record of strain and tilt. Site-specific angle of draw, subsidence factor, and tensile strain would be calculated.

An additional monitoring system of multiple-position extensometers, or other suitable devices, would be installed to verify the mechanics of subsidence and to evaluate the caving and fracturing of the overburden. Strata movement measurements would be conducted in the life-of-mine area with 400 to 600 feet of overburden.

d. Hydrologic

Monitoring would be conducted to detect changes in 81 wells, 130 springs, 12 sites in 9 stream drainages, 57 ponds, and about 30 acres of wetlands associated with existing hydrologic features in and adjacent to the life-of-mine area. Monitoring would include both quantity and quality information. Observation frequency would vary from annual to quarterly depending on the size, use, and location of the feature (i.e., well, spring, pond) in question. Monitoring frequency could increase to a weekly basis as mining approached, then passed below, the location of the feature. When more frequent monitoring indicated that the effects of subsidence had been felt and the area stabilized once again, permission would be obtained from Montana DSL to reinstitute the original, less frequent monitoring schedule for that feature. Particular data to be collected would depend somewhat on the type of hydrologic feature being monitored. Wells would be monitored for water elevation and quality. Springs and ephemeral drainages would be monitored for flow rate and quality. Ponds would be monitored for water volume and quality and wetlands for areal extent and vegetation data.

APPENDIX B

SUMMARY DESCRIPTION OF

CUMULATIVE DEVELOPMENT

A. INTRODUCTION

Several established business operations, expansion projects, and proposed activities in the study area could have cumulative effects on the human environment in combination with the proposed Project. The following paragraphs describe existing or expanding developments and new projects that may compete with the proposed Project for local employees or that may produce cumulative impacts in conjunction with the proposed Project.

1. PM Mine

The PM Mine is an underground coal mining operation consisting of 101.17 permitted acres located 16 miles southeast of Roundup, Montana in the W 1/2 of Section 13, and the NE 1/4 of Section 14, T6N, R26E MPM (see Figure B-1). RBM Mining extracts coal under a contract with Meridian Minerals Company (Meridian), which owns the mineral rights at the PM Mine. RBM Mining employs 6 workers and is currently permitted to remove 12,000 tons of coal up to the current permit boundary. Four underground mining portals have been constructed and the mine life is dependent on both market demand and the rate of advancement of the portals.

Coal from the PM Mine is extracted in a continuous-miner process, transferred to the surface by shuttle car, washed and stockpiled on site, and picked up at the mine by the purchaser. It is sold in the Roundup area and to a small Statewide market as "lump coal." Existing mine facilities include a scale; wash plant; four, 150-ton coal silos; a hopper unit; and a combined office and scale house.

Historical land uses for the PM minesite have been livestock grazing and wildlife habitat. The area was first mined in the 1930s as an underground coal mining operation, but it was converted by the owners, the Meged Family, into a surface coal mine in 1972. In the fall of 1991, the mine was converted back to underground mining when the present RBM Mining project commenced operation. Total coal production from 1973 to 1990 amounted to 228,573 tons.

2. Coal Test Pit

The Meridian coal test pit is a surface mine developed by Meridian for the purpose of extracting up to 250,000 tons of coal for marketability testing. About 101 acres were ultimately permitted by Montana DSL for test pit operations, with 36 acres constituting the total disturbed area (see Figure B-1). Approximately 160,000 tons of coal were extracted using standard open pit techniques between November 1989 and November 1990. Clean coal for shipment totaled 130,000 tons. Peak employment during this period was about 20 employees, including 5 employees in supervisory positions. The coal was trucked to the Huntley loadout for ultimate shipment to foreign markets. Reclamation of the mined area began in late-1991 and continued into 1992.

3. Huntley Loadout Facility

The Huntley loadout is a 6.07-acre rail support facility located in the NE 1/4 of the NE 1/4 Section 25, T2N, R27E in Yellowstone County, Montana, on the east edge of Huntley (see Figure B-2). The loadout's surface area consists partly of gravel and partly native range. Washington Corporations,

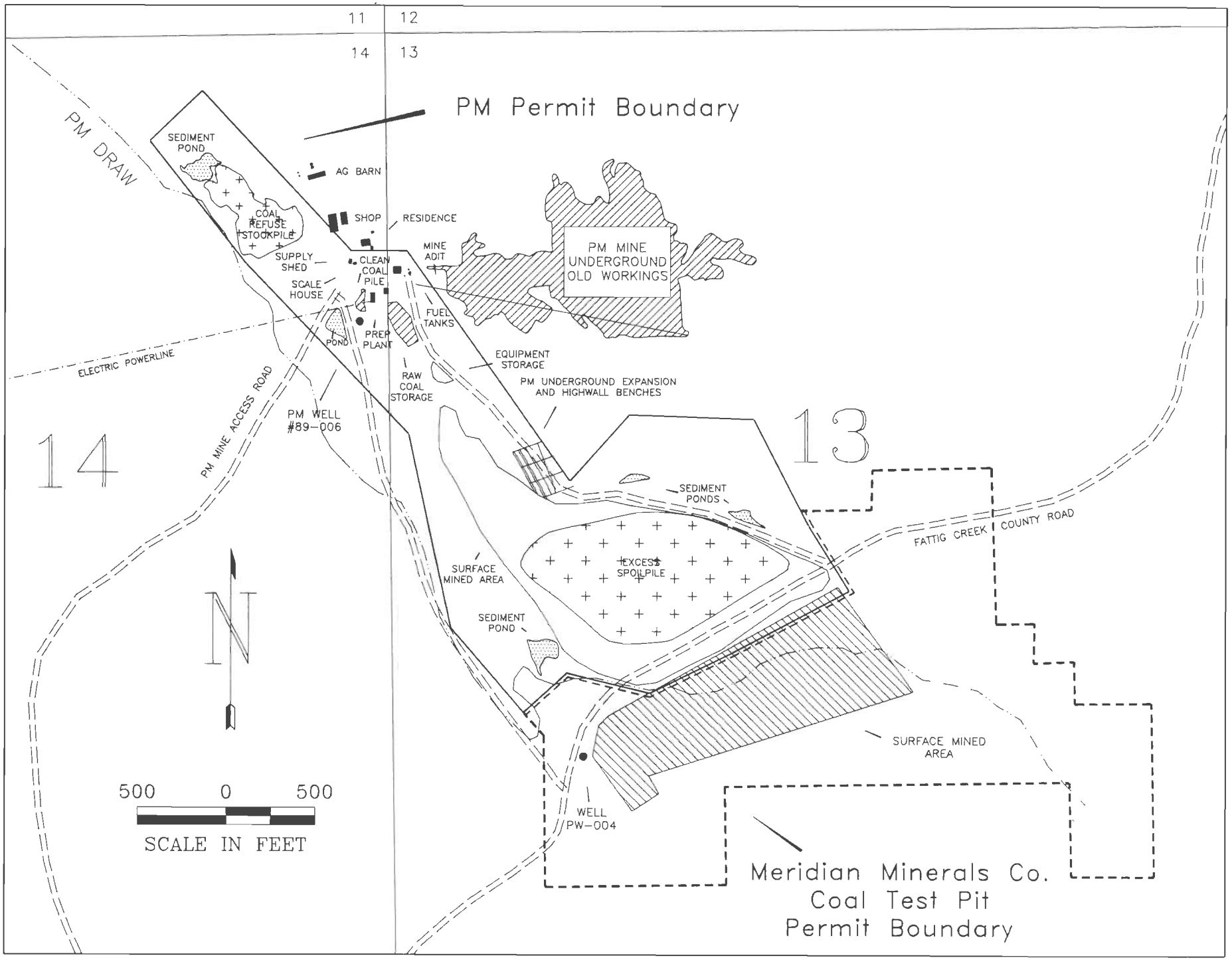


Figure B-1 Existing buildings and facilities at the PM Coal Mine and coal test pit

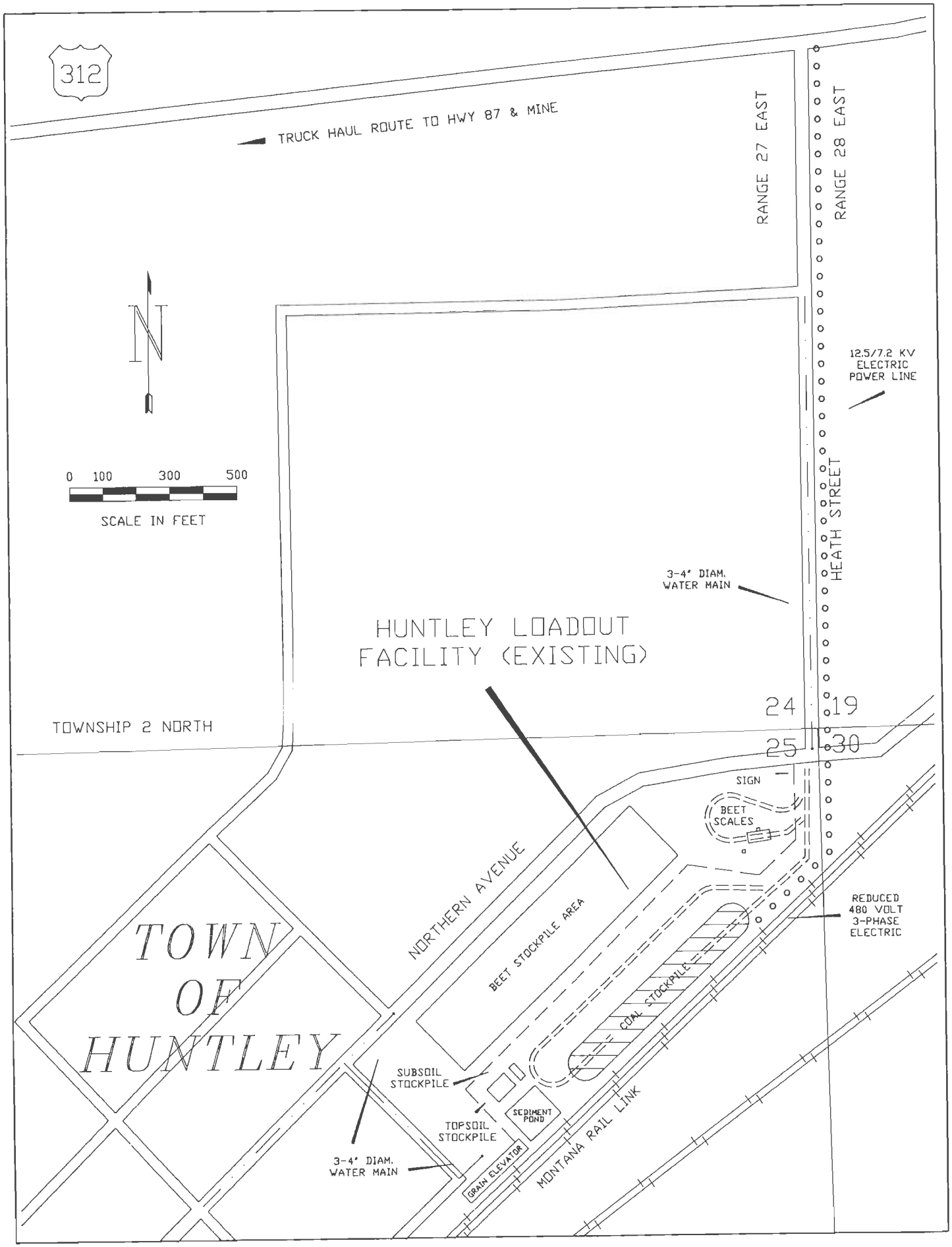


Figure B-2 Existing Huntley loadout, beet-loading facility, and grain elevator

through its railroad subsidiary, Montana Rail Link, owns the facility. The site has electrical service. Water for dust control is available from a well completed by Meridian in 1990. In recent years, horses have been grazed on the land for short periods of time. The southwest portion was established as a temporary coal loadout by Meridian, in its 2-year test pit permit, from November 1989 to November 1991.

4. Sugar Beet Loading Site

The Huntley sugar beet loading and stockpiling site is located directly west and adjacent to the existing coal loadout facility in Huntley (see Figure B-2). The property is owned by Montana Rail Link and leased to Western Sugar Company (WSC). WSC uses the site to temporarily stockpile beets before they are hauled to a processing factory in Billings. Sugar beets received from local farmers are stockpiled during the peak harvest month of October and subsequently hauled to a factory in Billings from October through January. Total WSC employment at the stockpile usually averages between 4 and 6 workers.

Since 1985, sugar beet truck traffic from local farmers hauling to the stockpile has varied from 830 loads in 1985 to 4,252 loads in 1990. Most field harvest traffic has occurred in October, usually 10 to 12 hours per day, 6 days per week. In 1990, the average truck traffic from farms to the stockpile was 177 trips per day over a 24-day period. Peak hauling during 1990 occurred on October 13 and involved 281 trips from area farms. Most farm truck traffic arrives at the stockpile using Northern Avenue from the west and east, and Heath Street from the north.

Beets are subsequently re-hauled from the loading site to the factory in Billings. This activity fluctuates annually, but from 1988 through 1990 the average was about 35 loads per day for 26 days per year. Hauling usually occurs daily, throughout a 24-hour period, with intermittent breaks as dictated by factory needs. Peak hauling in 1990 was 69 loads on October 21, with 60 or more loads occurring on 3 other days. Beet hauling is usually contracted with a local trucking firm. Trucks normally haul to the factory in Billings by turning west from the loadout facility site onto Northern Avenue, and by taking Interstates 94 and 90 to the exit ramp at 27th Street.

5. Fergus Electric Cooperative

As a power distribution cooperative, Fergus Electric does not own any power generation facilities. Its subtransmission and distribution system is served by 19 substations. Fergus Electric Cooperative was incorporated in 1938 under the authority of the Rural Electrification Act of 1935. Fergus Electric serves a 13-county geographical area centered around Lewistown, and supplies power to about 2,700 customers over about 4,000 miles of subtransmission and distribution lines (see Figure B-3).

System power is purchased through the Central Montana Electric Power Cooperative, an electric power broker that purchases wholesale power from Montana Power Company and Western Area Power Administration. The cooperative's customer base is primarily rural residential and irrigators. Large commercial customers include the Kendall Mine, BER Oil, and PM Mine. Annual Power sales average 70 to 80 million kilowatt hours. Fergus Electric employs a total of 24 people; 21 in Lewistown and a maintenance crew of 3 in Roundup.

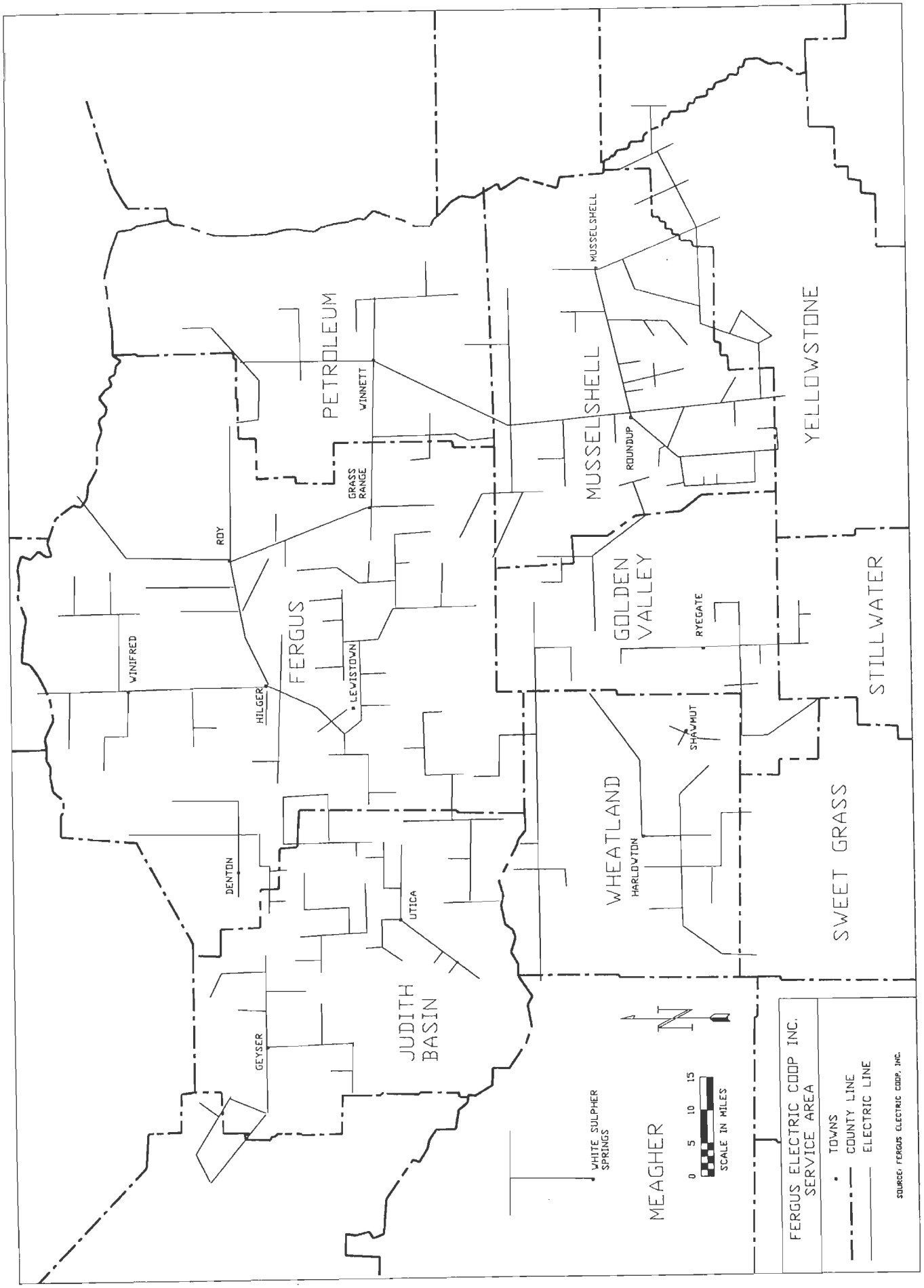


Figure B-3 Fergus Electric Cooperative power distribution system

6. Women's Correctional Facility

The State of Montana proposes to construct a new Women's Correctional Facility in the Billings area near 32nd Street West and Hesper. The present facility for women prisoners is located in Warm Springs and would be closed upon completion of the new prison. Construction of the proposed $10 million facility should begin in January 1993 and last for about 18 months. Construction employment would total 50-100, and operation of the 120-bed facility eventually would employ 80 to 90 people on a permanent basis.

7. Cenex Hydrosulphurization Project

Cenex operates a fuel refinery in Laurel, Montana, that produces asphalt, diesel fuel oil, gasoline, and liquified petroleum products. The refinery has been in operation since 1930, with a capacity of 42,000 barrels per day, and is expected to continue operations for at least 44 years. In May of 1992, Cenex began construction on a hydrosulphurization project that is also located at the refinery in Laurel. The hydrosulphurization project, which is expected to become operational toward the end of 1993, is strictly a mitigation project to reduce air emissions and is not expected to expand the number or value of products produced. The construction phase is expected to employ about 400 workers who are being hired from the local area.

8. Cogeneration Project

Billings Generation, Inc. is in the permitting process to construct a proposed $150 million cogeneration project east of Billings. The cogeneration plant would use refinery coke and return steam to the Exxon refinery to be used in production. The project is also expected to reduce sulphur dioxide emissions from the Exxon refinery. If permitting continues as planned, construction of the project would begin in fall 1992 and operations would commence in 1994. The construction phase of the project would employ 400 to 500 workers hired from the local work area. When complete, the project's permanent employment requirements would be 30 direct workers and 15 secondary workers.

If permitting continues as planned, construction of the project would begin in spring 1992 and operations would commence in 1994. A construction contractor based in California has been selected; however, it is expected to subcontract for employees in the local work area. The project would employ 400 to 500 construction workers, primarily pipefitters. When complete, it would increase employment by 30 direct workers and 15 secondary workers (Owen Orndorff, Billings Generation, Inc., November 7, 1991).

9. U.S. Highway 87 Improvements

The State of Montana has two reconstruction projects planned for U.S. Highway 87 between Roundup and Billings. Reconstruction of 6.2 miles of U.S. Highway 87 is scheduled to begin after 1993 between milepost 23 and milepost 29.2, several miles south of the south entrance to Old Divide Road. The construction period should last about a year and would employ between 50 and 100 workers. Truck

traffic from reconstruction may periodically total 20 trucks per hour. The trucks would be similar in size to coal haul trucks.

The other reconstruction project planned for U.S. Highway 87 is north of the proposed coal haul route from Klein to the junction of Highway 12. This project includes 1.8 miles of U.S. Highway 87 and 1.1 miles of Highway 12 (from the junction with U.S. Highway 87 to Roundup). Depending on the contractor, truck hauling related to this project may use U.S. Highway 87 south of the reconstruction project.

10. Sealey's Sawmill

Sealey's Sawmill is located east of Roundup on Highway 12 and is owned and operated by Lawrence Sealey. The sawmill, in operation since 1948, currently produces rough lumber and timber, dimension lumber, and firewood. Employment usually averages 8 people, but the firm also hires contractors as needed. At the present time, the sawmill obtains logs from the Lewistown area.

11. Gebhardt's Post Plant and Sawmill

Gebhardt's Post Plant and Sawmill is located west of Roundup and is owned and operated by Monte Gebhardt. The mill, in operation since 1985, produces timbers, posts and poles, rough and surfaced timber, and treated wood products. Due to recent layoffs at the sawmill operation, employment has been reduced to 2 workers. The mill currently obtains logs from the Lewistown and Musselshell areas.

12. Burlington Northern Railroad

Burlington Northern (BN) owns tracks that are located near Broadview and connect Great Falls to the Montana Rail Link tracks at Mossmain, several miles east of Laurel, Montana (see Figure B-4). BN employs approximately 125 workers in the Billings area. The largest operation is the rail welding plant in Laurel, employing about 100 workers. The Great Falls/Mossmain tracks were built in the early-1900s and are currently used by 2 to 4 trains per day between Shelby and Mossmain.

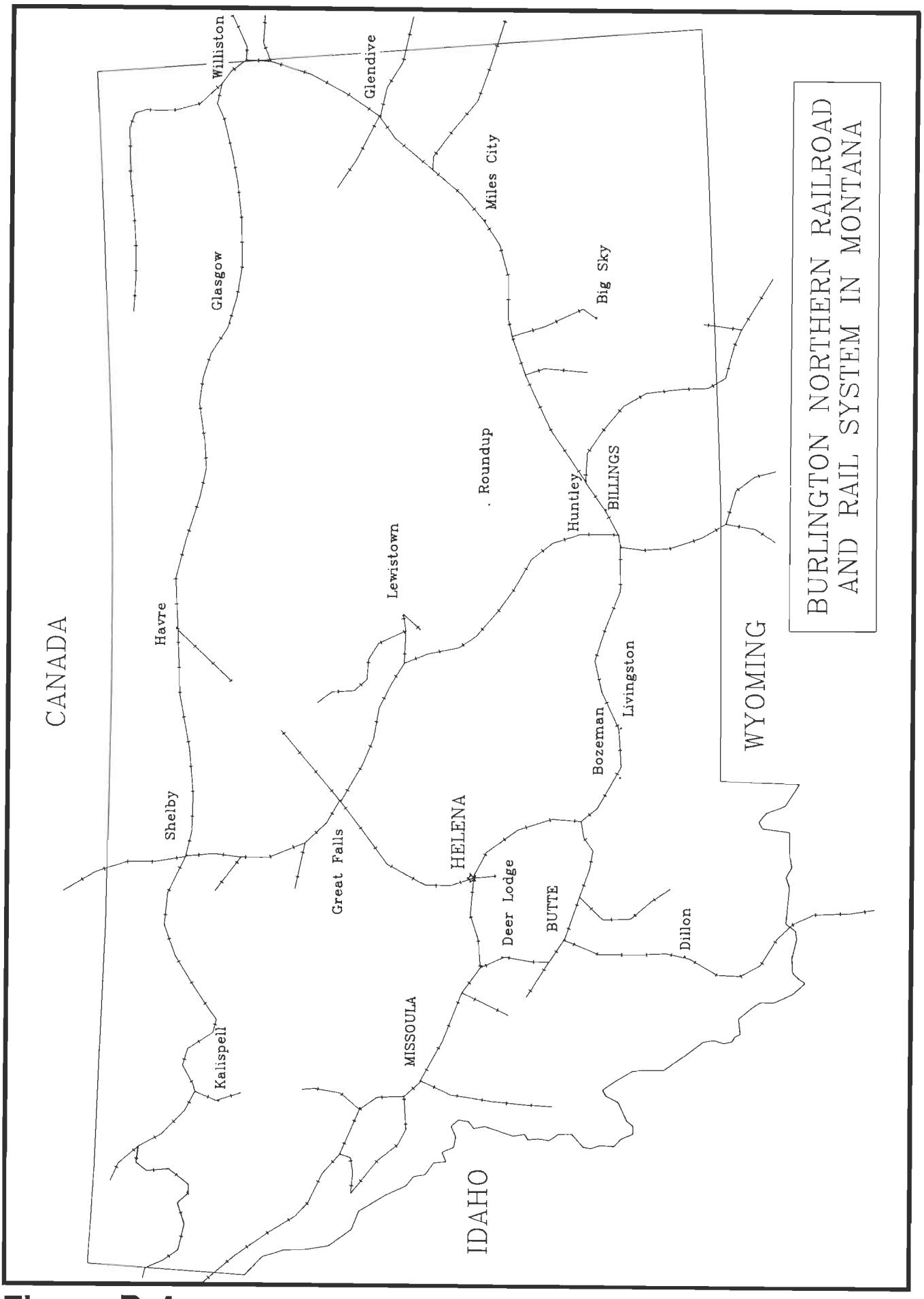


Figure B-4 Burlington Northern Railroad and rail system in Montana

APPENDIX C

UNDERGROUND MINING OF COAL

Mining Methods and Equipment
and
Mechanisms of Subsidence

1. INTRODUCTION

Coal mining involves the extraction of coal deposits. Although the thickness of a coal bed may vary, mined deposits generally are continuous over large areas. When the deposit is close to the ground surface (less than 200 feet deep) generally it is mined using open-pit, surface methods. Deeper deposits must be mined by underground methods.

Rocks above and below the coal deposit are known as overburden and underburden. Rocks of the overburden and underburden that are actually in contact with coal are called the "roof" and "floor", respectively. Blocks of coal left in place to help support the roof of the mine are called "pillars".

Removal of coal by underground methods creates a void in the rock column. As a block of coal is extracted, natural forces act on the stability of the overburden and cause the column to subside. Even in the strongest rock formations, large, artificial underground openings will eventually be filled by the collapse and compaction of overburden and pillars. Underground mining methods are generally classified or distinguished from each other by the type of support used to prevent the roof from collapsing prematurely on workers and equipment.

2. ROOM-AND-PILLAR MINING OPERATIONS

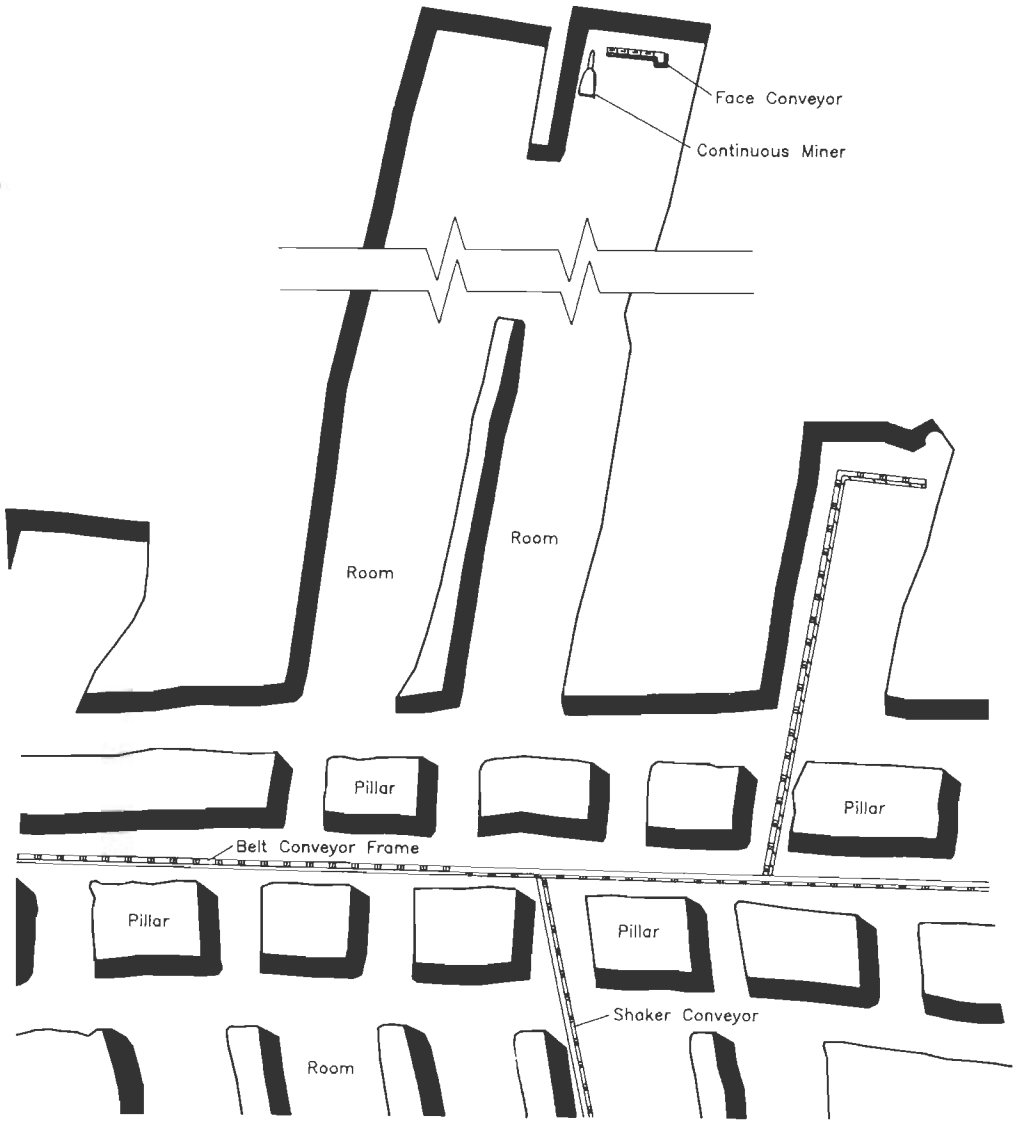
Room-and-pillar mining is generally defined as "a system of mining in which part of the coal is mined out and the rest is left in place as pillars for support" (Stout 1980). It involves the partial removal of coal from a series of small areas or "rooms" that are large enough to make the removal of coal economical, yet small enough to leave remaining walls and pillars that are of adequate size to support the roof and ensure the safety of both workers and their mining equipment (Figure C-1).

Room-and-pillar operations are generally conducted with a continuous-miner system, which includes:

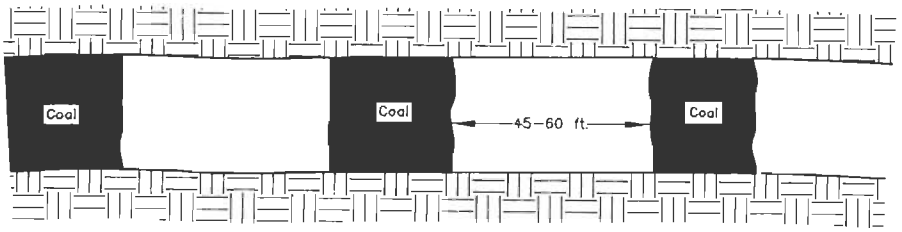
- a coal extraction machine (continuous miner)
- a coal haulage system (shuttle cars and conveyor belts)
- a roof support system (roof bolts and pillars).

The continuous miner is electro-hydraulically powered and cat-track propelled. Major components of this machine include a rotating-cutting drum, a gathering head, and a conveyor. Operation of the machine at the working face of the coal involves driving the rotating-cutting drum at the front (head) of the machine into the coal bed, thereby cutting coal from the coal face. The gathering head shifts the cut coal to the conveyor for transfer to the rear (tail) of the machine. An articulating conveyor then transfers the coal to shuttle cars.

Shuttle cars are used to transport mined coal (10 to 15 tons per car) from the continuous miner to a conveyor belt transfer point within the mine. The cars are either electric or diesel powered, 2- or 4-wheel drive, and have either a conveyor or push-ram system to discharge the coal. Additional conveyor belts transport coal to a run-of-mine (ROM) coal stockpile outside the mine portal.



Plan View



Cross Section

Figure C-1 Conceptual room-and-pillar mining

Pillars and roof bolts are used to support the roof. Solid pillars of coal are left in place during the initial (advance) mining stage to provide basic roof support within each block of mined-out coal and along the main access corridors (entries) of the mine. Additional roof support is provided by the use of roof bolts. Roof bolts are long steel rods, drilled into place and then anchored to the roof rock by either a resin glue or a mechanical compression device. They create a supporting "beam" of rock by bonding or "bolting" several layers of rock strata together. The general mining/ production sequence allows for the continuous miner to advance about 20 feet before the roof of the mined area is secured with roof bolts. Several continuous-miner sections (entries) are usually developed concurrently to allow for uninterrupted mining activity (i.e., while roof bolts are being installed in some entries, mining can continue in other entries).

As a general rule, 30 to 60 percent of the coal remains in place in the form of pillars after the rooms are mined. To increase coal recovery, the roof can be temporarily reinforced with additional bolts so that those pillars not required for support of the main entries can be systematically removed. In this second stage of mining, pillars are removed (or "robbed") as the mining equipment "retreats" from each mined room. As pillar-robbing progresses, each mined-out block of rooms is allowed to cave in and the mined area is abandoned.

3. LONGWALL MINING OPERATIONS

Longwall mining is generally defined as "a system of mining whereby most of the coal is mined and the roof over the worked out area is allowed to cave" (Stout 1980). It involves a complete, single-stage extraction of coal that uses hydraulic equipment to temporarily support the roof during coal removal activities and ensure the safety of both workers and their mining equipment (Figure C-2).

Longwall operations begin with continuous-miner equipment and room-and-pillar techniques to create a set of parallel entries on either side of a large block (or "panel") of coal. These entries are connected at the far end of the panel, resulting in a long corridor, thus the "longwall". The distance between the entries is equal to the length of the longwall equipment that will be used (ranging from 520 to 840 feet).

Longwall operations are generally conducted with a longwall mining system. As with the continuous miner, the longwall system would include:

- a coal extraction machine (shearer)
- a coal haulage system (face conveyor)
- a roof support system (shields)

While the continuous-mining system employs several independently-operated pieces of equipment to mine coal, the longwall mining system is totally integrated, with all of the necessary equipment interconnected. For example, in the longwall mining system, the shearer actually moves along the face conveyor and the shields are physically connected to it.

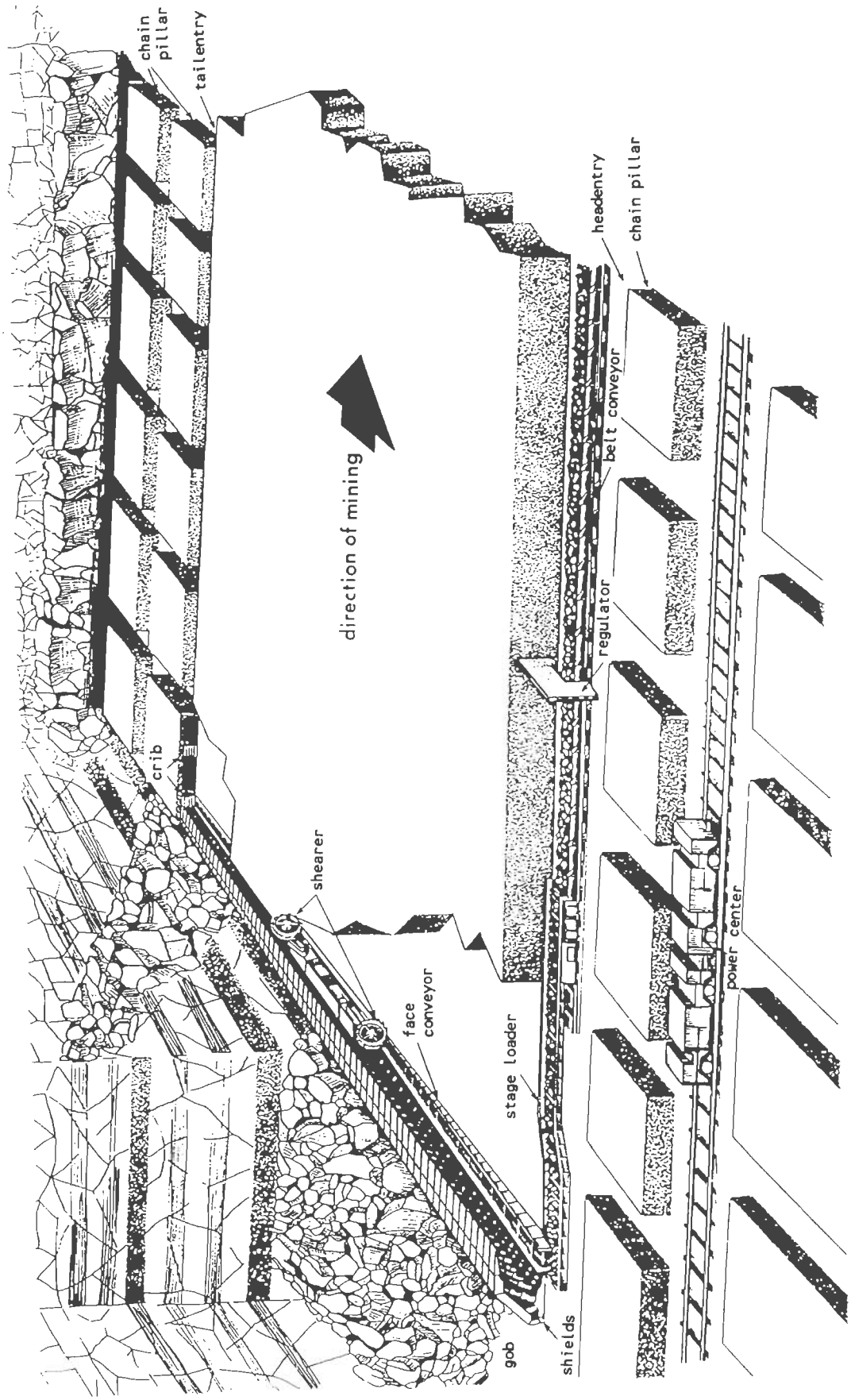


Figure C-2 Conceptual longwall mining

The shearer, like the continuous miner, is electro-hydraulically powered. The major components of this machine are the rotating-cutting drums and the tram system. The drums, located at each side of the machine, are limited to an up-down movement. Operation of the shearer at the working face involves driving the rotating-cutting drums into the coal bed as the machine trams laterally along the face conveyor, thereby cutting coal from the coal face. Cut-coal falls to the floor-supported face conveyor for transport to the end of the longwall or "headgate". Here the coal is transferred to another conveyor belt. The end of the conveyor opposite the headgate is known as the "tailgate." As in the continuous-miner system, additional conveyor belts transport the coal from the belt-conveyor transfer point to a ROM coal stockpile outside the mine portal.

Longwall roof support is temporarily provided by the use of hydraulic roof supports (shields). Major components of the shields include canopy, hydraulic cylinder, hydraulic controls, and the base. The canopy is a thick, reinforced, steel plate which is pushed against the roof by hydraulic cylinders to support the weight of the overburden while coal removal operations continue below. Shields are generally 5-feet wide, vary from 7- to 14-feet high, and have a design-load capacity of 500 tons or more per shield. The base length of the shield is relatively short, allowing the face conveyer to sit on the floor ahead of the base. Shields are designed to be large enough to safely cover the face conveyor, shearer, and workers. In the longwall system, a series of individual shields are installed next to one another along the entire longwall face, from the face conveyor headgate to its tailgate.

The mining/production sequence involves cutting (shearing) a section of coal face, typically 30 to 42 inches deep, from the headgate to the tailgate, using hydraulic rams to move the face conveyor up against the face of the fresh-cut coal seam. Hydraulic rams attached to the face conveyor then move individual shields forward. The unsupported roof behind the shields is allowed to fall to the floor. As the block of coal is systematically removed, mined area is gradually abandoned.

4. MECHANISMS OF SUBSIDENCE

Removal of coal deposits by underground mining methods creates voids that are filled when natural forces overcome the stability of the overburden and it collapses. The collapse of overburden into the void, and translation of this movement to the surface are known as subsidence. Subsidence-related deformation of rocks above underground mines can consist of fragmentation, fracturing, sagging, and bedding-plane separation. The type of deformation that occurs depends on a number of factors including rock strength, mine layout, and how far a particular horizon lies above the void in the mined area. Subsidence-related deformation of the surface can consist of basins or depressions, pits, and/or cracks. The magnitude, extent, and duration of subsidence can be minimized by an efficient mine layout, barrier and pillar design, and a rapid and efficient mining system.

a. Subsidence-Related Deformation

In the overburden above mined areas, 3 zones of deformation tend to develop in response to subsidence (Figure C-3). In the "Fragmented Zone", rocks of the immediate roof are expected to fragment, cave, and rotate. This zone can be as much as 10 times thicker than the void produced by mining (the mining height). Directly above, in the "Fractured Zone", rocks are expected to fracture and deform but they should maintain their continuity. Bedding plane separations can occur. This zone can

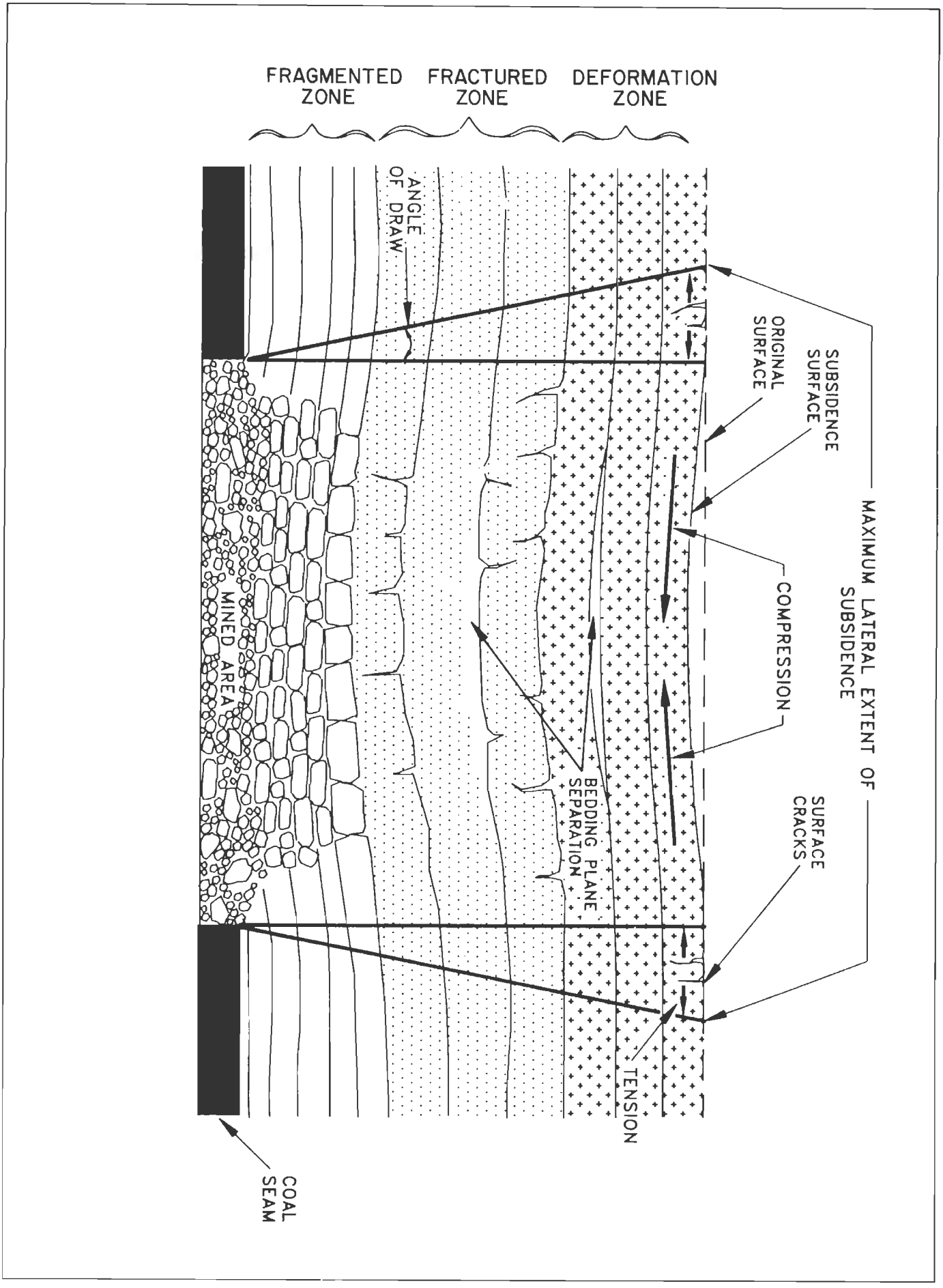


Figure C-3 Conceptual representation of subsidence deformation zones

be as much as 50 times thicker than mining height. In the third zone, the "Deformation Zone", rocks should sag downward without major fracturing but bedding-plane separations can still occur. This zone generally extends from the top of the fractured zone to the ground surface. After the deformation process, fractures that developed in softer sandstones and shales tend to close, while fractures that developed in more brittle rocks may remain open.

The surface expression of subsidence basically consists of basins or depressions, pits, and/or cracks. Subsidence "basins" form above room-and-pillar mines where pillars have been robbed or above longwall mines. These basins are typically elliptical or trough shaped because the rooms or panels are large and rectangular and coal seams often are nearly horizontal. Subsidence "pits" form above room-and-pillar mines where pillars have been retained because the overburden directly above the pillars continues to be supported, while the overburden above the mined area eventually collapses into the relatively smaller, mined-out rooms.

Horizontal strain, both tensile and compressive, results from lowering of the surface during subsidence. Tension that can cause cracks occurs as the surface begins to subside and stretch. Compression takes over and closes some of the tension cracks as the ground begins to settle. Corresponding changes in surface slope generally are temporary and often have a magnitude of less than 3 degrees. Tension cracks are more apparent than compression features because rocks are stronger in compression (Dunrud 1984). They are more abundant in solid rock than they are in unconsolidated materials. Tension cracks at the surface can range from small, (less than an inch) subtle features that are difficult to recognize to fractures several feet wide and up to 50 feet deep. Surface fractures may be temporary, often closing during successive subsidence events or after natural deposition of sediment or frost heaving fills them. Tension cracks over the edges of the mined area (the mining boundaries), may remain open indefinitely. This is most evident in those areas where brittle sandstones or other rocks crop out. The surface soil cover will have an influence on the cracking that is actually visible at the surface. Unconsolidated deposits of alluvium, colluvium, and soil tend to obscure surface cracks.

b. Factors Controlling Subsidence

Several factors control the area, amount, rate, and duration of subsidence. Mining factors include mine geometry, extraction ratio, mining method, height of the mine workings, and mining rate. Geologic factors include thickness of the coal deposit, and the thickness, lithology, strength, structure, and bulking factor of the overburden. The subsidence factor and the angle of draw are used to describe the maximum vertical displacement and the areal extent of subsidence, respectively.

The "mine geometry", or mine design, determines the size and configuration of the rooms, pillars, and panels, the height of the openings and pillars, and the spatial relation to any abandoned mines that may be located above the active mine. Generally mines are designed so that the subsidence process can take advantage of joints in the overburden. This can minimize sagging of the immediate roof and promote rapid roof collapse. Although subsidence can be reduced by leaving pillars for support, this procedure may only delay subsidence because pillars and roof rocks eventually yield with time and weathering.

The "extraction ratio" is the ratio of the amount of coal extracted to the total amount of coal in the deposit (Dunrud 1984). Longwall mining, because it extracts nearly 100 percent of the coal within a longwall panel, generally achieves an overall extraction ratio in excess of 80 percent of the total coal deposit. Room-and-pillar mining rarely extracts more than 55 percent of the total resource, but pillar robbing upon retreat from a mine has the potential to extract nearly as much of the coal as longwall mining.

The "mining method" also influences the amount of subsidence that occurs. Longwall mining results in more subsidence than room-and-pillar mining principally because of its greater extraction of coal. Efficient robbing of pillars, however, can result in surface subsidence nearly equal in magnitude to that associated with longwall mining. Subsidence above room-and-pillar mining areas is also less predictable and more variable in surface expression than above longwall panels because the extraction ratios and heights of caving are more variable (Dunrud 1984).

The "mining rate" affects subsidence too. When the mine face is extracted at an even and rapid rate, smoother subsidence profiles with less differential movement occur.

Thickness of the coal deposit, thickness of the overburden, and height of the mine workings control maximum subsidence. The "subsidence factor" is the ratio of maximum surface subsidence to the seam mining height and is often expressed as a percentage. For example, if 7 feet of subsidence occurred over a mine with a 10-foot mining height, then the subsidence factor would be 70 percent. In the western United States, subsidence factors range from about 45 to 90 percent of the thickness of coal mined (Dunrud 1984). The "angle of draw" identifies the limits of subsidence beyond the boundaries of the mined area (the subsidence occurring at the ground surface will be larger than the underground void). It is expressed in degrees from vertical above the edge of the mined area. For example, if the angle of draw were 27 degrees and the overburden were 400 feet thick, then subsidence could occur as much as 200 feet beyond the edge of the mined area. In the western United States subsidence angles of draw range from about 5 to 30 degrees (Dunrud 1984).

Sagging, caving, and fragmentation are governed by the "strength" and "structure" of the overburden. The composition of the mineral grains and cements that bind the grains together affect the strength of the rocks. Existing faults and fractures in the overburden offer good sliding surfaces that can influence the angle of draw. The strength and structure of the overburden rocks are considered when determining room, pillar, and panel orientation.

The "bulking factor", or the volumetric increase of fragmented rocks relative to their undisturbed and in-place volume, is a major factor controlling subsidence. The bulking factor is controlled by the size and shape of the broken rocks, the contact stresses among rock fragments within the fragmented zone, and the relative strengths of the affected rocks (Dunrud 1984). Bulking factors generally are lowest where the overburden is composed of soft claystones and thinly bedded shales, and greatest where hard, thickly bedded to massive sandstones and limestones predominate. If rock fragments fall to the floor of the mined area in a random fashion, and if strong, massive rocks occur in the fractured and deformation zones, then the bulking factor is higher. Higher bulking factors in the overburden result in less vertical movement of the rocks and reduced tension and compression at the surface.

c. Prediction of Subsidence

Subsidence associated with underground mining is anticipated and its magnitude and extent can be predicted. Often, predictions of maximum surface subsidence and horizontal tensile and compressive strains are used to help assess the secondary impacts to other resources (both human and natural). Data collected during actual subsidence are used to verify premining predictions.

A method of calculation developed by the British National Coal Board (Subsidence Engineers' Handbook 1975) offers one of the most comprehensive, conservative, and accurate techniques for predicting subsidence and surface strains. Other researchers have modified it for the stronger strata of coal mines in the western United States (Maleki 1987; Western Fuels Association, Inc. 1981). Inputs to the subsidence prediction model are depth, mining height (seam thickness), and room or panel geometry.

"Subsidence profiles" can be used to illustrate subsidence and strain predictions above a mined area. Diagrams A, B, and C of Figure C-4 show a cross section of a longwall mine and the subsidence and strain profile that might be expected to develop over 2 mined-out longwall panels. In this example, the longwall panels are 800 feet wide, overburden is about 780 feet thick, mining height is 13.5 feet, the subsidence factor is 70 percent, and angle of draw is 22.5 degrees. Under these conditions the maximum final surface subsidence would be 9.8 feet, which would occur over the middle of each panel. Final subsidence over the pillars between 2 panels, while not reaching the maximum, would still be about 5 feet. In diagram B, the dashed line indicates the limit of subsidence resulting from a single panel and the upper solid line represents the extent of subsidence (about 2.5 feet) immediately after mining the adjacent panel. The lower solid line represents the maximum final subsidence over the pillars after they have collapsed under the weight of the overburden. Diagram C shows the compressional strain that occurs above the panels and the tensile strain that occurs at panel boundaries and over pillars as the rocks flex and stretch downward into the subsidence trough. In this example, the tensile strain exceeds the strain criterion recommended by Singh and Bhattacharya (1984) in those areas above the panel boundaries and the pillars; surface cracking would be predicted in these areas, with larger maximum tensile strains possibly resulting in wider cracks. The exact location and actual width of open surface cracks is unpredictable.

A monitoring program is generally implemented at underground mines to collect subsidence data. These data are used to verify the accuracy of the predicted subsidence under actual ground conditions and to detect mining-induced impacts to surface resources, both predicted and unpredicted. In addition, site specific angle of draw, subsidence factor, and tensile strains may be calculated. These results can be used to refine the predictive model, which then can be used to estimate the effects of mining in successive longwall panels during the remainder of the mine life.

A number of techniques and types of equipment can be used in subsidence monitoring programs. These include: conventional ground surveying of monuments located over panels and extending out over unmined areas; installation of extensometers to measure horizontal strain; aerial photographic surveying; analytical aerial triangulation; digital terrain modeling; surface observations; and well, surface water, and spring monitoring. Monuments, to be effective, must be constructed so as to be unaffected by movements unrelated to subsidence, such as soil heave due to freezing.

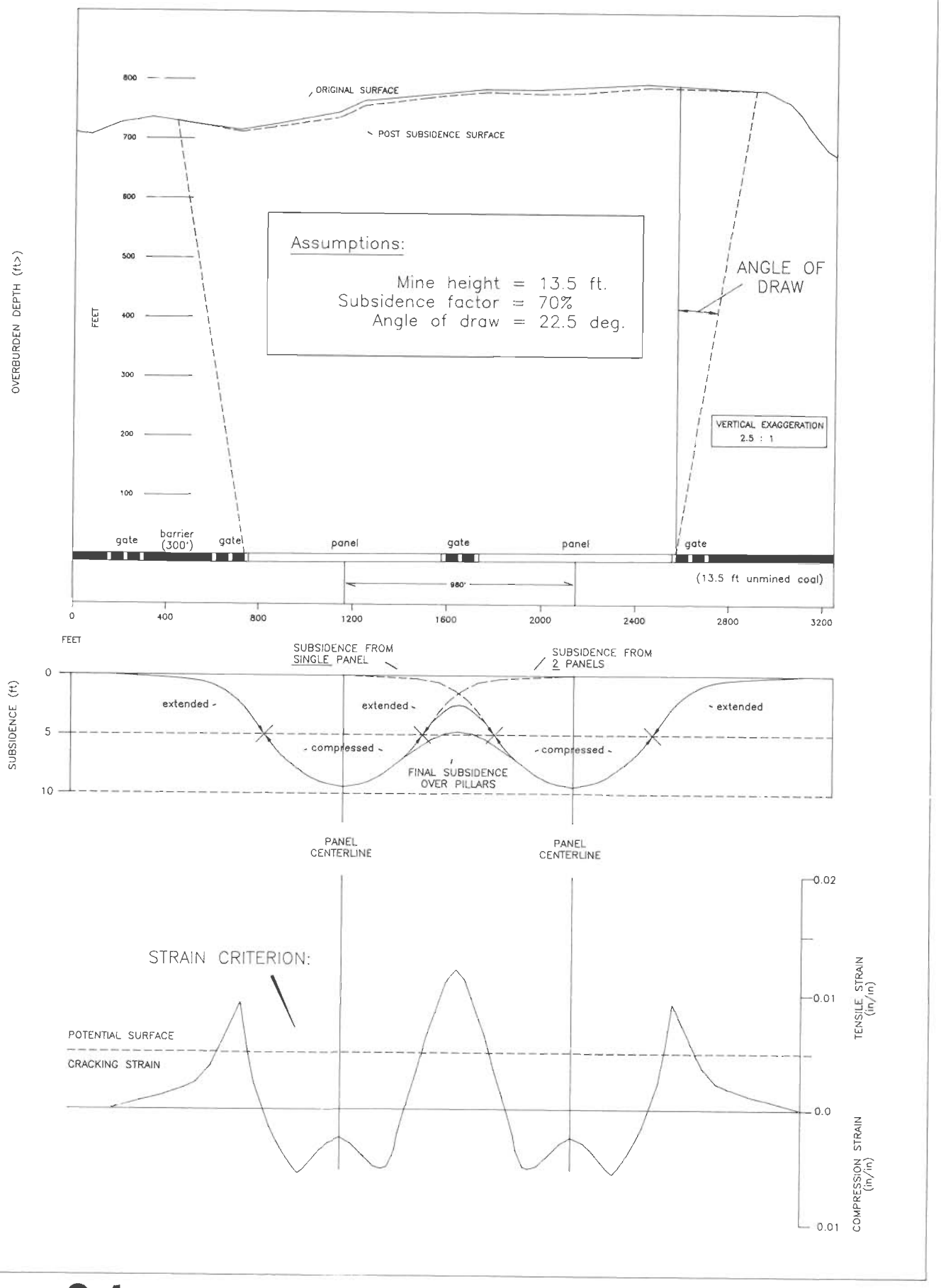
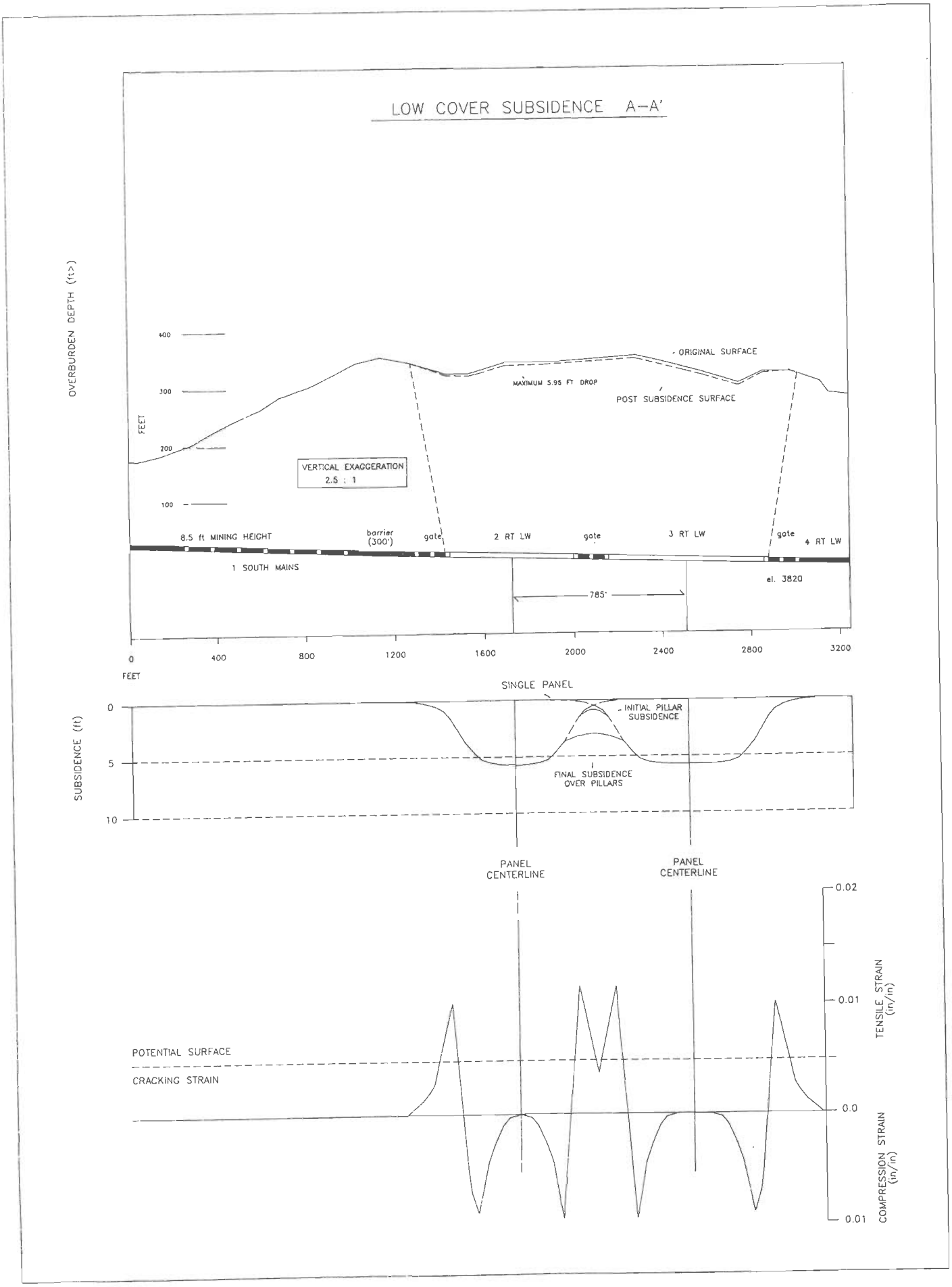
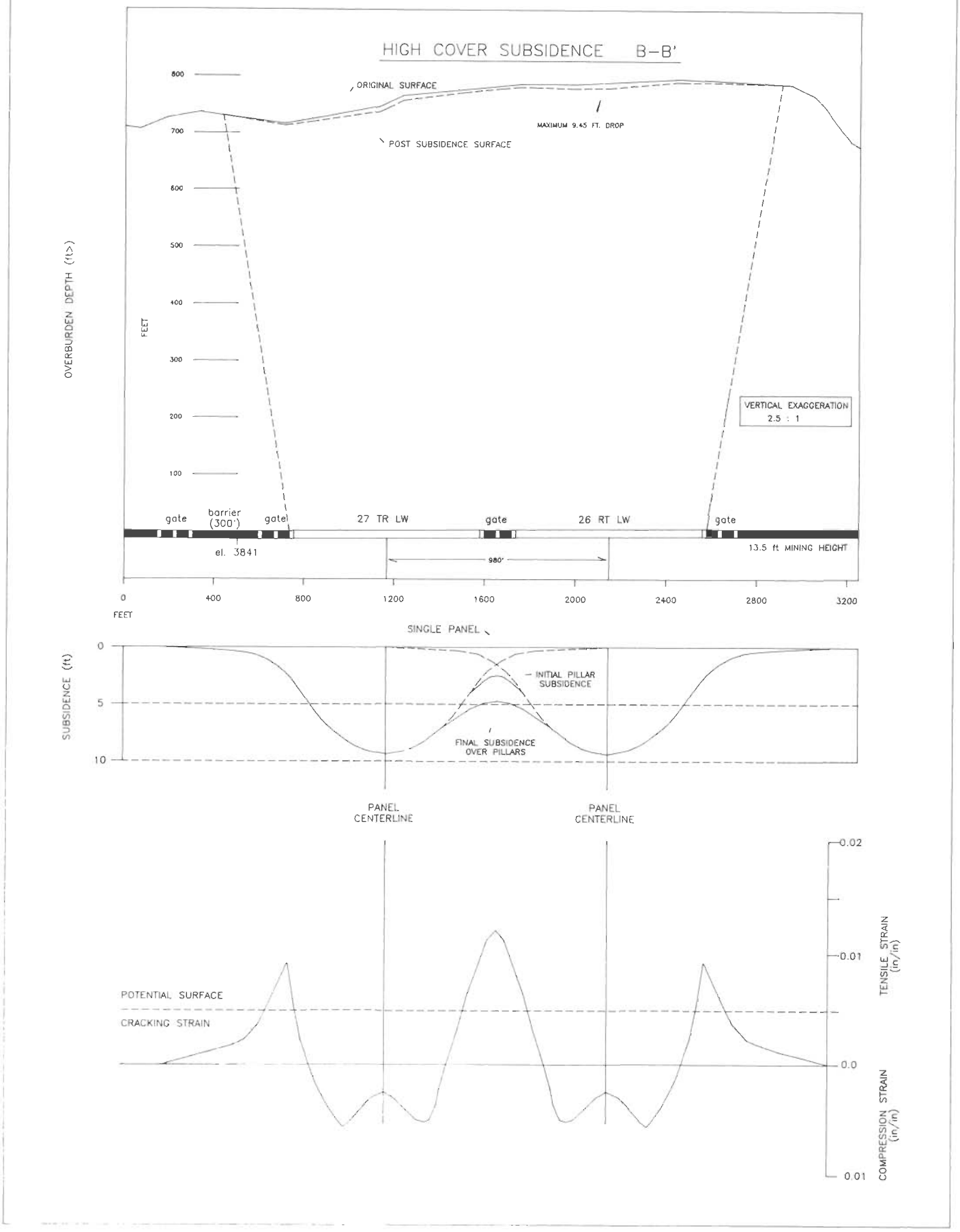


Figure C-4 Example of subsidence and strain profiles


LOW COVER SUBSIDENCE A–A'
OVERBURDEN DEPTH (ft>)
FEET
400
300
200
100
ORIGINAL SURFACE
MAXIMUM 5.95 FT DROP
POST SUBSIDENCE SURFACE
VERTICAL EXAGGERATION
2.5 : 1
8.5 ft MINING HEIGHT
barrier (300')
gate
2 RT LW
gate
3 RT LW
gate
4 RT LW
1 SOUTH MAINS
el. 3820
785'
0
400
800
1200
1600
2000
2400
2800
3200
FEET
SINGLE PANEL
SUBSIDENCE (ft)
0
5
10
INITIAL PILLAR SUBSIDENCE
FINAL SUBSIDENCE OVER PILLARS
PANEL CENTERLINE
PANEL CENTERLINE
0.02
0.01
0.0
0.01
TENSILE STRAIN (in/in)
COMPRESSION STRAIN (in/in)
POTENTIAL SURFACE
CRACKING STRAIN


HIGH COVER SUBSIDENCE B–B'
ORIGINAL SURFACE
MAXIMUM 9.45 FT. DROP
POST SUBSIDENCE SURFACE
OVERBURDEN DEPTH (ft>)
FEET
800
700
600
500
400
300
200
100
VERTICAL EXAGGERATION
2.5 : 1
gate
barrier
(300')
gate
27 TR LW
gate
26 RT LW
gate
el. 3841
980'
13.5 ft MINING HEIGHT
0
400
800
1200
1600
2000
2400
2800
3200
FEET
SINGLE PANEL
SUBSIDENCE (ft)
0
5
10
INITIAL PILLAR SUBSIDENCE
FINAL SUBSIDENCE OVER PILLARS
PANEL CENTERLINE
PANEL CENTERLINE
POTENTIAL SURFACE
CRACKING STRAIN
0.02
0.01
0.0
0.01
TENSILE STRAIN (in/in)
COMPRESSION STRAIN (in/in)

d. The Subsidence Event

The nature of subsidence, when load of the overburden is high compared with the rock strengths (that is, when the mined seam is fairly deep), may be summarized as follows:

- Sufficient coal is removed to open up the mine void and the roof support system is withdrawn or advanced.

- The immediate roof is fragmented and "bulks" into the mined area, while a percentage of the mining height (i.e., the subsidence factor) subsides all the way to the surface. The surface sags downward behind the advancing front of the mining activity. The subsidence trough formed at the surface (controlled by the angle of draw) is wider than the mined area.

- The advance of the mining activity also extends the deformation in the overburden. As the overburden rocks bend into the subsidence trough, new ground is placed in tension and new fractures open up. As the mining face passes under and progresses away from a particular point, the area of tensile stress moves away as well. Settling accompanied by compression takes over behind the area of stress and the tensional fractures tend to close. As successive areas are mined, this activity takes the form of a smooth subsidence wave. Pillars collapse under the overburden load when panels or rooms are mined on both sides of those pillars. This collapse can help to smooth out surface irregularities and help to close some of the remaining surface cracks. Massive sandstones in the overburden can also assist in smoothing out irregularities when they act as "beams" and produce a more complete collapse of pillars.

- Subsidence movement over longwall mines, and room-and-pillar mines where pillars have been robbed, tends to be relatively short-lived. Ninety to 95 percent of the subsidence is expected to occur once coal extraction in an area is complete (Dunrud 1984). Residual subsidence should be complete within 2 to 5 years after mining has ceased. Some delayed subsidence may occur over pillars that deteriorate slowly.

- Subsidence movement over room-and-pillar mines where pillars have been left behind tends to occur much slower, depending on the design and height of the pillars, and how much overburden weight rests on each pillar. Natural deterioration processes will eventually weaken the strongest pillar and cause it to collapse.

In situations where a mined area is fairly shallow and where massive sandstones in the roof provide some support to the overburden load, subsidence can occur abruptly with the entire load falling as a unit. Here, the surface expression may not be as smooth as that described above and larger cracks could result.

APPENDIX D

ROLES OF
STATE AND FEDERAL AGENCIES
IN PROJECT APPROVAL

State of Montana
Department of State Lands (DSL)
Coal and Uranium Bureau

Montana DSL is responsible for regulating coal mining operations within the State of Montana.

In April 1980, pursuant to Section 503 of the Federal Surface Mining Control and Reclamation Act (SMCRA) of 1977 as amended, the Secretary of the Interior approved Montana's permanent regulatory program, based on the Montana Strip and Underground Mine Reclamation Act (MSUMRA) of 1973 as amended, and its implementing regulations. Approval of the permanent program authorized Montana DSL to regulate surface coal-mining operations and surface effects of underground coal mining on non-Federal lands within the State. In April 1981, pursuant to Section 523(c) of SMCRA, Montana DSL entered into a cooperative agreement with the Secretary of the Interior authorizing Montana DSL to regulate surface coal-mining operations and surface effects of underground coal mining on Federal lands within the State.

Coal operators in Montana are required to submit detailed permit application packages (PAPs) to Montana DSL for proposed mining and reclamation operations in the State. Montana DSL reviews the PAP to ensure that the permit application complies with permitting requirements and that the coal mining operation will meet the performance standards of the approved Montana State permanent program, the Montana Environmental Policy Act, and other statutes. If it does comply, Montana DSL issues the applicant a *permit to conduct coal mining operations*. Montana DSL enforces the performance standards and permit requirements during the mine's operation and has primary authority in environmental emergencies.

State of Montana
Department of State Lands (DSL)
Board of Land Commissioners

Among the duties of the Board of Land Commissioners are the granting of *right-of-way use agreements* to railroads for the use of sections of land owned by the State and the lease of State-owned coal. These duties are specified in the Montana Code Annotated, 77-3-301 et seq. and 77-2-101 et seq., respectively. The Lands Division administers the rules implementing these statutes.

U.S. Department of the Interior
Office of Surface Mining Reclamation and Enforcement (OSM)

Prior to mining of Federal coal or affecting Federal surface estate, Meridian would have to obtain permits from OSM. OSM has primary responsibility to administer programs that regulate surface coal-mining operations and the surface effects of underground coal-mining operations.

Pursuant to the Montana cooperative agreement with the Secretary of the Interior, Federal coal lease holders and prospective coal operators affecting Federal surface estate in Montana must

submit a PAP, containing a detailed mining plan and Federal permit application, to OSM for proposed mining and reclamation operations on Federal lands in the State. OSM and other Federal agencies review the PAP to ensure that it complies with the terms of the coal lease, the Mineral Leasing Act (MLA) of 1920 as amended, the National Environmental Policy Act (NEPA) of 1969 and other applicable Federal laws and their attendant regulations.

For those operations on leased Federal coal, OSM recommends approval, approval with conditions, or disapproval of the mining plan to the Assistant Secretary of the Interior, Land and Minerals Management. Before the mining plan can be approved, certain other Federal agencies, including the surface-managing agency, must concur with this recommendation. If all approvals and concurrences are received, OSM issues a Federal *permit to conduct coal mining operations* for those activities proposed on Federal lands.

Although Montana DSL enforces the performance standards and permit requirements during the mine's operation and has primary authority in environmental emergencies, OSM retains oversight responsibility of this enforcement.

U.S. Department of the Interior
Bureau of Land Management (BLM)

BLM is responsible for administering the Federal Land Policy and Management Act (FLPMA) of 1976 and certain provisions of the MLA on BLM-administered Federal lands.

Individuals or companies wishing to develop BLM-administered lands for private purposes must submit an application, containing a detailed plan of development to the BLM. BLM reviews the proposal for compliance with the resource management plan, Section 302 of FLPMA, and other Federal laws, including NEPA. BLM establishes a fair market rental fee for the subject property and issues a Federal *land use permit.*

Prospective coal lessees must submit an application to BLM to lease Federal coal estate in Montana. BLM reviews the application for compliance with the resource management plan, the MLA, and other Federal laws, including NEPA; determines the fair market value for the coal resource; and holds a competitive lease sale. If the sale is successful, BLM issues a Federal *coal lease* to the highest, qualified bidder who meets or exceeds the fair market value.

Federal coal lease-holders in Montana, pursuant to the Montana cooperative agreement with the Secretary of the Interior, must submit a PAP containing a detailed resource recovery and protection plan to BLM for proposed coal removal operations on Federal lands in the State. BLM reviews the PAP to ensure maximum economic recovery of the Federal coal resource and compliance with the MLA. Before the mining plan can be approved by the Secretary of the Interior, BLM must concur with OSM's recommendation on the mining plan.

Although Montana DSL enforces the performance standards and permit requirements during the mine's operation and has primary authority in environmental emergencies, BLM has

authority in those emergency situations where Montana DSL or OSM inspectors cannot act before significant environmental harm or damage occurs.

U.S. Interstate Commerce Commission (ICC)
Office of Transportation Analysis

ICC is responsible for administering the Interstate Commerce Act, and the economic regulation of interstate surface transportation within the United States, including rail line construction and operation.

Parties seeking to construct and operate a rail line must file an application or a petition for exemption. The application must contain complete information concerning the applicant, its financial standing, the proposed transportation plan, specifics on the proposed construction and operation activities, and pertinent environmental data (49 CFR 1150). The Commission reviews the application and ensures compliance with the Interstate Commerce Act and all other applicable Federal laws and their attendant regulations. If the rail proposal is approved by the Commission, the ICC will issue a *certificate of public convenience and necessity* permitting construction and operation of the rail line.

An alternative procedure is the filing of a *petition seeking exemption of the project* from the prior approval requirements. This procedure may be used where the petitioner demonstrates that regulation is not necessary and the project is of limited scope and will not adversely affect shippers (49 CFR 1121).

1. Other Federal Responsibilities

U.S. Department of the Interior
Fish and Wildlife Service (USFWS)

Nature of responsibility: Consults on mitigation proposals for impacts to protected wildlife and vegetation species under their jurisdiction. Concurs on the biological opinion for impacts to threatened, endangered, or proposed species of fish, wildlife, or plants.

Authority: The Endangered Species Act of 1973 as amended, the Migratory Bird Treaty Act, the Bald Eagle Protection Act of 1973, and the Fish and Wildlife Coordination Act as amended.

U.S. Department of the Interior
Mine Safety and Health Administration (MSHA)

Nature of responsibility: Issues permits that cover roof control, ventilation, and other aspects of operational safety.

Authority: Mine Safety and Health Act of 1977.

U.S. Department of the Army
Corps of Engineers (Corps)

Nature of responsibility: Issues permits for the discharge of dredged materials or the placement of fill materials into the waters of the United States, including adjacent wetlands.
Authority: Section 404 of the Clean Water Act.

U.S. Department of the Treasury
Bureau of Alcohol, Tobacco, and Firearms

Nature of responsibility: Issues permits to purchase, store, and use explosives.
Authority: P.L. 91-452.

U.S. Federal Communications Commission (FCC)

Nature of responsibility: Issues licenses to operate industrial radio service and/or a remote, FM-radio base station at frequencies which do not interfere with existing frequencies within the transmitter range.
Authority: The Communications Act of 1934 as amended.

2. Other State Responsibilities

State of Montana
State Historical Society
State Historic Preservation Officer (SHPO)

Nature of responsibility: Under provisions of Federal Historic Preservation Law, is a consulting partner (with Montana DSL) in the prehistoric/historic/cultural resource protection process for mine permits during both premining and operational phases. Seeks a determination from the Keeper of the National Register for sites believed to be eligible for listing in the National Register of Historic Places. Issues a *State Antiquities Act permit*.
Authority: The archaeological provisions of MSUMRA, the Montana Antiquities Act, and the National Historic Preservation Act within the State of Montana.

State of Montana
Department of Health and Environmental Sciences (DHES)
Air Quality Bureau

Nature of responsibility: Issues a State *air quality permit* and an *open burning permit*.
Authority: The Montana Clean Air Act.

State of Montana
Department of Health and Environmental Sciences (DHES)
Water Quality Bureau

Nature of responsibility: Issues a *State Pollutant Discharge Elimination System permit.*
Authority: The Montana Water Quality Act.

State of Montana
Department of Natural Resources and Conservation (DNRC)
Water Resources Division

Nature of responsibility: Approves *water use permits*, assigns water rights, and approves dam designs. The agency grants *water use permits* for wells producing 35gpm or more. Permit holders may be inspected at random after obtaining a permit.

Prior to construction of a dam with over 50-acre feet normal capacity, a *hazard classification* must be applied for. There is no regular monitoring by the agency after the hazard classification is obtained.

Authority: The Montana Water Use Act.

State of Montana
Department of Natural Resources and Conservation (DNRC)
Facility Siting Bureau

Nature of responsibility: Approves powerline upgrades over 69 kV and powerline extensions of 10 miles or more.

Authority: The Montana Major Facility Siting Act.

State of Montana
Department of Transportation (MDT)
Area Maintenance Bureau

Nature of responsibility: Issues a *road approach permit.*
Authority: Montana Code Annotated, 61-5-101 et seq.

State of Montana
Department of Transportation (MDT)
Motor Carrier Services Division

Nature of responsibility: Inspects common carriers to ensure that they do not exceed the load limits set for Montana highways.

Authority: Montana Code Annotated, 61-10-201 et seq.

APPENDIX E

TECHNICAL TABLES

TABLE E-1

Climatological Summary for Logan International Airport, Billings, Montana

NORMALS, MEANS, AND EXTREMES

Month	Temperature							Normal Degree Days Base 65°F		Precipitation in Inches										
	Normal			Extremes						Water Equivalent							Snow, Ice Pellets			
	Daily Maximum	Daily	Monthly	Record Highest	Year	Record Lowest	Year	Heating	Cooling	Normal	Maximum	Year	Minimum	Year	Maximum in	Year	Maximum	Year	Maximum in	Year
(a)				45		45					45		45		45		45		41	
J	31.2	12.5	21.9	68	1953	-30	1937	1336	0	0.70	2.35	1972	0.04	1941	1.41	1972	27.7	1963	16.6	1972
F	37.1	17.7	27.4	72	1961	-38	1936	1053	0	0.64	1.77	1978	0.05	1977	0.61	1952	22.4	1978	9.0	1944
M	42.1	23.1	32.6	79	1978	-19	1951	1004	0	1.01	2.70	1954	0.13	1936	1.01	1973	27.6	1935	10.5	1964
A	55.8	33.4	44.6	87	1962	-5	1936	612	0	1.56	4.42	1955	0.06	1962	3.19	1978	42.3	1955	23.7	1955
M	65.7	43.3	54.5	96	1935	14	1954	333	8	2.08	6.97	1978	0.53	1937	2.83	1952	7.7	1967	5.7	1967
J	73.7	51.5	62.6	102	1966	32	1969	131	59	2.61	7.64	1944	0.24	1961	2.78	1937	2.0	1950	2.0	1950
J	85.6	58.0	71.8	106	1937	41	1972	10	220	0.87	3.12	1958	0.07	1976	1.87	1958	0.0		0.0	
A	93.8	56.3	70.1	105	1961	40	1939	15	173	1.00	3.50	1965	0.05	1955	2.47	1965	0.0		0.0	
S	71.3	46.5	58.9	100	1950	25	1972	221	38	1.39	4.99	1941	0.06	1964	2.19	1966	6.3	1962	6.3	1962
O	61.0	37.5	49.3	90	1963	3	1971	487	0	0.88	3.80	1971	0.02	1948	1.98	1974	23.1	1949	10.0	1949
N	45.0	26.4	35.7	73	1975	-22	1959	879	0	0.73	2.34	1978	T	1954	1.37	1959	25.2	1978	15.3	1959
D	35.8	17.7	26.8	69	1957	-26	1964	1184	0	0.68	2.00	1973	0.05	1957	0.96	1978	28.8	1955	13.7	1978
					JUL		FEB					JUN		NOV		APR		APR		APR
YR	57.3	35.3	46.3	106	1937	-38	1936	7265	498	14.15	7.64	1944	T	1954	3.19	1978	42.3	1955	23.7	1955

Table E-1 (Continued)

Month	Relative Humidity Pct. Hour 05 (Local Time)	Hour 11	Hour 17	Hour 23	Wind Mean Speed m.p.h.	Prevailing Direction	Fastest Mile Speed m.p.h.	Direction	Year	Pct. of Possible Sunshine	Mean Sky Cover, tenths, Sunrise to Sunset	Mean Number of Days Sunrise to sunset Clear	Partly Cloudy	Cloudy	Precipitation .01 or more	Snow, Ice Pellets 1.0 inch of more	Thunderstorms	Heavy Fog, Visibility ¼ Mile or Less	Temperatures °F Max. (b) 90°F Above	32°F and Below	Min. 32°F and Below	0°F and Below	Average Station pressure mb. Elev. 3,570 feet m.s.l.
(a)	20	20	20	20	40	15	36	36		40	40	40	40	40	45	37	40	32	20	20	20	20	7
J	64	61	58	64	13.1	SW	66	W	1953	47	7.2	5	8	18	8	4	*	1	0	16	28	10	890.9
F	65	58	53	62	12.5	SW	72	W	1963	54	7.1	4	8	16	7	3	*	2	0	8	25	3	890.3
M	67	53	46	61	11.7	SW	61	NW	1956	62	7.1	4	9	18	9	3	*	2	0	6	24	2	887.6
A	68	50	42	60	11.7	SW	72	NW	1947	59	7.1	4	9	17	10	2	1	3	0	1	14	0	889.0
M	69	48	43	60	11.0	NE	68		1939	61	6.6	6	10	15	11	*	4	1	*	0	2	0	889.1
J	71	47	41	59	10.4	SW	79	NW	1968	64	5.9	7	12	11	11	*	8	1	3	0	*	0	889.9
J	63	39	31	49	9.7	SW	73	N	1947	77	4.0	14	12	5	7	0	8	*	12	0	0	0	892.0
A	60	40	30	46	9.7	SW	66	N	1947	76	4.2	14	11	6	6	0	6	*	11	0	0	0	891.7
S	66	48	38	54	10.4	SW	61	NW	1949	68	5.1	10	10	10	7	*	2	1	2	0	1	0	892.8
O	63	49	41	55	11.1	SW	68	NW	1949	62	5.7	9	10	12	6	1	*	2	*	1	8	0	892.4
N	66	58	54	62	12.3	SW	63	NW	1948	46	6.8	6	8	16	6	2	0	2	0	6	23	1	891.6
D	64	60	57	63	13.2	WSW	66	NW	1953	45	6.8	6	9	16	7	3	*	2	0	12	28	4	889.9
YR	66	51	44	58	11.4	SW	79	NW	JUN 1968	62	6.1	89	116	160	95	19	29	18	28	49	151	19	890.6

Means and extremes above are from existing and comparable exposures. Annual extremes have been exceeded at other sites in the locality as follows: Highest temperatures 112 in July 1901; lowest temperature -49 in February 1989; minimum monthly precipitation 0.00 in October 1896.

(a) Length or record, years, through the current year unless otherwise noted, based on January data.
(b) 70°F and Above at Alaskan stations.
* Less than on half.
T Trace.

NORMALS - Based on record for the 1941-1970 period.
DATE OF AN EXTREME - The most recent in cases of multiple occurrence.
WIND DIRECTION - Numerals indicate tens of degrees clockwise from true north. 00 indicates calm.
FASTEST MILE WIND - Speed in fastest observed 1-minute value when the direction is tens of degrees.

Source: Ruffner 1980.

TABLE E-2

Bull Mountains Mine No. 1
Spring Information

Spring Number	Location[1] (TRS ¼ ¼)	Within Life-of-Mine Area	Elev.[2] (ft.)	Flow Range (gpm)	Flow Average (gpm)	Specific Cond.[3] (µmhos/cm)	Development
11115	T6N,R27E, SEC 6 Cb	No	4004	0.1-1.5	0.7	2023	2 Steel Tanks
11125	T6N,R27E, SEC 6 Cb	No	3960	Dry-0.3	0.03	1847	No Development
11185	T6N,R26E, SEC 12 Aa	No	3849	Pond	Pond	2276	1 Large Pond
11555	T6N,R26E, SEC 2 Ac	No	3870	Dry-Pond	Pond	2700	No Development
14115	T6N,R27E, SEC 16 Dd	Yes	4460	0.8-3.3	1.8	542	1 Steel Tank
14155	T6N,R27E, SEC 15 Cd	Yes	4440	Pond-3.8	0.9	718	No Development
14165	T6N,R27E, SEC 15 Cb	Yes	4340	Pond-1.6	1.6	930	No Development
14255	T6N,R27E, SEC 16 Ac	Yes	4203	0.3-30.0	7.9	1001	1 Small Pond
14325	T6N,R27E, SEC 17 Aa	Yes	4095	1.0-39.0	12.5	1144	2 Large Ponds
14415	T6N,R27E, SEC 8 Dc	Yes	4070	Pond-1.5	0.3	1314	1 Small Pond
14535	T6N,R27E, SEC 8 Ca	Yes	4000	Pond-0.5	0.1	1540	No Development
14555	T6N,R27E, SEC 8 Ca	Yes	4070	Dry-0.3	0.1	1360	1 Small Pond
14655	T6N,R27E, SEC 8 Bb	No	4040	Dry-1.0	0.2	1644	No Development
14755	T6N,R27E, SEC 6 Dc	No	4000	Dry-0.3	0.04	2492	1 Small Pond
14785	T6N,R27E, SEC 7 Ac	No	3925	0.3-6.0	1.0	1867	1 Large Pond
16135	T6N,R27E, SEC 22 Cb	Yes	4486	1.0-18.0	7.3	556	Stream Channel Flow
16145	T6N,R27E, SEC 21 Da	Yes	4480	0.3-3.5	1.8	598	Stream Channel Flow
16165	T6N,R27E, SEC 21 Ad	Yes	4440	Dry-1.3	0.6	899	No Development
16255	T6N,R27E, SEC 21 Ac	Yes	4368	Pond-23.5	4.7	792	No Development
16275	T6N,R27E, SEC 21 Ac	Yes	4350	Pond-3.0	0.6	747	1 Small Pond
16355	T6N,R27E, SEC 21 Ba	Yes	4282	2.3-66.0	17.2	828	Stream Channel Flow
16365	T6N,R27E, SEC 21 Bb	Yes	4237	0.3-24.0	9.2	832	Stream Channel Flow
16625	T6N,R27E, SEC 17 Db	Yes	4118	0.1-3.0	1.5	1904	No Development
16655	T6N,R27E, SEC 17 Ac	Yes	4069	11.5-68.0	16.2	1137	1 Large Pond
16755	T6N,R27E, SEC 17 Ab	Yes	4176	0.1-1.0	0.4	1549	1 Steel Tank
16855	T6N,R27E, SEC 17 Bb	Yes	4041	Pond-0.5	0.2	2771	No Development
16955	T6N,R27E, SEC 18 Aa	Yes	3961	Dry-41.8	6.0	1417	No Development
17115	T6N,R27E, SEC 33 Ba	No	4550	Pond-1.5	0.8	825	1 Small Pond
17145	T6N,R27E, SEC 28 Cd	No	4483	0.1-4.3	1.4	994	1 Wood Tank
17165	T6N,R27E, SEC 28 Cb	No	4360	Pond-2.3	0.3	1144	1 Large Pond
17185	T6N,R27E, SEC 29 Ad	No	4302	0.1-9.0	3.9	1390	Pond and Tank
17215	T6N,R27E, SEC 28 Ac	No	4500	Pond-1.5	0.6	916	1 Small Ponds
17255	T6N,R27E, SEC 28 Bc	No	4310	Pond	Pond	925	1 Small Pond
17275	T6N,R27E, SEC 29 Aa	No	4276	0.3-10.0	3.8	1220	1 Steel Tank
17315	T6N,R27E, SEC 20 Dc	No	4188	1.5-11.0	5.1	1270	1 Small Pond 1 Deep Well Not in Use
17415	T6N,R27E, SEC 20 Bc	Yes	4071	0.2-30.7	9.5	1705	2 Large Ponds
17515	T6N,R27E, SEC 17 Cc	Yes	4014	0.1-6.5	2.1	1776	1 Small Pond
17635	T6N,R27E, SEC 21 Bd	Yes	4470	Pond-1.5	0.6	896	1 Small Pond
17655	T6N,R27E, SEC 21 Bc	Yes	4250	Dry-5.0	1.7	1506	No Development
17685	T6N,R27E, SEC 20 Aa	Yes	4150	0.8-12.0	6.5	1861	1 Small Pond
31555	T7N,R27E, SEC 18 Bc	No	3610	Pond	Pond	1885	1 Small Pond
41125	T6N,R27E, SEC 6 Ba	No	4136	0.3-2.0	0.6	1853	2 Small Ponds
41135	T7N,R27E, SEC 31 Cd	No	4100	Pond	Pond	1975	1 Large Pond

TABLE E-2 (Continued)

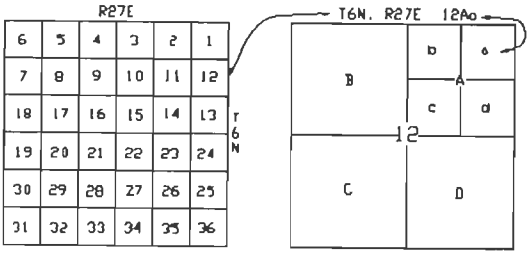
Spring Number	Location[1] (TRS ¼ ¼)	Within Life-of-Mine Area	Elev.[2] (ft.)	Flow Range (gpm)	Flow Average (gpm)	Specific Cond.[3] (µmhos/cm)	Development
41155	T7N,R27E, SEC 31 Bc	No	4075	Dry	Dry	–	No Development
41165	T7N,R27E, SEC 31 Ab	No	3980	Pond	Pond	NA[4]	1 Small Pond
41175	T7N,R27E, SEC 31 Ab	No	4010	Pond	Pond	1855	1 Small Pond
41185	T7N,R27E, SEC 31 Ba	No	4020	Pond	Pond	1864	1 Pond and Tank
41215	T6N,R27E, SEC 6 Ba	No	4419	0.1-1.0	0.4	628	1 Steel Tank
41225	T7N,R27E, SEC 32 Dc	No	4200	Dry-0.3	0.1	1448	No Development
41275	T7N,R27E, SEC 31 Aa	No	4010	Pond	Pond	1475	1 Small Pond
41315	T7N,R27E, SEC 30 Db	No	3955	Pond	Pond	NA[4]	NA[4]
41335	T7N,R27E, SEC 30 Db	No	3960	Pond	Pond	2697	1 Steel Tank
41425	T7N,R26E, SEC 25 Cd	No	4030	Pond	Pond	1816	1 Steel Tank
41445	T7N,R26E, SEC 25 Db	No	3970	NA[4]	NA[4]	NA[4]	NA[4]
41545	T7N,R27E, SEC 29 Ab	No	3870	Pond	Pond	3550	1 Small Pond
41555	T7N,R27E, SEC 20 Cd	No	3840	NA[4]	NA[4]	2050	No Development
41575	T7N,R27E, SEC 20 Cd	No	3800	Dry	Dry	–	Old Mine Entry
41585	T7N,R27E, SEC 16 Cc	No	3680	Pond	Pond	1465	1 Small Pond
41625	T7N,R27E, SEC 28 Bc	No	3940	Pond	Pond	3713	1 Large Pond
41635	T7N,R27E, SEC 28 Bc	No	3920	NA[4]	NA[4]	1810	No Development
41665	T7N,R27E, SEC 21 Bc	No	3740	Pond	Pond	1993	1 Small Pond
41685	T7N,R27E, SEC 16 Ca	No	3655	Pond	Pond	1730	1 Large Pond
41755	T7N,R27E, SEC 22 Bb	No	3610	NA[4]	NA[4]	NA[4]	NA[4]
41825	T7N,R27E, SEC 22 Bb	No	3700	NA[4]	NA[4]	NA[4]	NA[4]
41925	T7N,R27E, SEC 14 Db	No	3775	NA[4]	NA[4]	NA[4]	NA[4]
41945	T7N,R27E, SEC 14 Ca	No	3740	NA[4]	NA[4]	NA[4]	NA[4]
41985	T7N,R27E, SEC 15 Ba	No	3580	Pond	Pond	1445	1 Small Pond
51175	T7N,R27E, SEC 26 Cc	No	3740	0.3-1.8	0.6	2034	No Development
51255	T7N,R27E, SEC 36 Db	No	3707	0.5-6.3	3.5	2450	No Development
51445	T7N,R27E, SEC 26 Cb	No	3780	Dry-Pond	Pond	1060	No Development
51465	T7N,R27E, SEC 26 Bd	No	3700	Dry-Pond	Pond	2332	No Development
51485	T7N,R27E, SEC 26 Ab	No	3655	Dry	Dry	-	No Development
52125	T6N,R27E, SEC 9 Da	Yes	4200	Pond-6.0	1.2	1278	1 Small Pond
52145	T6N,R27E, SEC 9 Ad	Yes	4060	Dry-Pond	Pond	1103	1 Small Pond
52165	T6N,R27E, SEC 3 Cc	Yes	3980	Pond-3.3	1.0	1749	2 Small Ponds
52225	T6N,R27E, SEC 9 Bd	Yes	4072	0.3-2.3	0.7	1552	No Development
52235	T6N,R27E, SEC 9 Bd	Yes	4100	Dry-0.5	0.1	1690	No Development
52255	T6N,R27E, SEC 9 Bb	Yes	4090	Dry-0.1	0.02	1889	No Development
52275	T6N,R27E, SEC 4 Dd	Yes	3960	Dry-0.8	0.1	1871	No Development
52355	T6N,R27E, SEC 4 Ca	Yes	4038	Dry-2.0	0.5	1542	No Development
52365	T6N,R27E, SEC 4 Ca	Yes	4028	Dry	Dry	–	No Development
52375	T6N,R27E, SEC 4 Ac	Yes	3950	Dry-0.8	0.1	1768	Pond
52455	T6N,R27E, SEC 3 Bc	Yes	3840	0.8-10.2	4.4	2042	2 Small Ponds
52525	T6N,R27E, SEC 5 Ab	No	4286	0.1-2.0	0.6	772	1 Steel Tank
52535	T6N,R27E, SEC 5 Aa	No	4110	1.0-6.0	2.6	910	No Development
52545	T7N,R27E, SEC 33 Cb	No	4100	Pond-0.3	0.2	1485	No Development
52565	T7N,R27E, SEC 33 Dc	No	3960	Dry	Dry	-	No Development
52655	T7N,R27E, SEC 34 Cd	No	3788	0.1-24.0	3.5	2165	No Development

TABLE E-2 (Continued)

Spring Number	Location[1] (TRS ¼ ¼)	Within Life-of-Mine Area	Elev.[2] (ft.)	Flow Range (gpm)	Flow Average (gpm)	Specific Cond.[3] (µmhos/cm)	Development
52855	T7N,R27E, SEC 35 Bd	No	3690	Pond-1.5	0.2	2223	No Development
53115	T6N,R27E, SEC 15 Dc	Yes	4340	Pond-7.8	1.9	700	No Development
53125	T6N,R27E, SEC 15 Dc	Yes	4400	0.3-2.0	0.9	683	No Development
53145	T6N,R27E, SEC 15 Ac	Yes	4180	Pond-0.5	0.2	1132	No Development
53155	T6N,R27E, SEC 15 Ac	Yes	4180	Pond-6.0	1.9	1058	No Development
53175	T6N,R27E, SEC 15 Aa	Yes	4038	Pond-12.0	2.4	1033	1 Large Pond
53195	T6N,R27E, SEC 11 Ca	No	3917	Pond-19.8	4.9	1448	No Development
53225	T6N,R27E, SEC 14 Ca	Yes	4113	Dry-0.5	0.1	1979	No Development
53245	T6N,R27E, SEC 14 Bd	Yes	3980	Dry-0.5	0.1	2789	No Development
53285	T6N,R27E, SEC 11 Cd	Yes	3980	Pond-3.5	0.5	2458	2 Small Ponds
53325	T6N,R27E, SEC 13 Ca	No	4100	Dry-3.3	0.8	3972	No Development
53335	T6N,R27E, SEC 13 Cb	No	4080	Pond-0.6	0.2	4356	No Development
53385	T6N,R27E, SEC 11 Dc	No	3940	Dry-1.0	0.1	3597	No Development
53415	T6N,R27E, SEC 11 Bd	No	3880	Dry-10.3	1.8	2351	No Development
53455	T6N,R27E, SEC 11 Ba	No	3820	Pond-4.5	1.2	1962	No Development
53465	T6N,R27E, SEC 2 Cd	No	3800	Pond-0.8	0.1	1741	No Development
53475	T6N,R27E, SEC 2 Dc	No	3815	Pond-9.8	1.6	2067	No Development
53485	T6N,R27E, SEC 2 Dc	No	3802	1.5-9.5	4.0	2348	No Development
53495	T6N,R27E, SEC 2 Db	No	3780	Pond-0.3	0.03	2379	No Development
53525	T6N,R27E, SEC 10 Bd	Yes	4040	Pond-0.5	0.1	2461	No Development
53535	T6N,R27E, SEC 10 Bd	Yes	4040	Dry-0.3	0.04	1760	1 Small Pond
53545	T6N,R27E, SEC 10 Bd	Yes	4000	Pond-0.1	0.02	2473	No Development
53575	T6N,R27E, SEC 10 Aa	No	3890	Pond-0.8	0.2	1748	No Development
53615	T6N,R27E, SEC 13 Ac	No	4080	Dry-3.3	1.0	3330	No Development
53635	T6N,R27E, SEC 13 Ba	No	4030	Dry-1.3	0.4	3620	No Development
53685	T6N,R27E, SEC 2 Da	No	3780	Pond-1.0	0.1	1796	No Development
53755	T6N,R27E, SEC 2 Bc	No	3800	Pond-3.5	1.4	1443	1 Large Pond
53855	T7N,R27E, SEC 35 Cd	No	3760	Dry-Pond	Pond	1118	No Development
71115	T6N,R27E, SEC 22 Ab	Yes	4416	1.3-9.0	4.3	488	2 Steel Tanks
71125	T6N,R27E, SEC 22 Bd	Yes	4460	Pond-1.0	0.4	527	No Development
71355	T6N,R27E, SEC 23 Dc	No	4060	Pond-1.8	0.4	2688	No Development
71425	T6N,R27E, SEC 24 Cc	No	3920	Dry-0.8	0.2	1236	1 Large Pond
71445	T6N,R27E, SEC 24 Cc	No	3900	Pond-1.5	0.4	1738	No Development
71465	T6N,R27E, SEC 24 Cd	No	3868	2.0-16.5	7.8	1432	1 Steel Tank
72115	T6N,R27E, SEC 27 Bb	No	4540	Pond-1.3	0.6	424	1 Steel Tank
72125	T6N,R27E, SEC 27 Ba	No	4340	0.3-3.0	1.8	862	1 Steel Tank
72135	T6N,R27E, SEC 27 Ba	No	4340	0.3-1.5	0.5	1009	No Development
72155	T6N,R27E, SEC 27 Ac	No	4216	0.3-16.7	4.1	1117	No Development
72175	T6N,R27E, SEC 27 Da	No	4140	Pond-7.0	1.2	1609	1 Small Pond
72185	T6N,R27E, SEC 26 Cc	No	4064	Pond-6.5	2.3	2071	1 Large Pond
92155	T7N,R26E, SEC 25 Cb	No	3830	Pond	Pond	2361	1 Small Pond

TABLE E-2 (Continued)

[1] Locations for the springs use USGS designations for 1/4 1/4 sections. This diagram illustrates that for a spring located in the NE corner of Township 6 North (T6N), Range 27 East (R27E), Section 12 (Sec 12) the 1/4 1/4 designation would be "Aa".



[2] Elevations surveyed or estimated from USGS 7.5 minute topographic maps.

[3] CLASSIFICATION OF GROUNDWATER (MONTANA ADMINISTRATIVE RULE 16.20.1002)
CLASS I - <1,000 μmhos/cm
CLASS II - 1,000 to 2,500 μmhos/cm
CLASS III - 2,500 to 15,000 μmhos/cm
CLASS IV - >15,000 μmhos/cm

[4] NA - Data Not Available

* Classification (ARM 16.20.1002) of Ground water

"The ground waters of the State of Montana are classified as follows:

(a) Class I ground waters are generally suitable for public and private water supplies, culinary and food processing purposes, irrigation, livestock and wildlife watering, and for commercial and industrial purposes with little or no treatment. Class I ground waters have a specific conductance of less than 1000 micromhos/cm at 25°C.

(b) Class II ground waters are generally marginally suitable for public and private water supplies, culinary and food processing uses and are suitable for irrigation of some agricultural crops, for drinking water for most wildlife and livestock, and for most commercial and industrial purposes. Class II ground waters may be used for municipal or domestic water supplies in areas where better quality water is not readily available. Class II ground waters have specific conductance ranging from 1000 to 2500 micromhos/cm at 25°C.

(c) Class III ground waters are suitable for some industrial and commercial uses and as drinking water for some wildlife and livestock and for irrigation of some salt-tolerant crops using special water management practices. In some cases Class III ground waters are the only economically feasible source for municipal or domestic water supplies. Class III ground waters have specific conductance ranging from 2500 to 15,000 micromhos/cm at 25°C.

(d) Class IV ground waters may be suitable for some industrial, commercial and other uses, but are unsuitable or, for practical purposes, untreatable for higher class beneficial uses. These ground waters have specific conductance greater than 15,000 micromhos/cm at 25°C."

TABLE E-3
Bull Mountains Mine No. 1
Hydrology Matrix for Spring Ranking

WATER AVAILABILITY	SCORE
ALL YEAR	4
OCCASIONALLY FROZEN	3
OCCASIONALLY DRY AND/OR FROZEN	2
FREQUENTLY DRY	1

+

AVERAGE FLOW GALLONS PER MINUTE (GPM)	SCORE
> 10 GPM	4
5 TO 10 GPM	3
1 TO 5 GPM	2
< 1 GPM	1

+

AVERAGE QUALITY MONTANA ARM 16 20 1002 CRITERIA	SCORE
CLASS I	4
CLASS II	3
CLASS III	2
CLASS IV	1

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HYDROLOGY SCORE USED IN TABLE III-3 CUMULATIVE

TABLE E-4
Bull Mountains Mine No. 1
Aquatic Ecology Matrix for Spring Ranking

HABITAT DIVERSITY (RELATES TO HABITAT FORM PROVIDING THE DEGREE OF MULTIPLE USE)	SCORE
HABITAT IS PERENNIAL AND IN THE FORM OF SPRING FLOW WITH PONDED WATER	4
HABITAT IS PERENNIAL AND IN THE FORM OF SPRING FLOW WITH STREAM POOLS	3
HABITAT IS PERENNIAL AND IN THE FORM OF SPRING SEEPAGE	2
HABITAT IS INTERMITTENT AND IN THE FORM OF SPRING SEEPAGE	1

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HABITAT EXTENT (RELATES TO AMOUNT OF HABITAT IN FORM AND FUNCTION)	SCORE
HABITAT IS PERENNIAL WITH HIGH EXTENT	4
HABITAT IS PERENNIAL WITH MODERATE EXTENT	3
HABITAT IS PERENNIAL WITH LOW EXTENT	2
HABITAT IS LIMITED IN EXTENT AND SEASONAL AVAILABILITY	1

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MACROINVERTEBRATE DIVERSITY (RELATES TO NUMBERS OF INDIVIDUALS AND TAXA FOUND SEASONALLY)	SCORE
DIVERSITY AND DENSITY ARE HIGH	4
DIVERSITY AND DENSITY ARE MODERATE	3
DIVERSITY AND DENSITY ARE LOW	2
DIVERSITY AND DENSITY ARE LIMITED	1

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PERIPHYTON DIVERSITY (RELATES TO NUMBERS OF INDIVIDUALS AND TAXA FOUND SEASONALLY)	SCORE
DIVERSITY AND DENSITY ARE HIGH	4
DIVERSITY AND DENSITY ARE MODERATE	3
DIVERSITY AND DENSITY ARE LOW	2
DIVERSITY AND DENSITY ARE LIMITED	1

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AQUATICS SCORE USED IN TABLE III-3 CUMULATIVE

TABLE E-5

Bull Mountains Mine No. 1
Hydrophytic Vegetation Matrix for Spring Ranking

SPRING DESCRIPTION	VEGETATION SCORE USED IN TABLE III-3 CUMULATIVE
NATIVE PLANTS VERY DOMINANT, OVERALL SPECIES DIVERSITY AND DIVERSITY OF HYDROPHYTIC ZONES HIGH, LARGE AREAL EXTENT OF HYDROPHYTIC VEGETATION. RELATIVELY LOW MANIFESTATION OF RECENT DISTURBANCE.	4
NATIVE PLANTS DOMINANT OVER INTRODUCED SPECIES, OVERALL SPECIES DIVERSITY AND DIVERSITY OF HYDROPHYTIC ZONES MODERATELY HIGH, MODERATELY LARGE AREAL EXTENT OF HYDROPHYTIC VEGETATION. MODERATE RECENT DISTURBANCE.	3
NATIVE AND INTRODUCED PLANTS CO-DOMINANT, SPECIES AND ZONAL DIVERSITY MODERATE, MODERATE OR SMALL AREAL EXTENT. RECENT DISTURBANCE OFTEN EXTENSIVE.	2
INTRODUCED PLANTS OFTEN DOMINANT, SPECIES AND ZONAL DIVERSITY LOW, SMALL AREAL EXTENT. RECENT DISTURBANCE OFTEN EXTENSIVE.	1

TABLE E-6

Bull Mountains Mine No. 1
Land Use Matrix for Spring Ranking

SPRING DEVELOPMENT (RELATES TO TYPE AND AMOUNT OF DEVELOPMENT)	SCORE
SPRING IS DEVELOPED WITH LARGE POND AND/OR OTHER WATER PRODUCING STRUCTURE	4
SPRING IS DEVELOPED WITH SMALL POND	3
SPRING IS DEVELOPED WITH STOCK TANK	2
SPRING HAS NO DEVELOPMENT	1

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RANCH USE (RELATED TO IMPORTANCE OF SPRING AND POSITION RELATIVE TO RANCH AND PASTURE USE)	SCORE
SPRING IS OF HIGH USE FOR RANCH OPERATIONS	4
SPRING IS OF MODERATE USE FOR RANCH OPERATIONS	3
SPRING IS OF LOW USE FOR RANCH OPERATIONS	2
SPRING IS OF LIMITED USE FOR RANCH OPERATIONS	1

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ECOLOGICAL IMPORTANCE (RELATES TO IMPORTANCE AND POSITION OF SPRING RELATIVE TO ECOLOGICAL SURROUNDINGS)	SCORE
SPRING IS OF HIGH IMPORTANCE	4
SPRING IS OF MODERATE IMPORTANCE	3
SPRING IS OF LOW IMPORTANCE	2
SPRING IS OF LIMITED IMPORTANCE	1

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LAND USE SCORE USED IN TABLE III-3 CUMULATIVE

TABLE E-7

Bull Mountains Mine No. 1
Wildlife Matrix for Spring Ranking

SPRING DESCRIPTION	WILDLIFE SCORE USED IN TABLE III-3 CUMULATIVE
PERENNIAL, GOOD TO EXCELLENT HABITAT, WITH GOOD TOPOGRAPHIC AND/OR VEGETATIVE COVER, OPEN WATER. LITTLE OR NO LIVESTOCK USE.	4
GENERALLY PERENNIAL, OFTEN A LONG REACH OF PARTIALLY OPEN WATER, FAIR TOPOGRAPHIC AND/OR VEGETATIVE COVER. LIGHT TO MODERATE LIVESTOCK USE.	3
MAY HAVE SOME DESIRABLE CHARACTERISTICS FOR WILDLIFE, BUT GENERALLY LIMITED BY LOW FLOWS, INTERMITTENT NATURE. HEAVY LIVESTOCK USE, OR LIMITED COVER.	2
SEVERELY LIMITED DUE TO LOW FLOW, LITTLE OR NO TOPOGRAPHIC AND/OR VEGETATIVE COVER. HEAVY LIVESTOCK USE.	1

TABLE E-8

Bull Mountains Mine No. 1
Spring Impact Potential,
Relative Importance of Potentially-Impacted Springs,
and Severity of Impacts

Spring	Location[1] (TRS¼¼)	Within Life-of-Mine Area	Potential for Impact	Relative Importance of Potentially-Impacted Springs[2]	Severity of Impact Prior to Mitigation
11115	T6N,R27E, SEC 6 CB	No	None		
11125	T6N,R27E, SEC 6 CB	No	None		
11185	T6N,R26E, SEC 12 AA	No	None		
11555	T6N,R26E, SEC 2 AC	No	None		
14115	T6N,R27E, SEC 16 DD	Yes	Low	Low	Negligible
14155	T6N,R27E, SEC 15 CD	Yes	Low	Low	Negligible
14165	T6N,R27E, SEC 15 CB	Yes	Moderate	Moderate	Potential to Become Major
14255	T6N,R27E, SEC 16 AC	Yes	Moderate	Major	Major
14325	T6N,R27E, SEC 17 AA	Yes	Moderate	Major	Major
14415	T6N,R27E, SEC 8 DC	Yes	Moderate	Moderate	Potential to Become Major
14535	T6N,R27E, SEC 8 CA	Yes	Moderate	Negligible	Negligible
14555	T6N,R27E, SEC 8 CA	Yes	Moderate	Low	Negligible
14655	T6N,R27E, SEC 8 BB	No	None		
14755	T6N,R27E, SEC 6 DC	No	None		
14785	T6N,R27E, SEC 7 AC	No	None		
16135	T6N,R27E, SEC 22 CB	Yes	Low	Low	Negligible
16145	T6N,R27E, SEC 21 DA	Yes	Moderate	Low	Negligible
16165	T6N,R27E, SEC 21 AD	Yes	Moderate	Moderate	Potential to Become Major
16255	T6N,R27E, SEC 21 AC	Yes	Moderate	Low	Negligible
16275	T6N,R27E, SEC 21 AC	Yes	Moderate	Low	Negligible
16355	T6N,R27E, SEC 21 BA	Yes	Moderate	Moderate	Potential to Become Major
16365	T6N,R27E, SEC 21 BB	Yes	Moderate	Moderate	Potential to Become Major
16625	T6N,R27E, SEC 17 DB	Yes	Moderate	Low	Negligible
16655	T6N,R27E, SEC 17 AC	Yes	Moderate	Major	Major
16755	T6N,R27E, SEC 17 AB	Yes	High	Low	Potential to Become Major
16855	T6N,R27E, SEC 17 BB	Yes	Moderate	Negligible	Negligible
16955	T6N,R27E, SEC 18 AA	Yes	High	Low	Negligible
17115	T6N,R27E, SEC 33 BA	No	None		
17145	T6N,R27E, SEC 28 CD	No	None		
17165	T6N,R27E, SEC 28 CB	No	None		
17185	T6N,R27E, SEC 29 AD	No	None		
17215	T6N,R27E, SEC 28 AC	No	None		
17255	T6N,R27E, SEC 28 BC	No	None		
17275	T6N,R27E, SEC 29 AA	No	None		

TABLE E-8 (Continued)

Spring	Location[1] (TRS¼¼)	Within Life-of-Mine Area	Potential for Impact	Relative Importance of Potentially-Impacted Springs[2]	Severity of Impact Prior to Mitigation
17315	T6N,R27E, SEC 20 DC	No	None		
17415	T6N,R27E, SEC 20 BC	Yes	Low	Major	Potential to Become Major
17515	T6N,R27E, SEC 17 CC	Yes	High	Moderate	Major
17635	T6N,R27E, SEC 21 BD	Yes	Moderate	Low	Negligible
17655	T6N,R27E, SEC 21 BC	Yes	Moderate	Low	Negligible
17685	T6N,R27E, SEC 20 AA	Yes	Low	Moderate	
31555	T7N,R27E, SEC 18 BC	No	None		
41125	T6N,R27E, SEC 6 BA	No	None		
41135	T7N,R27E, SEC 31 CD	No	None		
41155	T7N,R27E, SEC 31 BC	No	None		
41165	T7N,R27E, SEC 31 AB	No	None		
41175	T7N,R27E, SEC 31 AB	No	None		
41185	T7N,R27E, SEC 31 BA	No	None		
41215	T6N,R27E, SEC 6 BA	No	None		
41225	T7N,R27E, SEC 32 DC	No	None		
41275	T7N,R27E, SEC 31 AA	No	None		
41315	T7N,R27E, SEC 30 DB	No	None		
41335	T7N,R27E, SEC 30 DB	No	None		
41425	T7N,R26E, SEC 25 CD	No	None		
41445	T7N,R26E, SEC 25 DB	No	None		
41545	T7N,R27E, SEC 29 AB	No	None		
41555	T7N,R27E, SEC 20 CD	No	None		
41575	T7N,R27E, SEC 20 CD	No	None		
41585	T7N,R27E, SEC 16 CC	No	None		
41625	T7N,R27E, SEC 28 BC	No	None		
41635	T7N,R27E, SEC 28 BC	No	None		
41665	T7N,R27E, SEC 21 BC	No	None		
41685	T7N,R27E, SEC 16 CA	No	None		
41755	T7N,R27E, SEC 22 BD	No	None		
41825	T7N,R27E, SEC 22 BD	No	None		
41925	T7N,R27E, SEC 14 DB	No	None		
41945	T7N,R27E, SEC 14 CA	No	None		
41985	T7N,R27E, SEC 15 BA	No	None		
51175	T7N,R27E, SEC 26 CC	No	None		
51255	T7N,R27E, SEC 36 DB	No	None		
51445	T7N,R27E, SEC 26 CB	No	None		
51465	T7N,R27E, SEC 26 BD	No	None		
51485	T7N,R27E, SEC 26 AB	No	None		
52125	T6N,R27E, SEC 9 DA	Yes	Moderate	Moderate	Potential to Become Major
52145	T6N,R27E, SEC 9 AD	Yes	Moderate	Low	Negligible
52165	T6N,R27E, SEC 3 CC	Yes	Negligible		
52225	T6N,R27E, SEC 9 BD	Yes	Moderate	Low	Negligible

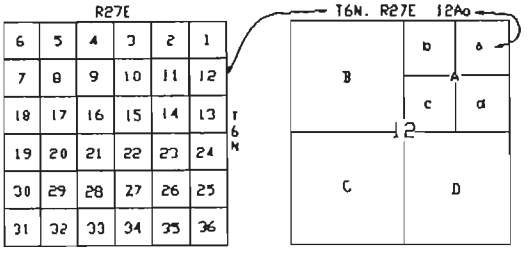
TABLE E-8 (Continued)

Spring	Location[1] (TRS¼¼)	Within Life-of-Mine Area	Potential for Impact	Relative Importance of Potentially-Impacted Springs[2]	Severity of Impact Prior to Mitigation
52235	T6N,R27E, SEC 9 BD	Yes	Moderate	Low	Negligible
52255	T6N,R27E, SEC 9 BB	Yes	Moderate	Negligible	Negligible
52275	T6N,R27E, SEC 4 DD	Yes	Negligible		
52355	T6N,R27E, SEC 4 CA	Yes	None		
52365	T6N,R27E, SEC 4 CA	Yes	None		
52375	T6N,R27E, SEC 4 AC	Yes	None		
52455	T6N,R27E, SEC 3 BC	Yes	Negligible		
52525	T6N,R27E, SEC 5 AB	No	None		
52535	T6N,R27E, SEC 5 AA	No	None		
52545	T7N,R27E, SEC 33 CB	No	None		
52565	T7N,R27E, SEC 33 DC	No	None		
52655	T7N,R27E, SEC 34 CD	No	Negligible		
52855	T7N,R27E, SEC 35 BD	No	None		
53115	T6N,R27E, SEC 15 DC	Yes	Moderate	Low	Negligible
53125	T6N,R27E, SEC 15 DC	Yes	Moderate	Low	Negligible
53145	T6N,R27E, SEC 15 AC	Yes	High	Low	Potential to Become Major
53155	T6N,R27E, SEC 15 AC	Yes	High	Low	Potential to Become Major
53175	T6N,R27E, SEC 15 AA	Yes	Moderate	Moderate	Potential to Become Major
53195	T6N,R27E, SEC 11 CA	No	Negligible	Moderate	Negligible
53225	T6N,R27E, SEC 14 CA	Yes	Moderate	Low	Negligible
53245	T6N,R27E, SEC 14 BD	Yes	High	Low	Potential to Become Major
53285	T6N,R27E, SEC 11 CD	Yes	Negligible		
53325	T6N,R27E, SEC 13 CA	No	None		
53335	T6N,R27E, SEC 13 CB	No	None		
53385	T6N,R27E, SEC 11 DC	No	None		
53415	T6N,R27E, SEC 11 BD	No	None		
53455	T6N,R27E, SEC 11 BA	No	Negligible		
53465	T6N,R27E, SEC 2 CD	No	Negligible		
53475	T6N,R27E, SEC 2 DC	No	Negligible		
53485	T6N,R27E, SEC 2 DC	No	Negligible		
53495	T6N,R27E, SEC 2 DB	No	Negligible		
53525	T6N,R27E, SEC 10 BD	Yes	High	Low	Potential to Become Major
53535	T6N,R27E, SEC 10 BD	Yes	High	Low	Potential to Become Major
53545	T6N,R27E, SEC 10 BD	Yes	Moderate	Low	Potential to Become Major
53575	T6N,R27E, SEC 10 AA	No	None		
53615	T6N,R27E, SEC 13 AC	No	None		
53635	T6N,R27E, SEC 13 BA	No	None		
53685	T6N,R27E, SEC 2 DA	No	None		

TABLE E-8 (Continued)

Spring	Location[1] (TRS¼¼)	Within Life-of-Mine Area	Potential for Impact	Relative Importance of Potentially-Impacted Springs[2]	Severity of Impact Prior to Mitigation
53755	T6N,R27E, SEC 2 BC	No	None		
53855	T7N,R27E, SEC 35 CD	No	None		
71115	T6N,R27E, SEC 22 AB	Yes	Moderate	Low	Negligible
71125	T6N,R27E, SEC 22 BD	Yes	Moderate	Low	Negligible
71355	T6N,R27E, SEC 23 DC	No	None		
71425	T6N,R27E, SEC 24 CC	No	Negligible		
71445	T6N,R27E, SEC 24 CC	No	Negligible		
71465	T6N,R27E, SEC 24 CD	No	Negligible		
72115	T6N,R27E, SEC 27 BB	No	None		
72125	T6N,R27E, SEC 27 BA	No	None		
72135	T6N,R27E, SEC 27 BA	No	None		
72155	T6N,R27E, SEC 27 AC	No	None		
72175	T6N,R27E, SEC 27 DA	No	None		
72185	T6N,R27E, SEC 26 CC	No	None		
92155	T7N,R26E, SEC 25 CB	No	None		

[1] Locations for the springs use USGS designations for 1/4 1/4 sections. This diagram illustrates that for a spring located in the NE corner of Township 6 North (T6N), Range 27 East (R27E), Section 12 (Sec 12) the 1/4 1/4 designation would be "Aa".



[2] For explanation of method used to derive "Relative Importance of Potentially-Impacted Springs" rating see accompanying tables E-3 through E-7, Appendix E.

TABLE E-9
List of Species

Scientific and Common Names of Vegetation Species*

Scientific Name	Common Name
Agropyron cristatum	crested wheatgrass
Agropyron intermedium	intermediate wheatgrass
Agropyron smithii	western wheatgrass
Agropyron spicatum	bluebunch wheatgrass
Artemisia cana	silver sagebrush
Bouteloua gracilis	blue grama
Bromus japonicus	Japanese brome
Bromus tectorum	cheatgrass
Carex filifolia	threadleaf sedge
Carex nebraskensis	Nebraska sedge
Carex spp.	sedge
Centaurea maculosa	spotted knapweed
Cirsium arvense	Canada thistle
Distichlis stricta	inland saltgrass
Hordeum jubatum	foxtail barley
Juncus balticus	wire rush
Juncus bufonis	toad rush
Juniperus scopulorum	Rocky Mountain juniper
Koleria cristata	prairie junegrass
Lactuca serriola	prickly lettuce
Medicago sativa	alfalfa
Pinus ponderosa	ponderosa pine
Poa pratensis	Kentucky bluegrass
Poa sandbergii	sandberg bluegrass
Puccinellia nuttalliana	Nuttall's alkaligrass
Rosa woodsii	woods rose
Sarcobatus vermiculatus	greasewood
Scirpus acutus	western bulrush
Scirpus spp.	bulrush
Stipa comata	needle-and-thread
Stipa viridula	green needlegrass
Suaeda depressa	seepweed
Symphoricarpos albus	snowberry
Symphoricarpos occidentalis	snowberry
Taraxacum officinale	dandelion
Typha latifolia	cattail

* Species mentioned in Chapt. 3

TABLE E-10

List of Species

Common and Scientific Names of Wildlife Species*

Common Name	Scientific Name
MAMMALS	
Nuttall's cottontail	*Sylvilagus nuttalli*
Least chipmunk	*Tamius minimus*
Richardson's ground squirrel	*Spermophilus richardsonii*
Coyote	*Canis latrans*
Rocky Mt.Elk	*Cervus elaphus*
Mule deer	*Odocoileus hemionus*
White-tailed deer	*Odocoileus virginianus*
Pronghorn	*Antilocapra americana*
Blacktail prairie dog	*Cynomys ludovicianus*
BIRDS	
Bald Eagle	*Haliaeetus leucocephalus*
Turkey vulture	*Cathartes aura*
Northern harrier	*Circus cyaneus*
Sharp-shinned hawk	*Accipiter striatus*
Cooper's hawk	*Accipiter cooperii*
Swainson's hawk	*Buteo swainsoni*
Red-tailed hawk	*Buteo jamaicensis*
Ferruginous hawk	*Buteo regalis*
Rough-legged hawk	*Buteo lagopus*
American kestrel	*Falco sparvarius*
Prairie falcon	*Falco mexicanus*
Sharp-tailed grouse	*Tympanuchus phasianellus*
Wild turkey	*Meleagris gallopavo*
Great horned owl	*Bubo virginianus*
Red-headed woodpecker	*Melanerpes erythrocephalus*
Downy woodpecker	*Picoides pubescens*
Hairy woodpecker	*Picoides villosus*
Mountain bluebird	*Sialia currocoides*
Cliff swallow	*Hirundo pyrrhonata*

* Species mentioned in Chapter 3.

TABLE E-11.

Birds Observed Along Proposed Railway Corridor Which Were Primarily Associated with Wetlands

Species	Breeding Pairs or Territorial Defense	Broods	Unknown Status
Green-winged teal	X		
Mallard	X	X	
Northern pintail	X		
Blue-winged teal	X		
Cinnamon teal	X		
Northern shoveler	X		
Gadwall	X		
American wigeon	X		
Redhead			X
Lesser scaup	X		
American avocet	X		
Willet		X	
Long-billed curlew	X		
Long-billed dowitcher			X
Wilson's phalarope		X	

TABLE E-12

Employment in Montana, Musselshell County, and Yellowstone County - 1980 and 1989

Employment Sector	Montana				Musselshell County				Yellowstone County			
	1980		1989		1980		1989		1980		1989	
	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total
Total Employment	389,460	100.0	421,539	100.0	1,944	100.0	1,850	100.0	60,286	100.0	68,964	100.0
Farm	32,870	8.4	31,024	7.4	332	17.1	331	17.9	1,378	2.3	1,311	1.9
Nonfarm	356,590	91.6	390,515	92.6	1,612	82.9	1,519	82.1	58,908	97.7	67,653	98.1
Private	281,449	72.3	312,959	74.2	1,349	69.4	1,276	69.0	51,017	84.6	59,382	86.1
Agricultural Services	3,726	1.0	5,748	1.4	31	1.6	40	2.2	445	0.7	573	0.8
Mining	9,619	2.5	7,005	1.7	278	14.3	116	6.3	783	1.3	589	0.9
Construction	22,324	5.7	20,193	4.8	75	3.9	99	5.4	3,523	5.8	3,205	4.6
Manufacturing	26,225	6.7	24,730	5.9	69	3.5	52	2.8	4,454	7.4	3,359	4.9
Transportation and Utilities	26,194	6.7	23,616	5.6	92	4.7	114	6.2	4,865	8.1	4,667	6.8
Wholesale Trade	18,805	4.8	16,408	3.9	86	4.4	75	4.1	5,827	9.7	5,441	7.9
Retail Trade	68,756	17.7	76,561	18.2	331	17.0	298	16.1	12,231	20.3	14,274	20.7
Finance, Insurance, & Real Estate	22,922	5.9	26,128	6.2	74	3.8	51	2.8	4,414	7.3	5,766	8.4
Services	82,878	21.3	112,570	26.7	313	16.1	431	23.3	14,475	24.0	21,508	31.2
Government	75,141	19.3	77,556	18.4	263	13.5	243	13.1	7,891	13.1	8,271	12.0
Federal (civilian)	13,967	3.6	13,797	3.3	19	1.0	21	1.1	1,636	2.7	1,805	2.6
Federal (military)	9,256	2.4	9,562	2.3	26	1.3	26	1.4	679	1.1	745	1.1
State and Local	51,918	13.3	54,197	12.9	218	11.2	196	10.6	5,576	9.2	5,721	8.3

Source: U.S. Department of Commerce 1991.

TABLE E-13

Labor Force Statistics - Montana, Musselshell County, and Yellowstone County (Selected Years, 1970-1990)

Place/Category	1970	1980	1985	1986	1987	1988	1989	1990
Montana								
Civilian Labor Force	273,000	371,000	405,000	407,000	403,000	402,000	405,000	402,000
Employed Persons	261,000	348,000	374,000	374,000	373,000	374,000	381,000	379,000
Unemployed Persons	12,000	23,000	31,000	33,000	30,000	28,000	24,000	23,000
Unemployment Rate	4.4	6.2	7.7	8.1	7.4	7.0	5.9	5.7
Musselshell County								
Civilian Labor Force	1,440	1,841	1,984	1,961	1,883	1,865	1,782	1,696
Employed Persons	1,333	1,798	1,838	1,754	1,693	1,695	1,648	1,564
Unemployed Persons	107	43	146	207	190	170	134	132
Unemployment Rate	7.4	2.3	7.4	10.6	10.1	9.1	7.5	7.8
Yellowstone County								
Civilian Labor Force	35,170	55,542	61,749	61,423	60,043	59,518	61,870	64,473
Employed Persons	32,966	52,861	57,259	56,718	55,726	55,648	58,704	61,395
Unemployed Persons	2,204	2,681	4,490	4,705	4,317	3,870	3,166	3,078
Unemployment Rate	6.3	4.8	7.3	7.7	7.2	6.5	5.1	4.8

Source: Montana Department of Labor and Industry 1991.

TABLE E-14

Personal Income in Montana, Musselshell County, and Yellowstone County - 1980 and 1989
($000,000)

Earnings Sector	Montana				Musselshell County				Yellowstone County			
	1980		1989		1980		1989		1980		1989	
	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total
Total Personal Income	$7,039.6	100.0	$11,392.5	100.0	$42.2	100.0	$58.3	100.0	$1,107.2	100.0	$1,810.8	100.0
Total Earnings	5,070.8	72.0	7,366.8	64.7	23.5	55.6	29.3	50.2	862.4	77.9	1,275.4	70.4
Farm	280.2	4.0	474.4	4.2	1.7	4.1	5.5	9.5	7.0	0.6	25.1	1.4
Nonfarm	4,790.6	68.1	6,892.4	60.5	21.7	51.6	23.8	40.8	855.4	77.3	1,250.2	69.0
Private	3,830.7	54.4	5,373.7	47.2	19.1	45.4	19.7	33.9	751.6	67.9	1,079.0	59.6
Agricultural Services	29.0	0.4	52.7	0.5	0.3	0.6	0.6	1.0	4.3	0.4	6.3	0.3
Mining	240.4	3.4	247.7	2.2	6.5	15.3	2.6	4.5	16.6	1.5	17.6	1.0
Construction	445.9	6.3	405.2	3.6	1.1	2.6	1.4	2.3	74.9	6.8	67.1	3.7
Manufacturing	504.3	7.2	619.3	5.4	0.3	0.8	0.3	0.6	93.3	8.4	98.7	5.5
Transportation and Utilities	565.0	8.0	720.2	6.3	2.1	4.9	5.1	8.8	106.2	9.6	134.8	7.4
Wholesale Trade	337.6	4.8	386.5	3.4	2.2	5.2	1.5	2.5	114.3	10.3	143.7	7.9
Retail Trade	613.1	8.7	850.0	7.5	2.5	5.8	2.8	4.7	116.0	10.5	166.8	9.2
Finance, Insurance, & Real Estate	217.7	3.1	313.7	2.8	0.9	2.2	0.7	1.1	42.9	3.9	77.7	4.3
Services	877.7	12.5	1,778.5	15.6	3.4	8.1	4.8	8.2	183.1	16.5	366.3	20.2
Government	960.0	13.6	1,518.7	13.3	2.6	6.2	4.0	6.9	103.8	9.4	171.2	9.5
Federal (civilian)	257.7	3.7	394.2	3.5	0.3	0.7	0.6	1.0	33.6	3.0	59.5	3.3
Federal (military)	74.8	1.1	133.1	1.2	0.1	0.2	0.2	0.3	2.3	0.2	5.2	0.3
State and Local	627.4	8.9	991.4	8.7	2.2	5.3	3.3	5.6	68.0	6.1	106.6	5.9

Source: U.S. Department of Commerce May 1991.

TABLE E-15

Population by Age - Bull Mountains Study Area

Place/Age	1970	Percent of Total	1980	Percent of Total	1990	Percent of Total
Montana Total	694,409	100.0	786,690	100.0	799,065	100.0
0 to 4 Years	57,054	8.2	64,455	8.2	59,257	7.4
5 to 17 Years	196,071	28.2	167,440	21.3	162,847	20.4
18 to 64 Years	372,548	53.6	470,236	59.8	470,464	58.9
65+ Years	68,736	9.9	84,559	10.7	106,497	13.3
Musselshell Co. Total	3,734	100.0	4,428	100.0	4,106	100.0
0 to 4 Years	273	7.3	376	8.5	199	4.8
5 to 17 Years	934	25.0	937	21.2	844	20.6
18 to 64 Years	1,919	51.4	2,419	54.6	2,242	54.6
65+ Years	608	16.3	696	15.7	821	20.0
Roundup Total	1,564	100.0	2,116	100.0	1,808	100.0
0 to 4 Years	N/A	0.0	186	8.8	100	5.5
5 to 17 Years	N/A	0.0	343	16.2	357	19.7
18 to 64 Years	N/A	0.0	1,129	53.4	884	48.9
65+ Years	N/A	0.0	458	21.6	467	25.8
Yellowstone Co. Total	87,367	100.0	108,035	100.0	113,419	100.0
0 to 4 Years	7,068	8.1	9,013	8.3	8,418	7.4
5 to 17 Years	24,701	28.3	22,665	21.0	22,455	19.8
18 to 64 Years	48,534	55.6	66,516	61.6	68,547	60.4
65+ Years	7,064	8.1	9,841	9.1	13,999	12.3
Billings Total	61,581	100.0	66,842	100.0	81,151	100.0
0 to 4 Years	4,790	7.8	4,907	7.3	6,036	7.4
5 to 17 Years	16,928	27.5	12,606	18.9	14,785	18.2
18 to 64 Years	34,758	56.4	42,603	63.7	48,977	60.4
65+ Years	5,105	8.3	6,726	10.1	11,353	14.0

Note: N/A = Not Available

Source: U.S. Department of Commerce 1970, 1980, and 1990.

TABLE E-16

Baseline Economic Projections for Montana, Musselshell County, and Yellowstone County - 1990 to 2010

Place/Type	1990	1995	2000	2005	2010
Montana					
Population	799,065	824,591	849,782	873,195	897,738
Employment	426,923	454,890	483,126	506,978	523,272
Per Capita Income	$11,609	$13,101	$14,801	$16,692	$18,752
Musselshell County					
Population	4,106	4,238	4,389	4,436	4,615
Employment	1,858	1,897	1,955	2,013	2,052
Per Capita Income	$10,828	$12,143	$13,683	$15,422	$17,341
Yellowstone County					
Population	113,419	119,928	125,489	130,309	134,968
Employment	70,279	77,242	83,688	89,110	92,981
Per Capita Income	$12,780	$14,334	$16,139	$18,136	$20,330

Source: National Planning Association Data Services, Inc. 1990.

APPENDIX F

DRAFT EIS COMMENTS AND RESPONSES

1. INTRODUCTION

Appendix F has been printed on shaded paper to distinguish comments and responses for the Draft EIS from the remainder of the document.

The draft Environmental Impact Statement (EIS) for Meridian Minerals Company's proposed Bull Mountains Mine No. 1 was published and released for public review on August 31, 1992. Notices of publication and of public meetings on the draft were published in the Billings Gazette September 9, 19, and 25, 1992, and in the Roundup Record - Tribune September 9, 16, and 23, 1992.

In this appendix, Montana DSL (the Agency) responds to substantive comments received on the draft EIS. Substantive comments are those that question analyses or procedural steps. Statements of support or objection to the proposed Project, and other personal opinions, such as the necessity of boosting the local economy, are hereby acknowledged and are reproduced as oral or written testimony in Section 3. However, the Agency cannot respond to these comments.

Public meetings were held in Huntley, Montana, on September 22, 1992, in Billings, Montana, on September 23, 1992, and in Roundup, Montana, on September 24, 1992 to receive comments on the draft EIS. Transcripts of oral testimony from these meetings are included in Section 3. of this appendix. Comments at these meetings focused on concerns about transportation, surface and ground water, socioeconomics, noise, air quality, and reclamation.

Eighty-four letters were received on the draft. An index follows that lists letters and testimony in order of receipt, the commentor by name, commentor's affiliation, impact topics, and page numbers for each letter/oral testimony and response. Each comment has been assigned a number corresponding to the letter received, or to the town in which oral testimony was received, followed by a comment number (e.g., Letter 1, fourth comment would be comment 1-4; oral testimony in Roundup, fourth comment would be R-4). Responses to these comments are presented in Section 4. Where no substantive comment was made, no response was given. Comment numbers were assigned to oral testimony only where substantive comments were made.

Revisions, deletions, and additions to the text of the draft EIS have been made to address concerns where appropriate.

2. INDEX FOR COMMENTS AND RESPONSES

LETTER NUMBER	AUTHOR	AFFILIATION	TOPIC	PAGE # - LETTER	PAGE # - RESPONSE
1	Dale R. Harms State Supervisor	U.S. Fish & Wildlife Service	Wildlife	F-15	
2	Max Long Executive Director	Roundup Memorial Hospital	Socioeconomics	F-15	F-81
3	Steven M. Erb President	Huntley Community Club	General (Duplicate of Letter #39)	F-15	F-81
4	John Scott State Representative	Montana House of Representatives	General Socioeconomics Transportation	F-16	F-81
5		Fergus Electrical Cooperative	Socioeconomics Noise General Air Quality Transportation	F-16	F-81
6	Nicol Price	Huntley Community Club	Socioeconomics Noise General Air Quality Transportation	F-17	F-81
7	Ellen Pfister		Transportation Socioeconomics General	F-18	F-83
8	Don Golder		General	F-19	F-84
9	Jerry Thomas Executive Director	Montana Tradeport Authority	Socioeconomics	F-20	F-84
10	Nicol Price		General Socioeconomics Visual	F-20	F-84
11	J. Jay Erdie District Superintendent	Roundup Public Schools	Transportation	F-21	F-85
12	M.D. Brewer County Commissioner	Musselshell County	Transportation	F-21	F-85

LETTER NUMBER	AUTHOR	AFFILIATION	TOPIC	PAGE # - LETTER	PAGE # - RESPONSE
13	Monica J. Lindeen	Huntley Community Club	Transportation General	F-21	F-85
14	Monica Lindeen	Huntley Water District	Hydrology Land Use Transportation General	F-22	F-86
15	Cheri Kilby		Support	F-23	
16	Mike Kilby		Support	F-24	
17	Roberta Snider		Support	F-24	
18	Steven M. Erb		Land Use General Socioeconomics Transportation	F-24	F-86
19	Karla Snider		Support	F-27	
20	Richard D. Snider		Support	F-27	
21	Bruce J. Hoiland	Hoiland Ford, Inc.	Socioeconomics	F-27	F-86
22	Steve and Jeanne Charter		Hydrology General Geology	F-28	F-86
23	Hershel M. Robbins		Support	F-28	
24	Larry Lekse President	Musselshell Valley Chamber of Commerce	Socioeconomics	F-28	F-87
25	Pete Tully	Northern Plains Resource Council/Bull Mountains Landowners Association	Hydrology General Transportation Geology	F-29	F-87
26	Kelly Gebhardt County Commissioner	Musselshell County	Support	F-30	
27	G. Paul Smith County Sheriff	Musselshell County	Socioeconomics	F-30	F-88

LETTER NUMBER	AUTHOR	AFFILIATION	TOPIC	PAGE # - LETTER	PAGE # - RESPONSE
28	Sally J. Armstrong Mayor	City of Roundup	Socioeconomics	F-31	F-88
29	J. Jay Erdie	Roundup Public Schools	Socioeconomics	F-31	F-88
30	Alvin E. Mills		Support	F-31	
31	Don Golder		General	F-31	F-88
32	Don Golder		Hydrology General	F-32	F-88
33	Ellen Pfister		General	F-32	F-88
34	Diana L. Vanek	State Historic Preservation Office	Cultural	F-33	F-88
35	Murdo A. Campbell Administrative Officer	Montana Department of Commerce	General	F-33	
36	James A. Ziegler, Sr. Mike Matthew, and H. Elwood English County Commissioners	Yellowstone County	Socioeconomics	F-33	F-90
37	Douglas Richardson		Support	F-34	
38	Charles and Barbara Cropp		Air Quality Hydrology Wildlife Transportation General	F-34	F-90
39	Steven M. Erb President	Huntley Community Club	General (Duplicate of Letter #3)	F-35	F-90
40	Robert Knickerbocker President	Huntley Water and Sewer District	Socioeconomics General Transportation Hydrology	F-35	F-91
41	Robert E. Ochsner	Meridian Minerals Company	General	F-36	F-91

LETTER NUMBER	AUTHOR	AFFILIATION	TOPIC	PAGE # - LETTER	PAGE # - RESPONSE
42	James V. Pope		Noise Air Quality General Transportation	F-36	F-91
43	Larry Klinger		Hydrology	F-37	F-92
44	George and Eleanor Carlson		Support	F-37	F-92
45	Johanna Soennichsen		Support	F-38	
46	Al Landwehr		Support	F-38	
47	Ellen J. Lee Clerk/Treasurer	City of Roundup	Socioeconomics	F-39	F-92
48	Alan D. Evans Chairman	Musselshell County Republican Central Committee	Support	F-39	
49	Ray Bernsten Acting Suprvisor	Montana Department of Fish, Wildlife and Parks	General Wildlife Vegetation Recreation Socioeconomics	F-39	F-92
50	Dennis Johnson		Support	F-40	
51	Ed Kirby Weed Supervisor	Yellowstone County Surveyors Office	Vegetation	F-40	F-93
52	Alan Olson		Support	F-41	
53	Mary F. Brower		Support	F-41	F-94
54	543 Petitioners		Support	F-42	
55	Abe Horpestad	State of Montana, Department of Health and Environmental Sciences, Water Quality Bureau	Hydrology	F-42	F-94

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56	Francis R. Cherry, Jr. Associate State Director	U.S. Department of the Interior, Bureau of Land Management	General Hydrology Vegetation Wildlife	F-43	F-95
57	Don W. Cromer Supervisor	Montana Department of Transportation	Transportation	F-43	F-97
58	Nicol Price		General	F-44	F-97
59	Kimberly Mueller		General	F-47	F-97
60	Nicol Price Coordinator	Medicine Wheel Alliance/Associated with Northern Cheyenne Cultural Commission	Cultural	F-48	F-98
60A	Nicol Price Coordinator	Medicine Wheel Alliance/Associated with Northern Cheyenne Cultural Commission	Cultural	F-48	
61	Howard E. Zahller		Air Quality General	F-49	F-98
62	Donna Marsh		Support	F-49	
63	Chalentz A. McKown and 10 Petitioners		Transportation	F-49	F-98
64	Dale Marsh		Support	F-50	
65	JoAnn E. Mills		Support	F-50	
66	Talmadge Gee		General	F-50	F-98
67	Beverly Meged		Support	F-51	
68	Steve and Jeanne Charter		General Geology Hydrology	F-51	F-98
69	Steven M. Erb President	Huntley Community Club	General Transportation Socioeconomics	F-56	F-100

LETTER NUMBER	AUTHOR	AFFILIATION	TOPIC	PAGE # - LETTER	PAGE # - RESPONSE
70	Pete and Rhonda Tully		Hydrology General Wildlife	F-56	F-100
71	Donald E. Picchioni President	Musselshell Valley Development Corporation	Support	F-58	
72	R. Dennis Olson	Northern Plains Resource Council	General Air Quality Geology Hydrology	F-58	F-102
73	Wilbur Wood		Hydrology General Geology Transportation	F-59	F-103
74	David K. Zinke and David P. Becker	Washington Contractors Group, Inc.	Support	F-59	
75	Nick Janich		General Transportation	F-60	F-103
76	T.J. Mueller		Transportation General	F-60	F-104
77	Terry M. Holzer General Manager	Yellowstone Valley Electric Cooperative, Inc.	Support	F-61	
78	Ellen Pfister	Bull Mountain Landowners Association	General Geology Hydrology Recreation Wildlife Vegetation	F-61	F-104
79	Don Golder		General	F-68	F-109
80	Ella Dugan-Laemmle		General Socioeconomics Transportation	F-69	F-109
81	Elizabeth Woodson		General Transportation	F-71	F-109

LETTER NUMBER	AUTHOR	AFFILIATION	TOPIC	PAGE # - LETTER	PAGE # - RESPONSE
82	Monty L. Sealey Executive Director	Central Montana Resource Conservation and Development Area	Support	F-71	
83	Jackie Stearns		General Socioeconomic Transportation Hydrology Air Quality	F-71	F-109
84	Greg Pope		Opposition	F-73	

ORAL - TESTIMONY NUMBERS	SPEAKER	AFFILIATION	TOPIC	PAGE # TESTIMONY	PAGE # RESPONSE
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	Monica Lundeen		See Letter 13	F-74	
H-1 through H-14	Jackie Stearns		Air Quality Hydrology Transportation Socioeconomics General	F-74	F-112
	Steven Erb President	Huntley Community Club	See Letter 18	F-74	
	Nicol Price Coordinator	Medicine Wheel Alliance	See Letter 6	F-74	
	Roger McGraw		Transportation Socioeconomics	F-74	
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H-15 through H-22	Ellen Pfister		Transportation Socioeconomics General	F-74	F-113
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H-28, H-29	Esther Bengston Senator	Montana State Senate	Transportation General	F-75	F-113
H-30 through H-33	Greg Pope		Socioeconomics Wildlife	F-75	F-113
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	Al Evans		See Letter 5	F-75	
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H-64	Jim Cunningham		Transportation	F-77	F-115
H-65	Kim Mueller		General	F-77	F-115
H-66 through H-69	Darla Day		Transportation Socioeconomics	F-77	F-115
H-70	Dave Swyhart		Transportation	F-77	F-116
H-71	Unidentified Commentor		Transportation	F-77	F-116
H-72	Ella Dugan-Laemmle		General	F-77	F-116
H-73	Bonnie Lovelace	Montana Department of State Lands	General	F-77	F-116
	Monica Lundeen		See Letter 14	F-78	
	M.D. Bewer County Commissioner	Musselshell County	See Letter 12	F-78	
	David Shuler General Manager	Fergus Electric Cooperative	See Letter 5	F-78	
	Don Picchioni President	Musselshell County Development Corporation	See Letter 11 Support	F-78	
B-1	Nicol Price		See Letter 10 Air Quality	F-78	F-116
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B-5 through B-11	Ellen Pfister		Geology Hydrology	F-78	F-116
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B-17	Cal Cumin	Montana Tradeport Authority	Support Socioeconomics	F-79	F-117
	Doug Richardson		See Letter 37	F-79	F-117
B-18, B-19	Kim Mueller		Recreation	F-79	
	Jay Erdie		See Letter 29	F-79	
R-1	Mark Clark		Transportation	F-79	F-117
	Gary Amestoy	Montana Department of State Lands	General	F-79	
	Mark Clark		General	F-79	
	Robert Clark Representative	Montana House of Representatives	Support	F-79	

ORAL TESTIMONY NUMBERS	SPEAKER	AFFILIATION	TOPIC	PAGE # TESTIMONY	PAGE # RESPONSE
	Sally Armstrong Mayor	City of Roundup	See Letter 28	F-79	
	Ken Sanner		Support	F-79	
	Paul Smith Sheriff	Musselshell County	See Letter 27	F-79	
	Kelly Gebhardt County Commissioner	Musselshell County	See Letter 26	F-79	
	Pete Tully	Northern Plains Resource Council/ Bull Mountains Landowners Association	See Letter 25	F-79	
R-2 through R-4	Sue Olson County Commissioner	Musselshell County	Hydrology Visual Resources/ Esthetics Support	F-79	F-117
R-5 through R-8	Sanford Haugsdal Road Superintendent	Musselshell County	General Transportation Support	F-79	F-117
	Larry Lekse		See Letter 24	F-80	
	Hershel Robbins		See Letter 23	F-80	
	Jeanne Charter		See Letter 22	F-80	
	Larry Deschemaeker Board President	Fergus Electric	See Letter 5	F-80	
R-9	Corky McKown		Air Quality	F-80	F-118
	Don Golder		See Letter 31	F-80	F-118
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	Bruce Hoiland		See Letter 21	F-80	
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R-13	Monty Sealy		Socioeconomics	F-80	F-118
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	Gary Amestoy	Montana Department of State Lands	General	F-80	
R-16 through R-18	Steven Erb	Huntley Community Club	Transportation	F-80	F-118
R-19	Lavonne Rook		Socioeconomics	F-80	F-118

ORAL TESTIMONY NUMBERS	SPEAKER	AFFILIATION	TOPIC	PAGE # TESTIMONY	PAGE # RESPONSE
	Darrel Brewer County Commissioner	Musselshell County	General	F-80	F-118

3. COMMENTS ON THE DRAFT EIS

FISH AND WILDLIFE ENHANCEMENT
FEDERAL BUILDING, US COURTHOUSE
301 S PARK
P O BOX 10023
HELENA MT 59626

FWE-61130-Billings
M.45-(Informal)

September 16, 1992

Mr. Mike Da Silva
Environmental Specialist
Montana Department of State Lands
Capitol Station
Helena, Montana 59620

RECEIVED
SEP 17 1992
STATE LANDS

Dear Mr. Da Silva:

The U.S. Fish and Wildlife Service (Service) has reviewed the draft Environmental Impact Statement for Meridian Minerals Company's Bull Mountain Mine No. 1. The Service believes the document adequately assesses impacts of the proposed project on fish and wildlife resources and their habitats, including Federally listed threatened and endangered species.

We appreciate the opportunity to review the draft document.

Sincerely,

John F. Ward
For Dale A. Harms
State Supervisor
Montana State Office

cc: ARD, FWE, Denver, CO
Suboffice Coordinator, FWE, Billings, MT

DMC/jf

"Take Pride in America"

(2)

ROUNDUP MEMORIAL HOSPITAL
P.O. BOX 627
ROUNDUP, MONTANA 59072
(406) 323-2301

September 21, 1992

RECEIVED
SEP 22 1992
STATE LANDS

Mike Da Silva
Environmental Specialist
MT Dept. of State Lands
Capitol Station
Helena, MT 59620

Dear Mr. Da Silva:

As a concerned citizen of Roundup and the Bull Mountains and as the Executive Director of Roundup Memorial Hospital and Nursing Home, I feel that I have a responsibility to provide the following comments to you, concerning the DEIS for Meridian Minerals Company Bull Mountain Mine Number One prepared by the Montana Department of State Lands, August 1992.

Although the DEIS does some assessment of the economic impact on Roundup and Musselshell county, it seems to underplay the true importance and impact to the community's economic status. Based on the assumptions provided on page IV-4 Musselshell County would end up with an in-migration of 14 new employees with a total population increase of approximately 43 new residents.

The DEIS, page III-33 states that there has been a decrease in the available labor force and the absence of any new employment opportunities. Page III-34 projects little or no economic expansion for the future.

Health care services within the county is a major source of employment, the hospital and nursing home currently have a payroll of approximately 1.2 million dollars. Recruitment of health care professionals and other professionals into the community has historically been difficult. One of the reasons is that there is no opportunity for employment of the spouse. It is unreasonable to assume that the addition of approximately 300 jobs within the county would not improve the ability to find suitable employment for the spouse of Registered Nurses, Certified Nurse Aides, Medical Technologists and a multitude of other critical professions within the health care field. 2-1

Emergency transport with in the county must be addressed whether Alternative I is approved or not. With the approval of Alternative I increased economic improvement and taxation will occur which will provide the necessary funding to continue to keep this essential resources within our community.

Continued provision of quality health care to the Musselshell County residents must be a goal that is high on the priorities of those interested in the socioeconomic status of the community. Increased economic stability, increased property valuation and availability of an increased labor force will all contribute positively toward this goal.

The approval of this project provides a major opportunity to address the many needs of this community, jobs, tax relief and improved business climate. These are high concerns to all of us with in the county and within the state. I urge you to select Alternative I, and move forward toward a progressive future.

Very truly yours,

Max Long
Max Long
Executive Director

(3)

RECEIVED
SEP 22 1992
STATE LANDS

HUNTLEY COMMUNITY CLUB, HUNTLEY, MT 59037

September 22, 1992

Dennis Casey, Commissioner
Mike DaSilva, Environmental Specialist
MT Dept of State Lands
Capitol Station
Helena, MT 59620

RE: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR MERIDIAN MINERALS COMPANY'S, BULL MOUNTAINS MINE NO. 1 AND HUNTLEY LOAD-OUT FACILITY.

Dear Mr. Casey:

The Huntley Community Club/Environmental Committee would like to request of you a 30-60 day extension on the comment period for this document.

The reasons for this are:

1. We are a local grass roots group whose main concern until 1990 was taking care of the Barkemeyer Park. Since then, Meridian Minerals was allowed by MT Dept of State Lands to use this Community for its temporary load-out facility. Shortly after the load-out was in operation the HCC/EC was formed to address the concerns of the Huntley Community and surrounding area, regarding the load-out.

2. Since the Community of Huntley was not on the original list of communities to even have a scoping meeting planned for it, this Community had to go to the MT Dept of State Lands and request a meeting, which was held after the closing dates to even comment. All ready this Community was being treated as a write off in this project and yet has the most to lose in its quality of life. Because of this meeting and subsequent meetings sponsored by the Huntley Community Club the Draft EIS that was supposed to be out in the Fall of 1991, has now just been released. A WHOLE YEAR LATER! 3-1

3. Since this Community Group does not have the expertise at our disposal, that both Meridian Mines and MT Dept of State Lands does, we wonder WHY we are expected to assess this document in 30 days. We are sharp, but not that sharp!

4. For these reasons we are requesting an extension of time for us to be able to find the experts that can help us review this document so that our comments will be valid comments and will stand up to an appeal, if needed. We think this is the only fair thing that you Mr. Casey can do to make sure that our Community is just not railroaded into a load-out facility that is only being placed here because Meridian Minerals doesn't want to spend the time nor the money to address another site location and its impacts. To date this group HCC/EC does not feel that the Montana Environmental Protection Act has been adequately addressed.

Sincerely,

Steven M. Erb

Steven M. Erb, Pres.

Dennis, I feel the comment period should be extended to the full sixty days to provide full opportunity to the public to provide substantial oral and/or written comments on the draft EIS to guarantee these and many more issues have been adequately addressed and there are no errors or assumptions. 4-6

Sincerely,

John Scott

John Scott

(4)

The Big Sky Country

MONTANA HOUSE OF REPRESENTATIVES

REPRESENTATIVE JOHN F. SCOTT
HOUSE DISTRICT 97
HELENA ADDRESS
CAPITOL STATION
HELENA, MONTANA 59620
HOME ADDRESS
PO BOX 78
BIG TIMBER, MONTANA 59011

RECEIVED
SEP 22 1992
STATE LANDS

COMMITTEES
AGRICULTURE, LIVESTOCK & IRRIGATION
BUSINESS & ECONOMIC DEVELOPMENT
FISH & GAME

September 22, 1992

Montana Department of State Lands
Dennis D. Casey, Commissioner
1625 Eleventh Avenue
Helena, Montana 59620

Dear Dennis:

I am writing to request an extension on the comment period on the draft environmental impact statement on Meridian Minerals Company, Bull Mountain Mine #1. There are four reasons I feel you should grant an extension on the comment period: 4-1

1. Within the draft environmental impact statement proposed actions, there is reference to a Montana land use agreement. Without a copy of this agreement it is impossible to comment at this time. 4-2

2. Public safety does not seem to be an issue within this draft: to merely say potentially increasing the number of accidents or increased exposure between mine related traffic and school buses could increase the chance of an accident is inadequate considering there are five school systems operating buses in the affected area. I firmly believe that it will increase the chance of an accident or fatality. 4-3

3. Ambulance service obviously was not adequately addressed. If it had been, the Worden Ambulance which is the primary first responder service for Huntley and west to Shepherd road would have been mentioned. Shepherd also has a Q.R.U. (Quick Response Unit) serving Highway 312 to Dover Road. 4-4

4, Thirty-five days is not adequate time to address these issues, nor does it give the communities involved the time to research their legal options. 4-5

(5)

FERGUS ELECTRIC COOPERATIVE INC.

HC 85 BOX 4040 • LEWISTOWN MT 59457-9402 • PHONE (406) 538-3425

MERIDIAN COAL MINE EIS HEARING

Ladies and Gentlemen:

I'm here representing Fergus Electric Cooperative's Board of Directors and wish to speak in support of the Meridian Bull Mountain Mine #1.

Fergus Electric is headquartered in Lewistown, Montana and provides electric service in 13 counties in Central Montana. The Cooperative selves primarily rural farm-ranch operations.

The small communities of Winnett, Grass Range, Roy, Winifred, and Hilger are also part of the system. As with most of the electrical cooperatives in central and eastern Montana, Fergus Electric's density (members per mile of line) is very low and growth is minimal.

Fergus Electric Cooperative will be the power supplier for the Meridian mine that is being developed in the Bull Mountains south of Roundup. The Mine will provide Fergus Electric with an additional 10 to 12 megawatts of energy sales, which will double our system's summer peak. A load of this size and duration lends stability and economic support to the Cooperative. 5-1

The economic development associated with the mine will provide Musselshell and Yellowstone counties, as well as the State, much needed revenue. Opportunities will also be available for the development and growth of satellite businesses associated with the mine.

Due to the loading of rail cars, some residents of Huntley have expressed concern over the truck traffic and associated dust. The Fergus Electric Board appreciates this concern and feels that mitigation efforts could satisfy these problems. Again, this delivery system would only be utilized while the rail link to Broadview is being constructed.

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"OWNED BY THOSE WE SERVE"

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Dennis Casey, Commissioner
Mike DaSilva, Environmental Specialist
Mt. Dept. of State Lands
Capitol Station
Helena, MT 59620

Comments on the Draft EIS for Meridian Minerals Bull Mountains Mine No. 1 and Huntley Load-Out Facility for Public Hearing Sept. 22, 1992.

First off I would like to Thank You for holding a hearing in Huntley, something that was not scheduled during the scoping process. This Community and surrounding area will, according to the Draft EIS be moderately to significant impacted in many negative ways, Coal Hauling on 312E, Coal Hauling down Heath Street, Noise pollution, Dust Pollution, Quality of Life impacts and as far as I could determine, this Community will not receive any of the benefits, including tax dollars. Our Quality of life will be impacted significantly over a three year period OR LONGER, so an industry that evidently must live on a shoe string budget can get on its feet, so to speak. 6-1

I would like to address both the Huntley Load Out Facility and the Noise Pollution from this facility.

Areas that I feel were not adequately addressed in this Draft EIS is the considerable noise pollution that will go along with this operation. We live in a QUIET Community. At night we can hear the trucks going down the Highway. The echo levels in this valley are high, because of the River and how we are situated in the hills. We sleep with our windows open in the spring, summer & fall, an on a very few nights when alot of trains go through at one time, is the only time there is any noise. I request that you stay around after the meeting till the cars are gone and listen to how Quiet it is. 6-2

NOISE POLLUTION

Noise is listed in this document as an unwanted, unpleasant sound. I consider the crashing of railcars a noise, I consider the beeping of equipment when it backs up, noise, I consider trucks gearing down or up, Noise. I consider the augers rumbling, Noise. 6-3

Yet in this document the noise levels for equipment working at

the mine, (page IV-39) construction equipment, conveyors, dumping of coal into bins, trucks and rail cars the noise levels would range from 80-85 dBA and acceptable outdoor levels would decrease to 50-55 dBA at 4500 feet from the proposed site. 6-4

Yet on page III-31 this same document states construction equipment noise levels would have a range of 72 to 95 dBAs and go down to levels of 40 at 4,500 ft.

In figure III-5 a quiet rural nighttime reading is 25dBAs.

On page III-33 this document states "noise levels have not been measured in the area of \Huntley but can be approximated from traffic levels on roads. Road traffic I'm sure does not compare to rail traffic or the loading of railroad cars for 16 hrs at a time. Why were not noise studies done? 6-5

I would like to refer again to page IV-41 and impacts to noise due to construction and operation in Huntley. Quote " during construction period, construction equipment noise levels would range from 55-60 dBA at 1000 ft and decrease to ambient levels at 3000 ft. Noise sources associated with operation of the loadout would include arrival and departure of trucks and trains, operation of a conveyor belts, dumping coal into the dump bin, dozing the pile and loading railroad cars. Noise levels within 100 ft would range from 80 to 85 dBA. Yet noise levels to the nearest residence, 500 ft away would drop to 55-60.

Its interesting that in Huntley, where sound carries the noise levels will drop all those dBAs and yet up at the mine it takes 4500 ft to do the same thing. The Community of Huntley and most housing is within 3000 ft of the load facility planned. 6-6

Montana Dept of State Lands concludes that impacts to Huntley Area from the generation of noise due to the construction and operation of the Huntley Load-Out would be MINOR TO MODERATE OVER THE SHORT TERM, AND NEGLIGIBLE OVER THE LONG TERM. The term here is 3 to 4 years. To this Community there is no short term. This Community and surrounding area will get these levels, whatever they are, 340 days a year, 24 hours a day, and when trains are loaded out every three to four days, a 16 hour crash banging and all other associated noises. THIS IS MINOR? YOU HAVE GOT TO BE KIDDING. 6-7

HUNTLEY LOAD OUT FACILITY

I for one am very disappointed to not see any new base line data on the other 4 proposed sites for the load out facility. It appears to me that the data used is still the same old figures submitted by Meridian Minerals Company in april of 1991. Why has not the Dept of State lands done its own analysis of costs figures for at least four proposed sites. 6-8

To bring the audience up to date on what the Huntley Load-out Facility will be, here are some figures.

A coal stockpile, and 1/8 mile long, 200 ft wide and 25 ft high, (1.1 million tons), a 50-ton hoppered product bin, a medium capacity radial stacker using a 250 ft belt conveyor and flexible chute, a 375 foot reclaim tunnel, and a 25 ft by 100 ft belt conveyor and flexible chute, a mobile trailer for temporary office facilities, an existing 20 ft well to furnish 30,000 gallons of raw water for equipment washdown, service water for machines and dust control, 115 car unit train with 5 engines and a caboose, a waste water pit and a 8 ft high fence.

The Agency concludes that impacts to visual resources/aesthetics in Huntley from the Huntley loadout would be major and significant in the short term.

The analysis that was done by Mike DaSilva in Jan. of 1992 lists the review team as, Bob Ochsner, MM, Mike Dasilva, DSL, Anne Cossitt, GeoResearch. Sites were evaluated based on existing site conditions and facilities, environmental and safety considerations and economic factors. Haul Route consideration were secondary, but costs of route upgrading and haul distances were considered.

I look at this as Human Life to be secondary to economic factors for Meridian Mines. Data used for figures were again the april 1991 correspondence of Meridian Mines.

Huntley is still listed as the most advantageous because it would cost MM only $135,000 to start up. In checking with equipment companies they felt this figure was low, unless they planned to use surplus equipment. The other factor here is what was MM planning to do as far as the load out facility in april of 1991. I do not feel it is what is proposed in the draft EIS to date. 6-9

The only disadvantages listed is its relatively close to the town

of Huntley and within a quarter mile of a low development subdivision.

Now I would like to have you listen to other site evaluation.

Acton-disadvantages-located within Acton, there could be community impacts from the site. Residence and bar are located with the direction of prevailing winds.

Commanche-disadvantages-there may be some potential impacts on residences.

Broadview-disadvantages-Broadview school and the majority of the town population are located directly opposite tracks and in the prevailing wind direction.

Lavina-disadvantages-due to the proximity of the town, there is potential community impact.

Mossmain-advantages-there is sufficient siding, power and water available, the area is currently disturbed and used for stockpiling, the site is situated so that prevailing winds are not likely to impact residence, estimated cost $330,000. This does have the longest haul route.

Disadvangtages-this site is farthest from the mine (52.1 miles to Huntleys 47) although almost all is on paved highway and interstate. Operational costs for truck hauling would be greatest at this site.

The Montana Dept of State Lands needs to address alternative sites with a more comprehensive analysis then has taken place here. Its still going along with "WHAT MERIDIAN WANTS! MERIDIAN GETS" and the people of Huntley and surrounding community can just learn to live with it. 6-10

You the Dept of State Lands need to do studies on Wind Direction for the Community of Huntley and NOT USE base line data from Billings. We are different. 6-11

You the Dept of State Lands need to do studies on the Huntley Water Supply and how our city well will be effected by 30,000 gallons of water being pumped when the Community of Huntleys well only produces 18,000, and the law suit that was filed against Huntley on its well and the added cost to the Community water 6-12

page 5

users.

You the Dept of State Lands need to do studies on the Noise Pollution that will ingolf this Community throughout the 3 to 4 year period you are asking us to live with this facility. 6-13

You need to address all traffic that uses not only Heath Street but Northern Ave to the load out facility. I found no assessment of traffic coming from the east going west and a blind corner on heath street and northern ave. 6-14

The Social Impacts and survey done of this community should have been printed in this document along with a list of the people contacted. The survey was used to show that 90% of the people of Huntley were surveyed, but alot of people in the phone book that would be listed under Huntley are not Huntley Proper residents. Therefore your figure of 43% may be incorrect. 6-15

In every since of the word the beet facility in Huntley is only here from Oct to Jan. We don't consider that a big industrial site and truck hauling is maybe for only a month and the trucks for this come and go from the interstate not 312. In this document the industrial site is made to sound like we have both Billings Grain Terminal and Western Sugar right in our backyard.

Therefore, I must add my voice of disapproval to the Montana 5-year permit to mine coal, a disapproval to the Montana Land Use Agreement for the operation of the Bull Mountain Mine No. 1 and its associated support facilities. A disapproval of successive amendments of the Montana permit to mine coal, a Montana coal lease, a federal permit to mine coal and a federal surface use permit for future life-of-mine development.

I also feel that part japanese ownership of this mine needs to be addressed to its consequences to the Montana Coal Industry and what effect this would have on the railroad spur. 6-16

Sincerely,

Nicol Price

Nicol Price
meeber of the Huntley Community Club/Environmental Committee

(7)

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Draft Environmental Impact Statement Comments
Meridian Minerals Bull Mountain Mine No. 1
September 22, 1992
Huntley, Montana
By Ellen Pfister
926 Yale
Billings, Montana 59102

Tonight I would like to talk about the public subsidy to this mine for the transportation during the first three years of mine life, and to once again raise the questions of public safety on some of these roads.

To start with the Northern end of the transportation corridor, Meridian proposes to use the Fattig Road for a mile and a half. Fattig Creek Road is currently as described in the DEIS; however, the gravel surface on the road is crushed native sandrock, which would pulverize under the size tractors and trailers they propose to run over it. To haul 35 to 40 tons of coal per load, will require tractor, trailer, and pup combinations of the size that one sees Empire Sand and Gravel put out onto 312--trailer and pup combinations that cost $100,000 per unit. 7-1

Meridian is apparently going to stand the cost of repairing the damage it does to Fattig Creek Road both from its traffic, and future mining activities. DSL should know that more than one house is going into Hidden Spring Subdivision immediately adjoining the mine plan. The mile and shelf of Fattig Creek Road Meridian uses, will need constant maintenance and a better caliber of gravel than is immediately available for a close haul. With the kind of traffic proposed, Meridian could keep one road grader busy on the stretch of road that it uses. Where will the gravel come from, and who will pay for it? 7-2 7-3

PM Mine currently has a slightly longer private road which it uses that joins a short length of Fattig Creek Road just before it intersects with Old Divide Road. Why has Meridian decided NOT to use the current mine access road? Using the PM Road would mitigate the impact for a short distance, and put maintenance costs where they truly belong. 7-4

Old Divide Road is a former U.S. Highway, now a Musselshell County Road. It currently has a highly patched paved surface. Within a week after Meridian started hauling coal from the test pit, the stretch from Fattig Creek Road to its Southerly intersection with current U. S. 87 broke up on the loaded hauling lane in whole sections--not just an occasional chuck hole. It reverted to a semi-paved gravel road. It was not satisfactory with the residents along the road. If this Hauling plan is proposed, Musselshell County will probably have to redo the road bed to stand the heavier traffic, in addition to paving it. A serious rebuild, even without shoulders added to the road, could run as high as two hundred thousand dollars a mile. Meridian proposes to use approximately 5 miles of Old Divide Road. Musselshell County could be looking at a million dollars to rebuild the road, or shotguns from the residents if it does not. 7-5

The Southerly end of Old Divide intersects U. S. 87 on kind of a downslope. It is a dangerous intersection on snowpacked ice conditions, if the senders have not yet made it out. 7-6

The addition of shift change traffic coupled with the coal truck traffic should make this an interesting intersection. 7-7

To add to the U. S. 87 mix of traffic is a new subdivision, Cedar Ridge North, beginning at Mile Marker 25 on U. S. 87, and extending South along U. S. 87 about 3 miles, in some cases on both sides of the road. People are apparently buying lots, drilling wells, and moving in. I don't know if the roads within the subdivision are accepted for maintenance by the county. It would be a handy subdivision for potential mine workers. If that became the case, school bus routes would then come further up U. S. 87 from Shepherd, because Cedar Ridge North is in the Shepherd School District. Cedar Ridge North is one of the 20+ acre subdivisions allowed under Montana law. Another one is being planned in Section 25, T 5 N, R 27 E, which would exit from the East on County Line Road to U. S. 87 at mile marker 25. 7-8

What would it cost to build a raised cross walk over US 87 for the school children at Independent School? Increased shift traffic would be coming about the same time as the children, in addition to the constant coal truck traffic. The increased cost to maintain school children's safety would be another public subsidy to Meridian. 7-9

312 used to be a US highway like 87. When the Interstate was completed US 312 became simply 312. According to State Senator Esther Bengston, it is an "orphan highway". The Federal Government says it is unnecessary. The State will not hang a Mt.312 sign on it, the way they do on Mt. Highway 3 to Levina. Yellowstone County can't afford it. They are pulling back from road maintenance expenses any chance they can. Just ask the residents of some subdivisions who thought they had county maintenance on their roads. So we have ten miles of road carrying three times the amount of traffic currently of any other road involved in the transportation corridor. It carries a very high percentage of car and light truck traffic. About the only heavy trucks it carries come from the Empire Sand and Gravel, grain trucks coming off the Interstate at Huntley to Shepherd feedlots, and local haul cattle trucks. 7-10

312 currently has no shoulders on it, and the road bed is again beginning to heat out where most wheels meet the road. I have had one breakdown on 312 at evening rush hour, and it is a very scary experience. No one will stop, and there is no shoulder to get out of the line of traffic. According to Senator Bengston, to rebuild a road like 312 with shoulders would cost 275,000 dollars per mile, for which no public entity wishes to stand responsible. The addition of Meridian's coal haul traffic would materially increase the speed of deterioration of 312 and substantially decrease the safety of the traveling public. 7-11

The people at the State Highway department may have counted vehicles on 312, but apparently did not observe traffic patterns. To

qualify myself as something of an expert on driving 312, in the last 20 years I have made somewhere over 3000 round trips from the ranch to Billings, including 312 from the Shepherd intersection to US 87. I have never had an accident. However, in the last two years my number of near misses have substantially increased, usually due to people turning into businesses on 312 without turn signals or brake lights. 7-12

I am attaching to my testimony a list of businesses and dangerous intersections from Huntley to US 87. They average approximately 7 per mile, which does not include numerous other intersections as well. 312 also carries a good many elderly drivers from the Huntley-Worden area, as well as many young drivers at Shepherd headed for the video store on 312, or coming to or from football games and other activities at the Shepherd school. Adding an increasingly heavy number of coal trucks to this mix is a prescription for some bad accidents to happen.

Does Meridian plan to contract with a trucking firm to haul its coal, or will they be independent contractors? Does Meridian plan to insulate itself from the liability effects of hauling its coal over the public rights of way? 7-13 7-14

Contracting with gypsy truckers would be the absolute worst for public safety, especially if Meridian is planning on a five hour turn around time per trip. Most of the time such a turn around time will be in their dreams, regardless of who trucks. If the costs which Meridian gave at a public meeting in January 1990 were accurate, only gypsy truckers would sign the contract, because a reputable firm could not pay for its equipment at those prices.

To rebuild 312 to a reasonably safe standard would cost in the vicinity of three million dollars. According to the DEIS, no one agency would admit to having that kind of money available to spend on the project. If the users of 312 can get help from no one else, I would suggest going to the legislature to seek authorization for a toll road--or some form of redistribution of the diesel fuel tax to at least help pay for repairs. Otherwise the public somewhere somehow is going to subsidize Meridian's use of 312. I hope no one pays with his life, for then it becomes a very expensive subsidy indeed.

One final question--if Meridian fails to sell sufficient coal to support building the railroad, will Meridian be permitted to continue on this haul route for an indefinite period of time? The DEIS takes Meridian's plans as a fait accompli, but DSL should remember that "The best laid plans of mice and men often go awry." When DSL deals with public funds and public safety, they should consider that a failure to make sales as planned is a real possibility. 7-15

List of Businesses and Dangerous Intersections
Highway 312--Yellowstone County, Montana
Huntley to U. S. 87 Intersection
September 22, 1992

1. Mini-storage business
2. Reile Veterinary Clinic
3. Shepherd-312 Intersection
4. Jim's Barber Shop
5. Galaxy Video Shop
6. Countryside Superette and Gas
7. Our Place Cafe
8. Project Meat Service
9. Country Castle Child Care
10. Dog Training Kennel
11. Hideaway Bar, Cafe and Bowling Alley
12. Big Sky Propane
13. Country Gardens
14. Power Sub-station
15. Five-Corners Intersection
16. Quickway--groceries and gas
17. Corral Bar
18. Oil Field Supply
19. Mini-storage (Hager's Old Egg Farm)
20. Green Acres Produce
21. Belaro Speedway
22. Empire Sand and Gravel outlet
23. Big Sky Second Hand
24. Vashler's Frame Shop
25. Kremar-Crowder Horse Ranch
26. Used Car Lot
27. Trader Sannon-used anything
28. 312 Used Cars
29. Ellis Auction Barn
30. Thunder Ridge Kennels
31. D's Insulation and Lumber yard
32. Jubilee Chapel
33. Pyramid Baptist Church
34. Whispering Pines Baptist Church
35. OxBow Subdivision outlet--especially dangerous with left turns
36. OxBow Subdivision outlet
37. Dover Road Intersection--primary exit for Empire Sand and Gravel
38. Magic Mill
39. Zentz Lumber---quite a few bad left turns
40. Intersection with US 87. Intersection designed to funnel traffic into Billings, not designed to funnel heavy truck traffic East. Intersection should be rebuilt and re-signaled.

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Comments on Meridian Minerals'
Bull Mountain Mine No. 1
Draft Environmental Impact Statement
By Don C. Golder
P. O. Box 1705
Billings, Montana 59103
Huntley, September 22, 1992

The Meridian Minerals Representative in a taped interview in January 1990 gave a cost of $314,000 to haul 125,000 tons of test pit coal from the proposed mine site to Huntley, ecualling a cost of Two Dollars and Fifty-one cents per ton.

125,000 tons delivered to Huntley at 37½ tons per load=3333 trips.

37½ tons per trip @ $2.51 per ton = $94.12 per load divided by 41 miles =$2.29 per loaded mile or $25.00 per hour (2 hour round trip, mine to Huntley).

Cost of driver @ $12.50 per hour leaves $34.56 to maintain truck per hour.

Average fuel consumption @ 4 miles per gallon of deisel x 41 miles = 10 gallons.

10 gallons @ $1.10 per gallon = $11.00, leaving $23.56 per hour.

2. The DEIS projects 45 truck drivers. Figuring on a 40 hour week per driver = 1800 man hours per week. A 2 hour round trip, hauling 40 tons of coal on a set of doubles would result in 900 trips per week to load out three unit trains totaling 36,000 tons per week shipped.

900 trips per week = 150 trips per day on a 6 day work week or 6.25 trips per hour. Maximum capacity at these figure would be 1,872,000 tons shipped annually.

Contracting trucks at $72.00 per hour @ 1800 hours = $129,600 weekly or $6,739,200 annually.

3. 33% of this estimate would approximate 1 train load a week.

33% of freight costs would be 2,273936.00 per year.

14.4 mile haul down Rehder Coulee and on into Roundup on U.S. 87 is 35% of the distance of the Huntley Route. The

Northern Plains Resource Council

The Bull Mountain Landowner's Association, an affiliate of the Northern Plains Resource Council (NPRC), feels there are serious problems with the permit application of Bull Mountain Mine No. 1 *as it is currently proposed.* In light of this fact we have developed a list of conditions we feel must be implemented if the mine is to be permitted. These conditions have the full support of NPRC.

MINIMUM REQUIREMENTS FOR PERMITTING THE BULL MOUNTAIN MINE NO. 1

1. Realistic performance bonds and a permanent trust fund to cover the full costs of restoring water resources likely to be disrupted by mine subsidence both on-site and down through tributary drainages.

2. Realistic performance bonds and a permanent trust fund to cover the full costs of stabilizing slopes and controlling subsidence-caused erosion

3. Disapproval of interim coal hauling by truck to Huntley as a threat to public safety. Require coal transportation from the outset to be by conveyor, built down Halfbreed Creek to Roundup and then by a common carrier rail spur built from Roundup along the old Milwaukee right-of-way to the mainline at Cushman.

4. A state-of-the-art covered tipple for the coal loadout.

5. Formal and adequate notice given to interested parties on development and revisions of permit requirements.

Persons interested in adding their support for adoption and enforcement of these mine permit conditions please contact the Montana Department of State Lands, Capital Station, Helena 59620 or the NPRC office at (406) 248-1154.

419 Stapleton Building Billings, MT 59101 (406) 248-1154

freight bill per unit train would be 778,277.00, a savings of 1,445,559.00. How much track would that lay on the existing railroad bed from Roundup to Cushman.

4. The use of public roads for coal hauling would be reduced by 75%. The cost of repair, not to speak of rebuilding, to public roads would be likewise reduced. Traffic hazard exposure would probably decrease by 90%, especially when you figure that the majority of traffic and school bus stops is on 312 East from Billings.

5. If Meridian is in earnest about developing the Bull Mountain Mine, their capital expense, their permanent installations would be the construction of a coal silo and train loading facility at Roundup and the laying of railroad track from there West to Cushman on existing right of way. The way it now stands, Meridian has virtually no major capitol investment beyond the mine mouth. This would eliminate the construction of 32 miles of new railroad from the mine mouth to Broadview. At their estimated figures rail line is still costing a million dollars a mile. Those were current figures twenty years ago. 8-1

6. If Meridian's mine does prove successful for them, they then could invest in a conveyor belt or high volume air tunnel to move the coal into Roundup. This is also the direction in which the coal deposit lies. At the end of the life of this mine, the equipment could be removed with virtually no scars on the land. The railroad grade to Broadview would leave a permanent scar.

Montana TRADEPORT Authority

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September 22, 1992

Mike DeSilva
Environmental Specialist
Montana Department of State Lands
Capitol Station
Helena, MT 59620

Dear Mr. DeSilva:

We have reviewed the Draft EIS for Meridian Minerals Company Bull Mountains Mine No. 1, and we are in general consensus with the socio-economic impact findings noted therein.

We do feel, however, that the employment of upwards of 300 people in a basic industry in a rural area of Montana merits more than "minor" impact (Table IV-5). The same can be said for your summary statement (page IV) that under Alternative 2 (denial) there would be only negligible to moderate impacts. The non-creation of approximately 300 primary industry jobs in rural Musselshell and Yellowstone Counties, when the opportunity therefore exists within environmental constraints, needs to be considered a major, negative impact. 9-1

Thank you for the opportunity to provide comment.

Sincerely,

Jerry Thomas
Executive Director

115 North Broadway, Suite 200 • Billings, Montana 59101-2043 • Ph. (406) 256-6873 • FAX (406) 256-6877

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Dennis Casey, Commissioner
Mike Dasilva, Environmental Specialist
MT Dept of State Lands
Capitol Station
Helena, MT 59620

Comments on the Draft EIS for Meridian Minerals Bull Mountains Mine No 1 and Huntley Load-Out Facility for Public Hearing Sept. 23, 1992

I would like to thank State Lands for holding these public hearings and giving all of us a chance to speak. I spoke at the hearing last night in Huntley on Noise Pollution and the Huntley Load Out Site and its non-analysis. Tonight I would like to address the Social and Economic Impacts to Huntley and the Surrounding Area and the Tax and Fiscal Responsibility of this Project. I would also like to add some mitigative measures for this project.

First off, last night we discussed the Regulations that govern an EIS and what that entails. Since I don't have a copy of all the MEPA regs I will use the NEPA regs. Which I'm told are very similar.

I do not feel this EIS follows the regulation set forth in NEPA for these criteria.

1. Use the NEPA process to identify and assess the reasonable alternatives to proposed actions that will avoid or minimize adverse effects of these actions upon the quality of the human environment. 10-1

2. Use all practicable means, to restore and enhance the quality of human environment and avoid or minimize any possible adverse effects of there actions upon the quality of the human environment. 10-2

3. Prepare analytic rather than encyclopedic environmental impact statements. Of which this document is. 10-3

Under NEPA 1502.14 (a) It states agencies shall: Rigorously explore and objectively evaluate ALL REASONABLE ALTERNATIVES, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated.

(c) Include reasonable alternatives.

(e) Identify the agency's perferred alternatives or alternatives if one or more exists.

(f) Include appropriate mitigation measures not already included in the proposed action or alternatives. 10-4

None of these have been done for this document. There are no analysis for the other load out sites, including Broadview, Acton, Roundup or Moessmain. A one day trip to look at all these various sites is not rigorously exploring information. There are no alternative routes shown and data to help the public and the Commissioner make a decision. There are no mitigative measures listed in this document for any of the impacts for the Huntley Site or Community. 10-5

In part 1502.14 (a) It states, and EIS shall include discussions of (a) direct effects and their significance and (b) indirect effects and their significance.

In the area of Social and Economic Impacts to the Huntley Community this is what is written:

A recent survey done in 1991 stated 90% of the respondents were aware of the coal hauling and load out and 43% responded they were affected. It states we value our quiet, rural environment with open spaces, clean air and diversity of wildlife. Thats it! No where do you analysis the Quality of Life, the economic depression to the community, the stress to mental health, the impacts to the elderly who reside here. 10-6

Under Visual Resources/Aesthetics: It states the scenic quality of this area has been substantially impacted by cultural modifications. What does that mean? That we have houses an a elevator? We still have the hills, river and farm ground we think of as special. A huge coal pile does not fit in with this scene. 10-7

In the area of taxation and fiscal responsibility there is very little information but what is there is interesting.

Cost to repair road 312 per year $38,654. the diesel fuel tax and GVW will total over a 2.5 yr $378,691. or $151,476. per year.

MM says payroll will be 10 million per year. 10M divided by 300 is $33,000. per year. This is a cheap work force since decker and coal strip pay 35,000 to 65,000 per year.

Taxes paid by MM will be 9M of which musselshell Co will receive 1.2M to the County and $1.7M to the Schools. Yet projections say most people will reside in Billings or surrounding areas.

Billings share of the tax will be $20,000.

Yet in this Draft the cost of just fixing 312 will total 1.3M to 2.0M because of increased maintenance and operations cost. It states that DSL conclude that impacts to the public sector fiscal conditions from mining related impacts would be minor and beneficial. Does not picking up the tab for rebuilding 312 to the tune of 2M seem more than minor? 10-8

I would like to offer some mitigation proposals since none were printed or mentioned in this document.

1. That the Load Out and Stock Pile be totally covered such as the facility at the Absaroka mine on sarpy creek.

2. There be an eight hour work day at this facility and truck hauling and rail car loading be done from 8 to 5 each day; weekends off.

3. There be a small engine used to pull the cars while being loaded.

4. The trucks used for hauling be of a distinct color, have governors on them so speed limits are obeyed and a phone number printed on the truck so if something does happen people could call. 10-9

5. A signal light put at the intersection of 87 and 312 junction.

6. The 4% severance tax that would be paid by Meridian be put into a special account ear-marked for the repairs and maintenance of 312. Which would equal $44,000. per year. Which over a three year period would equal $132,000. Not nearly enough for a 2 million dollar repair bill to 312.

7. That Meridian purchase land in the Huntley area out of the housing development to build itself a road to use for hauling instead of Heath Street.

8. That a yearly review team be set up of staff from DSL, MM and the Community of Huntley to review the permit each year and work out problems that may arise. The Huntley Load Out would only be permitted for three years maximum.

Sincerely
Neil Price
PO Box 37
Huntley, MT 59037

(11)

Roundup Public Schools

MRS. SYLVIA SHELHAMER
Trustee Clerk
Phone 323-1307

School Districts No. 55 and 55-H
P. O. Box 717
Roundup, Montana 59072

September 22, 1992

AY ERDIE
Superintendent of Schools
Phone 323-1307

W. CHERY, Sr.
School Treasurer
Phone 323-2402

ETTE PRATT
Assistant Superintendent
Phone 323-1513

ARY F. RAY
Operations Director
Phone 323-2400

Mike DaSilva
Environmental Specialist
MT Dept. of State Lands
Capitol Station
Helena, MT 59620

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SEP 28 1992
STATE LANDS

Mr. DaSilva,

This letter and text focus on the test burn coal hauling that began almost 30 months ago with the route traversing a segment of a school bus route on the southern boundary of Musselshell County, a route serviced by Roundup Public Schools.

During Meridian Minerals test burn coal hauling, beginning January 31, 1990 and concluding on October 12, 1990, a portion of the haul road used by the trucks on their way to Huntley railhead was part and parcel to Roundup Public Schools' most southern bus route, Route 3, which includes all of the Old Divide Road in general but in particular, that portion of the haul road where Old Divide Road intersects with U.S. Highway #87 to the south and PM Coal Road to the north. The time frame (days), spanning nine and one-half months, included two different school years, 56 days in the 89-90 school year and 18 days in the 90-91 school year, consequently, Bus #10 traveled its assigned route 56 and 18 days, respective of the two school years, on a portion of the haul road.

11-1

The window of time that Bus #10 would encounter any haul trucks was 13 minutes in the morning, 7:27-7:40 a.m., and, a like number of minutes in the afternoon, 4:18-4:31 p.m. In this time frame and the 74 school days of hauling, Bus #10 encountered a haul truck approximately five times per week on that portion of the haul road in question. This amounted to approximately 15% of the approximately 1,346 haul trips made during 74 days of school. The long and short of those five "meetings" per week resulted in no abnormal happenings by the haul trucks i.e., no unsafe or imprudent driving incidents, no broken windows, no near misses at bus stops, no equipment failure impeding passage, no congestion of traffic, etc.. The impact to the school bus traveling the approximate 3.3 miles, during this time frame, was uneventful.

In conclusion, should the permit be approved, we anticipate similar encounters occurring under the full mine operation.

Sincerely,

J. Jay Erdie, District Superintendent
Roundup Public Schools

cc File

ACCREDITED BY THE MONTANA STATE DEPARTMENT OF PUBLIC INSTRUCTION AND THE NORTHWEST ACCREDITING ASSOCIATION

Bull Mountains Mine No 1-Draft EIS
Public Hearing, Huntley MT 9/22/92
Monica J Lindeen
Huntley Community Club Board Member
Huntley Water District Board Member
Huntley Resident

(13)

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STATE LANDS

The Huntley Community Club, and other concerned members of the community, would like to take this opportunity to express our formal position regarding the consideration of Meridian Minerals' proposed coal load-out site in Huntley. The HCC is not opposed to industrial economic growth in the state of Montana. However, we are opposed to growth which would have a decidely destructive effect on the quality of life in the Huntley area, in both human and non-human terms. The impact that the proposed load -out site would have on the quality of life, on both environmental and human terms, would indeed be destructive. Meridian Minerals' proposed coal load-out is just that-a severe impact to human and environmental safety, not only for the residents of Huntley, but for neighboring communities as well.

The HCC feels strongly that Meridian Minerals could choose an alternative load-out site which would dramatically decrease the impact to public safety. An alternative could slightly increase the cost of doing business for Meridian, but we feel that the cost of natural and human life is far more important than the cost of doing business. The conservation of ecology, both natural and social, should take precedence over corporate greed. Corporations continue to complain to government that they can not afford the costs of doing business, but data from government agencies like the Internal Revenue Service prove otherwise.

13-1

Consider, if you will, the total U.S. income taxes collected during the 1950's. The individuals' share totaled 61%, while the corporate share stood at 39%. Then in the 1980's, Regean's "trickle-down" economics came in to play and the numbers changed dramatically. Now, in the 1980's, the individual's share rose to a dramatic 83%, while the corporate share shrunk to just 17%. In other words, taxes paid by corporations increased 264% from the 1950's to the 1980's, and during that same period, tax payments by individuals soared 1,041%. And if you consider that mining has been given nothing but tax breaks in the state of Montana, we say that Meridian can afford a slightly more costly alternative. How long will we continue to allow the "corporate will" to dictate for the public what is best in regards to our own safety and quality of life? We say the time to end this corporate dictatorship is now!

We have played by the rules and standards of the power elite long enough. We were led to believe that if we were only patient,

(12)

JANE L. WANG
Clerk & Recorder
MARY C. NELSON
Treasurer
Supt. of Schools
Assessor
D. PAUL SMITH
Sheriff
VICKY SNYDER
County Attorney
DONA C. ADDISON
Clerk of District Court
JOHN RAE
Coroner
COLETTE V. MADISON
Public Administrator
ROBERT E. MINEAR (DECEASED)
Justice of the Peace

County of Musselshell
ROUNDUP, MONTANA

BOARD OF COUNTY COMMISSIONERS
BREWER
NELSON
EBERHARDT

September 23, 1992

Mr. Mike DaSilva
Environmental Specialist
Montana Dept. of State Lands
Capitol Station
Helena, MT 59620

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SEP 28 1992
STATE LANDS

Dear Mr. DaSilva:

The Musselshell County Commissioners would like to go on record in general agreement with the review and assessment of the impacts to the integrity/stability of county roads as stated in the transportation section of the Bull Mountain Mine No.1 DEIS.

Over the past two years, the Commissioners have had the opportunity to review the twenty odd volumes of mine permitting documentation and tremendous amounts of related correspondence, and have attended numerous public meetings related to this project. We recognize that all this has been considered in reaching conclusions about potential impacts.

We Commissioners have been asked, occasionally at related public meetings, how we intend to address the impacts, particularly to Old Divide Road. While this is beyond the scope of this DEIS, for your information, the Commissioners are assessing the potential damage, based upon test pit hauling, conducting discussions with company officials, and looking at financial options such as Coal Board impact funds and increased tax revenues to deal with the issue. We are confident that our planning efforts will help mitigate the impacts in a reasonable manner.

12-1

Thank you for this opportunity to comment.

Sincerely,

M. D. Brewer

M. D. Brewer, Chairman
Musselshell County Commissioners

and played an active role in the EIS process. compromises which were satisfactory to both sides could be worked out Obviously we, the public, were lied to once again This became evident to us after reading the none to cleverly concocted draft EIS We find the draft to be vague, shallow, and unacceptable.

We would also like to take this opportunity to present eight conditions we feel must be implemented if the mine is to be permitted.

1. We would like to see Meridian's transportation route re-routed off of Heath St.
2. We want to see that funds are set aside specifically for maintenance and repair of Highway 312 and any other roads on the route which will be eventually decided on.
3. We want to ensure that the load-out does indeed include the Best Available Controlled Technology (BACT) which Meridian has been promising us from the very beginning.
4. We insist that coal transport be shut down during school bus transportation hours.
5. We would like to see speed limit signs for the trucks posted on haul routes
6. We want to see drivers bonded or employees of Meridian Minerals.

13-2

7 We demand trailers be tarped, rather than relying on a trailer design which will merely reduce, not eliminate, blowing dust

13-2

8 We would like to urge DSL to seriously consider and follow the recommendation of the Department of Highways, who also feels that an alternative load-out site should be considered

13-3

Public Hearing, Billings Mt 9/23/92 (14)
Eastern Montana College

Monica Lyndeen
- Last night I spoke as a representative for the HCC and other concerned residents of Huntley
- Tonight I am speaking in two separate capacities:
  (1) as an elected official for the Huntley Water District
  (2) as a concerned citizen of Huntley who will be extremely affected by the proposed load-out

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- T J. Mueller
- Bob Knickerbocker
- Shirley Hermann

(1) Huntley Water District

Over the past several months, the Huntley Water District Board has been engaged in putting together engineers estimates, grants, and other related research in order to begin implementing an extensive project which would upgrade the Huntley Water system. As far as we know, we are the only government entity within the town site of Huntley, and so we do have some concerns which we feel have not been addressed.

(1) Why has no one from Meridian or the DSL contacted us? We have not been contacted or advised on how their water use may effect our system? This issue was not properly addressed in the EIS.

14-1

(2) Will Meridians' use of water during operations have any effect (pos or neg) on our plans to upgrade the Huntley Water System.

14-2

Someone from the DSL or Meridian needs to look at our engineers studys and determine if there will be any negative effects We have already put a great deal of our consumers $ into the project and we would hate to see it jeopardized for a so-called temporary project. The basic welfare and health of the Huntley community depends on the future success of our upgrade project.

14-2

(2) Concerned Citizen of Huntley

As many of you from Meridian and DSL already know, I live on Heath St, which is part of the immediate proposed route due to my house site lies upon 1,000 ft. from the proposed site. I will not subject you to the atrocities which myself and my family were subject to during the test pit operation of years ago. I believe it have gone on sufficient record over the past two years.

Instead, I wish to address items which were either not addressed in the EIS, or not addressed sufficiently.

(1) On more than one instance in the draft EIS, the proposed load-out site in Huntley is referred to as a "previously disturbed industrial area." This is incorrect! The proposed site is a previously disturbed agricultural area Meridian is using their own test pit operation as

14-3

justification for labeling the area as "industrial." I find this factor completely unacceptable, and I hope the DSL will clear up this matter in their final statement. No decision should be made based on this false "industrial" claim. 14-3

(2) Last night we proposed that the transportation route be rerouted off of Heath St. One reasons being that this is a residential street, with children and bus stops. We, and I say we, Huntley is going to be forced to live with the proposed load-out, we would like to see the access street from the highway 312 to the load-out moved East of Heath St. There is a short cut-over, with no residents, approximately 2-3 blocks east of Heath St. ~~One stop~~ 14-4

If Meridian were to use this cut-over it would help to reduce possible accidents with school buses and children. It would also help to reduce accidents that would otherwise occur at the blind intersection of Heath St. & Normal Ave which sits directly in front of the proposed load-out. This blind intersection was never addressed in the EIS.

(3) An even better idea, which was not addressed in the EIS, involves moving the site to another alternative area. Meridian continually cites the cost of doing business as their reason for choosing the Huntley site. I would like to know how much $ they have allocated for each individual life which will be lost because of this project. I know they have these figures figured into their cost of doing business — and I would like to see them addressed in the EIS. 14-5

Perhaps this $ could be better spent by moving the load-out somewhere where the threat to public safety is drastically reduced.

I went to see the EIS address load-out sites in Roundup, Broadview & Acton. The impact to public health & safety would be dramatically decreased if any "real" serious consideration was given to them

(4) However, if the Huntley area still appears to be the only choice I propose that the load-out be moved to the Coorsta, ~~site~~ east of Huntley. This site has been previously considered. ~~The same~~ According to field notes by the DSL and Meridian themselves, there appear to be only a small disadvantages. 14-6

(1) The site would require an upgrade travel crossing over the tracks, and possible relocation or modification of power lines.
(2) Cost to Meridian would be $55,000 more than at the Huntley site. 14-7

~~How close does the figure~~
How close is this figure, to Meridian's figure, for a life in the cost of doing business?

One more thing I would like to see the EIS address — who will be held liable if someone is killed in the transportation route? Is there sovereign immunity? 14-8

Sept. 24, 1992

(15)

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SEP 24 1992
STATE LANDS

702 2nd Street East
Roundup, Montana 59072

Mike DaSilva
Montana Department of State Lands
Capitol Station
Helena, MT 59620

Mr. DeSilva

I have attended a number of meetings on the proposed mine permit for the Bull Mountains that Meridian Minerals is applying for. Many of the people attending the meetings have had very strong views in opposition of the mine or strong views in support of the mine. I support the mine permit. But I also can understand the concerns with the water and the traffic and in Huntley with the noise level. Yet, after talking with and reading about the plans Meridian Minerals has for taking care of the problems, I don't feel the concerns I have heard should stop the permit from going through.

This mine will help the economic growth of Musselshell County, it will help the schools and the business trying to survive, and it will help the state of Montana. Already in the area we can see a slight impact on the economy. Many people are waiting in anticipation for the mine to begin operation. Jobs are important, and people want to go to work now. Yet in this county there are no jobs. The oilfields are slow, ranching is slow and so is farming. When these areas are going through tough times so do the businesses and in turn no jobs are available. Trickle down economics definitely apply to the Musselshell County area. Business, farms, ranches, and individuals will all benefit in a healthy way to the opening of the Bull Mountain Mine.

The permit should be granted, and it is my hope that it is granted soon and operation of the mine can begin.

Sincerely

Cheri Kilby

(16)

702 2nd Street East
Roundup, Montana 59072

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SEP 24 1992
STATE LANDS

Mike DaSilva
Montana Department of State Lands
Capitol Station
Helena, MT 59620

Mr. DeSilva

This letter is to state my support for the proposed mine in the Bull Mountains. I am a life time resident of Musselshell County and consider myself lucky because I have a job with the City of Roundup. My friends and neighbors are not so lucky. Many have had to leave the state in order to find jobs. I feel that the coal mine is vital for the survival of Musselshell County. The numbers that will be employed and the amount of money that will go back into our community is desperately needed.

I feel that Meridian Minerals is a very responsible company and that the state has numerous safeguards that will protect the environment and the interest of the people. These are important factors because of the water and the traffic. These are highly controversial issues; but because of the laws I feel the company will be monitored and any problems corrected immediately if the mine permit is granted.

Please grant the permit to Meridian Minerals. The county needs it and the state needs it; as well as the Company.

Sincerely
Mike Kilby

Mike Kilby

(17)

P.O. Box 313
Roundup, Montana 59072

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SEP 24 1992
STATE LANDS

Mike DaSilva
Montana Department of State Lands
Capitol Station
Helena, MT 59620

Mr. DaSilva

This letter is to voice my support for the proposed Mining operation in the Bull Mountains.

I feel the laws of the land and the watchful eye of the EPA will monitor the mining operation to the extent that few problems will be encountered with the mining operations. I know that good will come for the operation because of the increase in jobs and the increase in property value that will follow the opening of the Mine.

This seems to be a true opportunity for the Musselshell County and for the surrounding towns. The state needs the mining operation. Just looking at the bottom line should tell us that. No state can operate in the red and with the opening of the mine there will be more tax dollars in the state coffers.

I am in full support of the mining operation and I sincerely hope that you will find that Meridian Minerals is an important asset to the state and will grant them the permit to proceed with their operation.

Sincerely
Roberta Snider

Roberta Snider

(18)

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SEP 24 1992
STATE LANDS

Oral Comments by Steven M. Eab at MDSL Hearing regarding Bull Mountains Mine #1 at Huntley MT.

My name is Steve. I'm representing myself, my family Stacy Ashley + Cameron, and my community. I'm currently serving as President of the Huntley Community Club and as chairman of the standing committee which was formed to address the concerns of the Huntley Community and the surrounding area, regarding the proposed Huntley load-out. As a representative of myself and my family and the community of Huntley I'm announcing my opposition to the load-out site at Huntley.

Our community is a quiet, clean, out of the way, agricultural community, I stress agricultural community because the load-out site is referred to in the DEIS as an industrial area complete with a sugar beet loading facility, railyard, and grain elevator. This same industrial area happens to have residential areas to the northeast, north, and northwest as close as 500 feet to the load-out. I find it hard to believe that a sugar beet dump, which is used maybe 4 months out of the year, a rail yard consisting of a couple sets of tracks with a few cars on them and a grain elevator constitute an industrial area. I'd also like to point out here that we as a community have come to accept these facilities as an integral part of our community for a couple of reasons: ① these facilities are part of the agricultural backbone of our community and ② in most cases these facilities were here before we were! 18-1

On numerous occassions the DEIS mentions that alternative routes, sites, and methods were analyzed but not ~~and~~ considered due to cost, maintenance, or environmental degradation yet no figures for the aforementioned conditions are offered in the draft EIS. The HCC maintains that, while cost, maintenance, and environmental degradation estimates have been used as excuses not to consider alternative routes, sites, and methods; these same estimates apparently are more important than impacts to the human element of our environment which we refer to as our Quality of Life in the community of Huntley. 18-2

Meridian Minerals & MDSL have known since the summer of 1990 that two of this communities biggest concerns resulting from the operation of the load-out during the test pit phase were climate, mainly wind direction, and air quality. Yet since that operation ceased in the fall of 1990 no attempt has been made to collect any non-operating baseline data with which to compare operating data. The HCC simply cannot accept that this area has exactly the same winds and air quality conditions that 18-3

exist in Billings at the airport.

A telephone survey was completed by Economics Consultants Northwest. The questions asked and the resulting answers have been left out of the DEIS. Survey's to most people don't mean anything unless they are able to analyze ① the questions that were asked, ② who the questions were asked of, and ③ what the results were!

18-4

On May 29, 1991 the HCC sponsored a meeting in Huntley which featured a presentation by the MDOT. Issues related to coal truck traffic, subsequent highway degradation and use of the Huntley load-out site were discussed. The MDOT forwarded a document to MDSL regarding data and recommendations for the proposed Bull Mountain Coal Development. They forwarded this document as a participating agency in the overall MEPA process for evaluating this proposed project. Some of that data was used in the DEIS a lot of it was not. My most important objection to the omission of data was the fact that MDOT Recommendation seems to have been left out!

18-5

Myself and the HCC feel this information is critical to help decision makers make a more fully informed and therefore better decision.

As chairman of the HCC it is the HCC's opinion that a better decision would be one that demands a different load-out site.

Thank you!

Sincerely,
Steven M. Erb
Steven M. Erb
Box 65
Huntley, MT 59037

I point out the lack of the information regarding: ① alternative ~~routes~~ routes, sites, and environmental degradation, ② baseline data collected prior to operation, ③ the telephone survey, and ④ the recommendation of MDOT to MDSL in light of a letter sent by Dennis Casey to Representative John Scott dated 6/27/92. Mr. Casey was responding to questions asked by Representative Scott regarding alternative sites. I'd like to read the discussion which came about in item # 3.

DEPARTMENT OF STATE LANDS

STAN STEPHENS GOVERNOR — CAPITOL STATION

STATE OF MONTANA

(406) 444-2074 — January 27, 1992 — 1625 ELEVENTH AVENUE HELENA, MONTANA 59620

Representative John F. Scott
House District 97
P.O. Box 58
Ballantine, Montana 59006

Dear Representative Scott:

I wish to respond to your letter of January 16, 1992 in enough detail to allow you to feel comfortable with knowing the process and choices available to the Department in decision making regarding the Meridian Minerals' proposed underground coal mine. I'm sorry we were not able to visit on the issues while you were in town for the special session. I agree with you that the concerns expressed in your letter are genuine and reasonable.

1. How many sites have been or will be fully studied?

It is my understanding that 9 or more different sites for the proposed temporary coal load-out facility will be investigated in the preparation of the draft EIS. These sites are generally in the Roundup, Huntley, Broadview, and Acton areas with different combinations of roads and loading sites being evaluated.

2. Are you applying the same criteria to all the potential sites? If not, what criteria will be applied to each site?

In order to satisfy the requirements of the National and Montana Environmental Policy Acts, (NEPA & MEPA), all of the sites will be evaluated using the same evaluation criteria.

3. Will the EIS require Meridian to use the site found to have the least impact?

NEPA and MEPA are disclosure acts, not regulatory acts. They cannot "require" Meridian to do anything. An EIS is an informational tool designed to help decision makers make more fully informed and therefore "better" decisions. As quoted from the Council on Environmental Quality's regulations for implementing the procedural provisions of the National Environmental Policy Act, section 1500.1(c)...."The NEPA process is intended to help public officials make decisions that are based on understanding of environmental consequences, and take actions that

"AN EQUAL OPPORTUNITY EMPLOYER"

Representative John F. Scott
January 27, 1992
Page 2

protect, restore and enhance the environment." Montana's statute is fundamentally no different.

My choices for permitting are:

1. approval of the proposal once deemed technically adequate in accordance with the coal statute;
2. approval as above with special conditions at that site and in accordance with the coal statute; or
3. denial of the proposal.

Denial of the proposal would leave Meridian with the need to seek another loadout site which is permittable under the provisions of the coal statute. Of course, in this scenario all applicable provisions of the coal statute would have to be met including one year of baseline data collection in all of the scientific disciplines, a new application for the site, a new environmental analysis document, new written findings, and new public involvement opportunities.

4. Will this study assess the cumulative impacts of the total Meridian project?

The draft EIS will assess more than just the cumulative impacts of the Meridian project. As required by NEPA and MEPA, the draft EIS will address the cumulative impacts of all other known projects in the area which may, along with the Meridian project, collectively impact the human environment.

5. Will Meridian be required to provide a bond that can be used to immediately mitigate against any potential impacts?

No. Meridian will come under the same bonding requirements as all other coal mining companies. The department is limited in its ability to require bonds. We can only demand a bond for reclamation under the Montana Strip and Underground Mine Reclamation Act, 82-4-223, MCA.

I hope I have satisfactorily answered your questions. If you need more information, feel free to contact me at any time.

Sincerely,

Dennis D. Casey, Commissioner
Department of State Lands

/ns

cc. Bonnie Lovelace

"RECOMMENDATIONS

The MDT has no legal authority to regulate who can or cannot use those routes open to traffic by the general public. The only legal authority that we have is through Gross Vehicle Weight permits where we can regulate the size and weight of a truck and through encroachment permits or standard R/W 20 forms." As stewards of public transportation, we can only advise of where there could be potential impacts and make the appropriate recommendations."

Because of projected increased maintenance costs, projected decreased pavement life, projected decrease in available funds, anticipated decrease in level-of-service and an anticipated increase in the accidents for the component route segments; the MDT would prefer that Meridian Minerals would pursue other load out sites such as Acton or Broadview rather than Huntley.

However, if Meridian Minerals elects to haul on U.S. 87 and local road 312 to Huntley then we feel that the financial mitigation discussed on page 3 be pursued.

DWC:Q:STP:46.gg/6

September 30, 1992

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OCT 01 1992
STATE LANDS

Mike DaSilva
Environmental Specialist
Montana Department of State Lands
Capitol Station
Helena, MT 59620

Dear Mr. DaSilva:

As a retired, life long resident of the Huntley community, I am totally opposed to the proposed Meridian coal load-out facility in Huntley. Since the public hearing held in Huntley on September 22, 1992 was not a question and answer session, perhaps you can answer some questions regarding the draft E.I.S.

1. Air Quality

In the last paragraph in Chapter III, Page III-6, the agency would lead readers to believe that monitoring was done at Huntley during the temporary load-out in 1989 and 1990. It is stated that the maximum 24-hour PM10 concentration was about 41ug/m3 with an annual average of about 14 gu/m3. Since no monitoring was done near the load-out site during that period, how can these figures be used as fact?

In Chapter IV, Page IV-11, it stated that the maximum 24-hour PM10 concentration (37.6 ug/m3) resulting from the operation indicates that the degradation of air quality would occasionally exceed the allowable PSD increment by out 1.7 times, but PSD permit requirements would not be applicable because the estimated particulate emission would only be about 12 tons per year. Was the 12-ton emission figure also taken from the aforementioned non-existent monitors? Through the duration of one load-out in 1990 there was enough emissions to nearly blot out the street lights. What should residents with respiratory problems do during the duration of this project if approval is given?

2. Noise Levels

On Page IV-13 it is stated that a water spray system will be installed to minimize fugitive dust emissions. How can this system remain operable during freezing weather? On Page IV-42 it is stated that noise generated during the load-out operation

6270 (app)144

Mike DaSilva
Montana Department of State Lands
September 30, 1992
Page Two

would be noticed by Huntley residents and would occasionally be above acceptable levels recommended by E.P.A. The noise noticed by Huntley residents is an under statement if I ever heard one. During the load-outs in 1990, the noise from dozers pushing coal onto the conveyor belt and train locomotives moving empty and full cars, blowing their whistle with each move, along with diesel exhaust and coal dust made it impossible to leave windows open during summer nights. It was also impossible to get a decent night's sleep even with windows closed.

The agency admits that both air degradation and noise levels will exceed some standards, so how can they state that the impact to the Huntley community will be minor?

3. Recreation

Page IV-51 states that recreation opportunities and quality in Huntley would be impacted from coal dust. Yet the agency concludes that impacts to recreation opportunities will be minor. Do you also conclude that breathing coal dust when exercising and doing every-day activities is a minor impact?

In regard to the mis-quote by Tetra Tech which I mentioned at the public hearing on September 22,1992, the road that I referred to was not Heath Street but Old Highway 10 leading northeast out of Huntley. The other streets in that area of town, namely Date, Elm, Fir, Grape, Heath, Jute, 2nd North, and 3rd North, are all used for walking, jogging, biking, etc.

4. Transportation

Throughout the entire section on transportation from the mine to Huntley, your findings indicate there will be more traffic accidents, trucks having difficulty negotiating turns at the intersection of Highway 87 North and Highway 312 East, the LOS reduction at the intersection of Heath Street and Highway 312 East, and at the entrance to the load-out site, the deterioration of the roads, especially Highway 312 East and Heath Street.

Mike DaSilva
Montana Department of State Lands
September 30, 1992
Page Three

Why wasn't there more consideration given to alternate haul routes away from already congested roads? There can be no dollar amount place on those that will die or be maimed due to the truck-related accidents caused by this needless haul route.

I can only hope that you will take the concerns as expressed by people of the Huntley community seriously and not permit the load-out facility to be placed in Huntley.

Sincerely,

James V. Pope Box 41 Huntley MT 59037

James V. Pope

cc: Dennis D. Casey, Commissioner

(19)

1023 2nd Street East
Roundup, Montana 59072

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SEP 24 1992
STATE LANDS

Mike DaSilva
Montana Department of State Lands
Capitol Station
Helena, MT 59620

Mr. DeSilva

I am writing to voice my support for the proposed mine that Meridian Minerals Company is proposing. This is very important to Musselshell County and the surrounding area.

I find that Meridian Minerals is a very caring company. They have handled all the work and problems they have encountered in a very straight forward and quick manner. I believe that they will continue to do the same when the mine can begin operation.

This is economically important to Musselshell County and to the people that are trying to get employment in the area. We are presently seeking employment and we sincerely hope that we are able to stay in Roundup, but we feel that is only possible if the mine begins operation.

Meridian Minerals has followed all guidelines set by the EPA and because of the laws of the land they will continue to obey all the restrictions. This is for the protection of our environment. What more can a person ask.

Please grant the permit to Meridian Minerals. It is my hope that Musselshell County will prosper and so will the State of Montana.

Thank you very much

Sincerely,

Karla Snider

Karla Snider

(20)

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SEP 24 1992
STATE LANDS

1023 2nd Street East
Roundup, Montana 59072

Mike DaSilva
Montana Department of State Lands
Capitol Station
Helena, MT 59620

RE: Draft EIS for Meridian Minerals
Company's Bull Mountain Mine No.1

I have followed with interest the development of the Meridian Minerals Bull Mountain Mine No. 1 and the EIS study of the proposed mine operation.

Economically this mine is needed in Musselshell County. Numerous people are wanting and needing jobs that this mine will create.

Meridian is a responsible company that has followed all the guidelines and tried to solve any problems that were brought to their attention in a speedy and reliable manner. I feel that they will continue to do business this way.

I very much support the operation of the proposed mine and feel that our laws and our environmental concerns will be sufficient to safe guard the area around the mine as well as the truck route and load out area.

It is my hope you will allow Meridian Minerals to begin mine operation as soon as possible.

Thank you very much.

Sincerely,

Richard D. Snider

(21)

FORD HOILAND FORD, INC.

TELEPHONE (406) 323-1102
102 MAIN STREET
P.O. BOX 358
ROUNDUP, MONTANA 59072

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STATE LANDS

September 24, 1992

To The Montana Department of State Lands:

I would like to comment on the Meridian Minerals Company, Bull Mountain Mine No. 1 Draft Environment Impact Statement. The impact on Roundup as far as economics, in my estimation, has been greatly under estimated. A direct quote from your statement: "The Agency concludes that impacts on employment, personal income and population associated with disapproval of the proposed Project would be negligible. In foregone benefits, the Agency concludes that these impacts would be minor." End of quote. 21-1

Ladies and Gentlemen of the Agency, apparently you have spent little time in Roundup, Montana the past few years. We feel it would be a major impact if the mine permit is not issued.

Several community groups such as the Senior class non-alchol graduation party, the Meridian bowling team, the Bull Mountain Fire Department, Roundup Fire Department, Roundup Swim Team basketball court grant, the local 4-H Council and 4-H members and the local museum have been impacted by Meridian. The Senior Citizens and the Gateway House for Battered Women have been supplied with half a beef purchased at the annual 4-H Stock Sale and the baseball uniforms have been supplied for T-ball, Little League and the Roundup Miners Legion Teams. I would like to say," Thank You, Meridian" for your support.

We have no other company in Roundup to hand out grants and support dollars. Yes, it would be a major, major impact if the mine permit is not issued.

Yours truly,

Roger J. Hoiland

(22)

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Steve and Jeanne Charter
13838 Hwy. 87 N
Shepherd, MT 59079
947-2151

Our family ranches the part of Dunn Mountain, upper Railroad Creek, upper Fattig Creek, and uppermost Rehder Coulee which Meridian Minerals proposes to longwall mine.

We feel the state EIS is seriously inadequate in its assessment of the value and impacts to the land and water resources in our operation.

We do not agree with its' conclusion that our chief springs are of "low" importance. For example, we can and do water up to 350 pair on the Big Spring at the head of Railroad Creek--which the EIS classifies as being of "low" importance. A spring which runs consistently at 5 gallons per minute in eastern Montana is a valuable water resource. We disagree with the EIS' representation of the flow of Raspberry Springs at about .4 gallons per minute when our experience is that it flows as strong or stronger than the Big Spring. Similarly the flow of Red Tank Spring is represented as 1.8 gallons per minute where our experience is it is also at least as strong as the Big Spring. 22-1

The EIS' spring ranking criteria are flawed. Any consistent 3-5 gallon per minute spring is a very valuable livestock and wildlife resource. Tanks are in general superior to reservoirs for watering. The criteria assume that sources used heavily by livestock are not useful to wildlife. We disagree. Our stock use them at most the six warm months of the year, and wild animals have no competition at all when open water is most valuable to them. 22-2

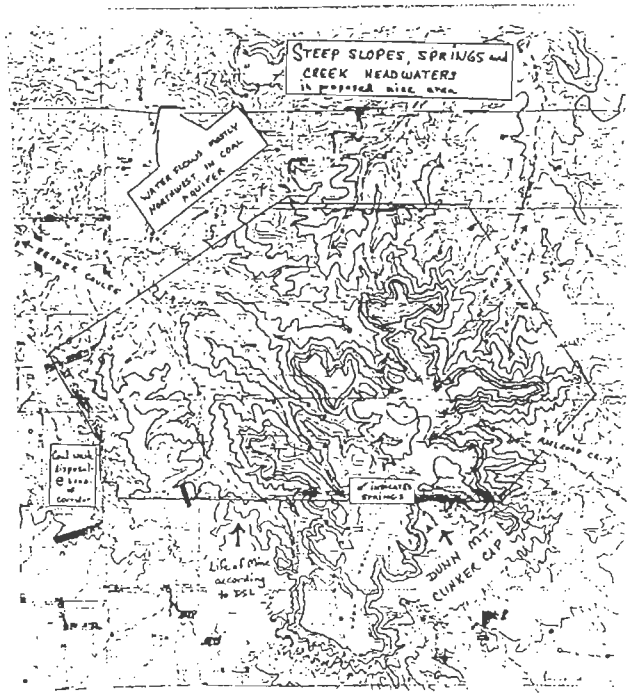
The EIS recognizes neither the existence nor the value of running water and consistent intermittent springs along Railroad and Fattig Creek coin within and immediately adjacent to the proposed life-of-mine. This is a very major omission. 22-3

The EIS is very unclear about the risk to our water or the feasibility and cost of "mitigation measures" including reconstruction of natural drainages. The final EIS should specifically address impacts and reclamation potential for each significant source. And it needs to be fair about what it classifies as significant sources. 22-4

Even more inadequate is the assessment of potential erosion impacts from longwalling in country as rough as the slopes and drainages of Dunn Mountain (see attached topographic map of mine area). It is our understanding that sloughing, slope failure and erosion from altered drainage patterns is expectable. Why does the impact statement dismiss this kind of impact? The final should address erosion and reclamation costs section by section. 22-5

We support the EIS proposal for a maintenance trust fund in addition to performance bonding. We are concerned that the bond and the trust fund be realistically priced and costs justified section by section. We want the opportunity to review and comment before they are finalized. 22-6

Steve Charter Jeanne Charter



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(23)

H.M. Robbins
915 1st East
Roundup, MT.

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STATE LANDS

Mike DaSilva
Environmental Specialist
MT. Department of State Lands
Capitol Station
Helena, MT. 59620

September 18, 1992

Mr. DaSilva:

I am a past County Commissioner and State Representative from Roundup. For many years, both as a public official and citizen, I have been involved with many of the issues reviewed in the DEIS for the Bull Mountain Mine No. 1 proposal. I have kept myself informed about this project since it began, some four or so years ago.

I have also felt some of the frustrations of many other citizens about how slowly this process moves along to a point of decision. I have contacted DSL, legislators and other interested parties of this project many times during these four years, to help my understanding of the issues and the process.

I must say that most of the time I have been impressed at how helpful DSL has been when I've made inquiries. I am amazed at how agency people, who have been conducting the process, stay neutral about each of the issues and attempt to stay objective in responding to the many outside influences.

I would be remiss if I didn't also state that the Company Officials from Meridian Minerals have also been very willing to provide information and discuss concerns related to their proposal. This document is based on the best efforts of many people. The DEIS is well done and only points to the fact that this project should be allowed to proceed.

Thankyou for the opportunity to offer these comments.

Sincerely,
H.M. Robbins

(24)

MVCC Musselshell Valley Chamber Of Commerce
Roundup, Montana 59072

September 16, 1992

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STATE LANDS

Mike DaSilva
Environmental Specialist
MT Dept. of State Lands
Capitol Station
Helena, MT 59620

Dear Mr. DaSilva:

As President of the Musselshell Valley Chamber of Commerce I am submitting the following comments about the DEIS for Meridian Minerals Company Bull Mountain Mine Number One prepared by the Montana Department of State Lands, August 1992.

Over all it appears the conclusions of the DEIS point to relatively minor negative impacts resulting from this project as proposed. There are obviously changes and inconveniences that could result from such a project, however, the more substantial ones would only occur in the first two to three years of the project. Generally, the Chamber of Commerce agrees with the conclusions of the DEIS.

However, a couple areas tend to understate the potential for beneficial impacts. Your assumptions on page IV-4 state Meridian should be able to hire 75% of the direct mine related employment from the available work force of the Billings labor market, which includes Roundup, Broadview, Huntley and Shepherd. The other 25% are assumed to be in-migrating workers. It is further assumed 13% of those in-migrating workers would located in Roundup and 6% in rural Musselshell County. That translates to 14 in-migrating workers in Musselshell County. Up to this point we cannot disagree, however, with any aggressive recruitment effort on the part of the Roundup community area, those percentages could potentially be increased. 24-1

The problem shows up in the socioeconomic section beginning on page IV-42. No discussion deals with what portion of the 75% local area hires would come from where. Population impacts (stated as less than 2% in Roundup) do not necessarily reflect changes in employment structure. Page IV-43, paragraph 3 states that Musselshell County's . . . "economic base would not expand appreciably since most of the workers are projected to live in Yellowstone County." That conclusion is certainly not based upon any other discussion in the DEIS. 24-2

The Musselshell Valley Chamber of Commerce, utilizing a recent informal survey of the immediate area, has reached the conclusion that the economic base could indeed expand appreciably by injecting one conservative assumption; 25% of the local hire (36 workers) would come from Musselshell County. Our information shows that fully 10-15% (160-240 persons) of our workforce either has or intends to apply for a mine related job and 96% of those applicants are currently employed. Since a good portion of our work force includes mining, oil field, construction, and/or agricultural experience, we do not believe it unreasonable to project that one-quarter of the local labor market hires could be from Musselshell County. 24-3

A little further analysis is essential to reach a conclusion about the effects on our economic base.

14 in-migrating workers	@ $33,389	$ 466,326.00 annual
56 local area workers	@ $33,389	1,865,304.00
70 workers		$ 2,331,630.00
X .45 secondary workers (page IV-4)		
31	@ $15,397 =	$ 477,307.00
TOTAL ADDED PAYROLL		$ 2,808,937

(PLUS! Job replacement opportunities [up to 56])

This amounts to an 8.7% increase in total earning, or a 10.3% increase in non-farm earnings (Table E-14). This added payroll is valid for the 30 year life-of-mine, which is the total working life of one generation.

In our opinion that is an appreciable expansion of the economic base of our area. 24-3

On page III-34 the DEIS states, "Both employment and population growth rates of Musselshell County are representative of a stable economy with little or no economic expansion projected." A project of this magnitude has the ability to provide significant economic expansion. 24-4

Almost without exception, all the surveys the Musselshell Valley Chamber of Commerce has reviewed in the past 5 years concerning quality of life and economic security, has cited JOBS, TAXATION RELIEF and STATE BUSINESS CLIMATE IMPROVEMENT as the top concerns of citizens. This project provides a major opportunity to help address all three concerns. 24-5

The Chamber recognizes that the economic benefits to an area for such a proposal are considered outside the scope of this EIS, but such benefits are certainly not outside the scope of the public interest. If the economic benefit were concluded to be negative, we doubt that it would be considered trivial to this process.

Please select Alternative I, and based on this DEIS process, any conditions should be in the interests of both the citizens and the project sponsor.

Sincerely,

Larry Lewis
President

-2-

3) We perceive Meridian's interim coal hauling plan to Huntley as an unreasonable hazard and a threat to public safety. We feel the DSL should require coal transportation from the outset to be provided by a conveyor, similar to that in Colstrip, down Halfbreed Creek to Roundup and by a common carrier rail spur built from Roundup along the old Milwaukee Road right-of-way to the mainline at Cushman. 25-4

This scenario would alleviate safety concerns over trucking, alleviate the burdensome costs of necessary road repair, provide Musselshell County with the tax revenue from a coal load out facility and provide Roundup with a Public Service railline.

4) We feel the DSL must require a state-of-the-art covered tipple for coal loadout. 25-5

5) We request that the DSL give formal notice to all interested parties prior to developments and revisions of permit requirements so we can be assured that the final permit has adequate safeguards. 25-6

6) Finally, we strongly urge any property owner within a 10 mile radius of the life of mine to monitor their pre-mine water for both quantity and quality and do so on a regular basis. They should try to ascertain the volume of flow and have a complete chemical analysis done by a qualified lab. This monitoring will be necessary to provide data to support your case should you believe your water has been impacted by this proposed mine. Under present law, the burden of proof lies upon you- the impacted property owner not upon Meridian Minerals Co. whose mine may have damaged or degraded your water. Therefore, no matter what may have been implied, Meridian or their assignees are not likely to volunteer assistance or compensation unless you can prove in court that their activities have damaged you.

I know from first had experience that when push comes to shove, Meridian Minerals Company is NOT a good neighbor.

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COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR MERIDIAN MINERALS
BULL MOUNTAINS MINE No. 1 September 24, 1992

25

My name is Pete Fully. I am here representing myself as a rancher in the Bull Mountains and Northern Plains Resource Council and its local affiliate the Bull Mountains Landowners Association.

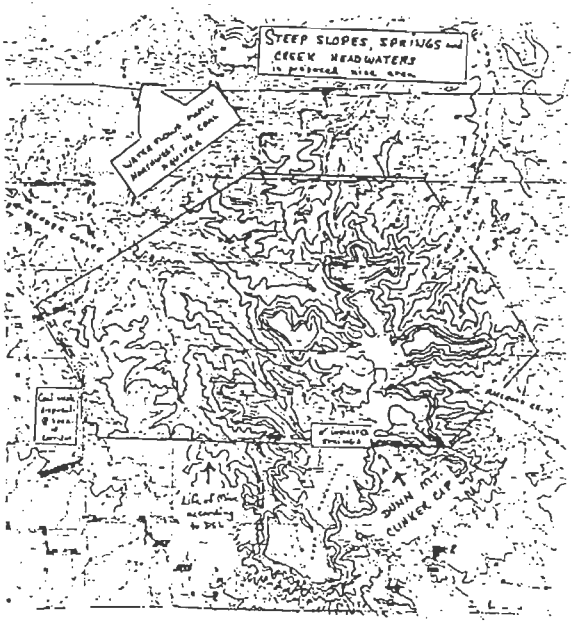
This statement will address what the NPRC and BLM feel are the minimal requirements necessary for the DSL to approve Meridian Minerals Company's Bull Mountain Mine No. 1 permit.

1) The DSL must require realistic bonding and a sufficient permanent trust fund to restore and maintain water resources likely to be disrupted by mining and mine subsidence both on-site and off-site. This bond and trust fund must be adequate to cover the distinct possibility of dewatering approximately 14 sections of land over the life of the mine, and also, compensate for the degradation of water quantity and water quality off-site as a result of mining out the headwaters of three tributary drainages and disrupting natural groundwater flow. 25-1

2) We want to see actual cost figures on a site by site basis to restore and maintain impacted springs, wells, and groundwater. Also, we want to see actual cost figures and a reclamation plan should this mine impact the hydrologic balance of the surrounding area. In order to come up with these actual cost figures, the DSL should confer with individuals living and ranching in the area who actually know the relative importance of each existing spring and well. Furthermore, the DSL needs to understand these individuals need to utilize ground and surface water throughout the life of mine and on into the future. 25-2

3) The DSL must require realistic reclamation bond to stabilize slopes and control subsidence-caused erosion. In order to calculate the total cost of reclamation, the DSL must require a detailed analysis of the slopes within the impacted area and how subsidence will affect these slopes. Surface damage due to subsidence should be scrutinized more closely since movement may occur in any slope over 20% grade. Much of the impacted area has slopes with a far greater percentage than this 20% grade. 25-3

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(26)

JANET E. MANIS
Clerk & Recorder
MARY C. NELSON
Treasurer
Supt. of Schools
G. PAUL SMITH
Sheriff
VICKI EVANSEN
County Attorney
DONA C. ROBSON
Clerk of District Court
JOHN RAY
Coroner
DOLETTE F. MADISON
Public Administrator
ROBERT E. MIHALOVICH
Justice of the Peace

County of Musselshell

ROUNDUP, MONTANA

BOARD OF COUNTY COMMISSIONERS
M. B. BREWER
DUE M. OLSON
KELLY GEBHARDT

September 18, 1992

Mr. Mike DeSilva
Environmental Specialist
MT. Dept. of State Lands
Capitol Station
Helena, MT. 59620

Dear Mr. DeSilva:

As a public official, I am obligated to be aware of the issues and concerns of our citizens, particularly if my decisions will greatly influence the outcome. I, along with the other Commissioners of Musselshell County, have made it my business to read about and participate in this EIS process, which has resulted from the permit applications package (PAP) submitted to DSL from Meridian Minerals Co.

In reviewing this DEIS document, I've tried to keep in mind that this EIS is primarily a Summary of the process methodology, those issues considered and those eliminated, the project proposal, and the anticipated impacts to the many aspects of our environment. The tremendous volumes of information leading to this document are staggering. Thousands of pages of permit application, deficiency correspondance, responses, baseline data, related permit applications to other agencies, etc., also must be considered when evaluating the conclusions set forth in the DEIS document.

There should be no question that the public has had the opportunity to be informed about this project and to participate in this process. Scoping Sessions, Public information meetings, public hearings, published public notices, agencies mailings, dozens of media reports in newspapers, television and radio; even "informal legislative informational meetings" have provided more than ample information about this project over the past 3-4 years. This is a NON-ISSUE.

In consideration of the above, I can unequivocally state that, although the process is perhaps too slow and cumbersome for all parties involved, I have confidence in the process. This DEIS is thorough and to the point. The potential for negative impacts when compared to many other potential development projects I can envision, is very much within reason.

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I, along with the other Commissioners of Musselshell County, do not see where this proposal imposes or has the potential to impose unacceptable impacts on the human environment. We encourage Montana DSL to approve the applicant's plan of operation. We are confident the plan can and will meet the requirements of all applicable State laws.

Sincerely,

Kelly Gebhardt

Kelly Gebhardt, Commissioner
Musselshell County

(27)

MUSSELSHELL COUNTY SHERIFF'S DEPARTMENT

G. PAUL SMITH — SHERIFF
ROUNDUP, MONTANA 59072
PH (406) 323-1402 OR (406) 323-1231

JERRY CAMPBELL, Undersheriff
LES OSBORNE, Chief Deputy Sheriff

BONI SEELITZ, Dispatcher & Clerk

September 24, 1992

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STATE LANDS

Mike DaSilva
Environental Specialist
Montana Department of State Lands
Capitol Station
Helena, Montana 59620

Dear Mr. DaSilva,

My name is Paul Smith and I am the Sheriff of Musselshell County. I would like to address the impacts to Law Enforcement agencies that will occur because of the Bull Mountain Mine Project.

I am in full agreement with the statement on page IV-46, that Law Enforcement agencies in the effected areas are currently understaffed. However, without the coal mine, my department will continue to remain understaffed given the current financial outlook for Musselshell County even though the work load for the Sheriff's Office is on the rise. Also, at the present time Musselshell County is seeing an increase in population. This is based on the present lack of available housing in Musselshell County as compared to the past two years. This involves the City of Roundup as well as the subdivisions in the Bull Mountains. There is already an increase in traffic and criminal activity in Musselshell County without any increase in finances to address these problems.

However, because of the prospect of the proposed coal mine becoming a reality, the tax base should be improved sufficiently to address the shortages that are presently occuring and will continue for the long run. Also, because of the proposed coal mine, Musselshell County is at the present time doing a coordinated effort to study the impacts due to the coal mine project and have begun a planning process by which to address all potential impacts in a productive, well organized manner. 27-1

If in fact the coal mine project becomes a reality and Musselshell County is impacted as projected by the Enviromental Impact Statement dated August 1992, Musselshell County will become eligible for assistance from the Montana Coal Board for financing solutions to the impacts in the short run.

Therefore, I, as Sheriff of Musselshell County, agree that there will be increases in traffic on US Highway 87 along with an increase in criminal activity due to population increases. However, I feel that because of the coordinated efforts and the planning that Musselshell County is presently doing to address the impacts and with possible financial assistance from the Montana Coal Board, that Musselshell County will be well prepared for any impacts from the mine project, especially concerning those problems facing Law Enforcement.

Sincerely,

G. Paul Smith

G. Paul Smith
Musselshell County Sheriff's Department

(28)

SALLY ARMSTRONG, Mayor

City of Roundup
Montana

September 24, 1992

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STATE LANDS

Mike DaSilva
Environmental Specialist
MT Dept. of State Lands
Capitol Station
Helena, MT 59620

Dear Mr. DaSilva:

When the Draft Environmental Impact Statement came out I instructed my staff to study the document and report to me any adverse impacts to the City of Roundup. I also reviewed the DEIS myself. Neither my staff nor myself can find any impact to the City of Roundup that isn't beneficial.

As a general statement I would say you have underestimated the beneficial impacts to employment, personal income, and public sector fiscal conditions. Your conclusions were minor during the life of the mine. With the depressed job market and taxable valuation in Roundup, any moderate increase in jobs, both primary and secondary will have a significant benefit. If this project can turn Roundup's economy from negative to positive, then those benefits are substantial. 28-1

In conclusion, as Mayor of the City of Roundup I urge your approval of Alternative #1 with stringent conditions as I am the majority of the citizens of the City of Roundup.

Sincerely

Sally J. Armstrong

Sally J. Armstrong
Mayor

(30)

September 24, 1992
25 Gibbtown Ave.
Roundup, Montana 59072

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Mr. Mike DaSilva
Montana Department of State Lands
Capitol Station
Helena, Montana 59601

Dear Mr. DaSilva:

Initially, I would just like to say that I am totally in favor of a clean, stable environment.

However, I think it is time for the radicals to take off their blinders and take a good look at what is happening, not just in Montana but in the gold old U. S. of A.

The economy is a disaster, crime is at an all time high, people are living in their cars and on the streets, unemployment is rampant. These facts are all traceable to one common cause, and that is: NO JOBS.

As a businessman in Roundup, I can personally vouch for how tough times are in this my hometown, and I can also see a solution: The proposed Meridian Minerals Coal Mine.

I personally feel it is time for all of us to choose between trees and rocks, or people and jobs. Let's quit our petty bickering and get the ball rolling, the time is now.

Sincerely,

Alvin E. Mills

ALVIN E. MILLS

(29)

Roundup Public Schools

MRS. SYLVIA SHELHAMER

School District No. 35 and 35-H
P. O. Box 717
Roundup, Montana 59072

J. JAY ERDIE

ALLEN W. CHERY, Sr.

PAULETTE PRATT

GARY F. RAY

September 24, 1992

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STATE LANDS

Mike DaSilva
Environmental Specialist
Montana Department of State Lands
Capitol Station
Helena, MT 59620

Dear Mr. DaSilva

From day one and reflecting back to where this process first started with the land exchange up through the present time and final stages leading to permission for permitting, the propensity, the time and the effort have been couched in economic development; a major concern for the State of Montana in general but in this case, Musselshell County and surrounding area in particular. As was so succinctly put by a Roundup life-time businessman in a feature article appearing in the Great Falls Tribune, Sunday, September 20, 1992, the "pivotal point" in the economic survival of this area is a successful conclusion on the mining permit being granted. Such approval affects every taxpayer in Musselshell County. This is noted in the Draft Environmental Impact Statement, August, 1992, page 44, *Impacts to public sector fiscal conditions from mining-related activities* and yet, I suggest the fiscal impact from mining-related activities would not be minor as suggested on page 46.

As is noted on page 44, and I quote, "Roundup Elementary and High School districts should realize increased general fund revenues of 30 percent, or about $700,000 per year through taxation from mining-related activities." This statement is true if general fund revenues include school foundation revenues, other non-tax revenues such as investments on earnings, motor vehicle fees, corporation license tax, etc. plus local tax levies. However, an additional comparison should be added to this discussion; $700,000 per year through additional taxation is a 200% increase when compared to current local tax levy amounts. Over the life of the mine, that is approximately $20,000,000 of additional tax dollars to Roundup Elementary and High School Districts. 29-1

In conclusion, this revenue cannot be considered only of minor benefit as you have concluded.

Thank you.

Sincerely,

J. Jay Erdie, District Superintendent
Roundup Public Schools

cc File

ACCREDITED BY THE MONTANA STATE DEPARTMENT OF PUBLIC INSTRUCTION AND THE NORTHWEST ACCREDITING ASSOCIATION

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Comments
Draft EIS
Bull Mountain Mine No. 1
Meridian Minerals
By Don Golder
P. O. Box 1705
Billings, Montana 59102
Roundup Hearing--September 24, 1992

Tonight I would like to talk a little more on the specific advantage of the coal delivery to a rail-head in Roundup.

First of all I would like to read to you from a document analysing 11 temporary loadout facilities, dated January 31, 1992 with a review team of Robert Ochsner, Mike Dasilva and Anne Cossit, entitled Draft Bull Mountains Mine No. 1 Temporary Load Out Facilities Alternative Sites Summary, summarizing an on site review January 29, 1992 and faxed out of the Georesearch office April 10, 1992. I would like to read as follows from Site 9.:

> The site area is located to the west of the intersection of highways 12 and 87 along the Burlington Northern Railroad right-of-way. The general setting is a river valley defined by Highway 12 and rock rims to the north and the river to the south. the river valley in this area contains cropland, low development housing and some light industry (a greenhouse). The town of Roundup is approximately one mile to the northeast.
>
> Advantages. Advantages to this site are similar to Lavina -- right of way ownership, power availability and water from the Musselshell River. This site is 16.8 miles from the mine, which is the closest site of all considered.
>
> Disadvantages. There are no existing mainline track, siding or loadout facilities. Although track previously existed along the right of way, track and other facility will create some environmental impact. Site may impact local residences. Thirty one miles of track will need to be laid to reach the site area. Although truck haul miles are shortest to this site 16.8 miles, the trucking would be permanent over the life of the mine. Cumulative truck miles will exceed any other site by a factor of approximately 2 to 1, based on a 30 year operation at Roundup compared to a 2 year temporary facility. There are 72 track miles to Laurel, the longest distance of all potential sites. Estimated cost of track and facilities construction is $6.750 million. 31-1

The difference in mileage between the Mine-site Laurel and the Roundup-Cushman-Laurel route is approximately 6 1/2 miles of rail line. The mine-site route is estimated to cost $23 million. To replace the line of the Milwaukee right of way is estimated to cost $6.750 million. The difference between the two rail line costs is about 26.25 million, enough to begin to figure out another way other than trucking to get the coal from the mine to the railroad. 31-1

producing 1 GPM. A spring producing 1 gallon per minute has an annual production of 525,600 gallons. The cost of developing a 1 GPM spring is around a thousand dollars and possibly up to $2500 complete for materials, and the water is steady and reliable.

I use the guzzler as an example of an alternate water source, and the plan concludes that it is for wildlife alone.

If Meridian is in earnest about replacing the water, possibly backstowing would be an alternate route. Otherwise, they should post a bond of not less than $500,000.

(32)

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Comments
Draft Environmental Impact Statement
Bull Mountain Mine No. 1
Meridian Minerals
By Don C. Golder
P. O. Box 1705
Billings, Montana 59102
September 23, 1992

In Huntley last night, I spoke of an alternate route for coal delivery. Tonight I would like to bring out an alternative solution for the subsidence over mined areas, backstowing or backfill. I appreciate the fact that it is cost prohibitive to do this.

The reason I bring up the issue of subsidence is because of the fracturing of the overburden that will undoubtedly take the spring water down and out of reach for livestock and wildlife. 32-1

If you compare the cost of real water replacement to the cost of back stowing, I wonder just what the differential would be. Backstowing, if done right, can reduce the subsidence 10% to 15%, which would in turn help to stabilize the perched water tables. 32-2

Let's consider the cost factors vs. water production in a suggested water replacement scheme in the Permit Application, a guzzler (water catchment system). A guzzler consists of a rain water catchment apron, drain pipe and trough, storage tank, float valve and drinking basin. The inadequacies of such a system, if it is drawn to scale in the permit application, are that an inch of rain on a thousand square foot apron will produce 623.27 gallons of water, and the storage tank, if drawn to scale, will hold 216.4 gallons of water. There are no provisions for overflow of water from the storage tank, or siltation clean out access to remove the dirt that will inevitably accumulate. 32-3

The cheapest tank that I know of at 500 gallons is $400.00. A 2000 gallon fiberglass underground storage tank will cost $2500.

A 5000 square foot rainwater catchment apron will collect 2116 gallons of water out of an inch of rain. The same size apron would collect 43,620 gallons of water annually with 11 inches of rain a year. If you could catch it all, the cost would be prohibitive for anything except wildlife. 32-4

The DEIS equates one of these guzzlers to a spring

(33)

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Comment
Bull Mountain Mine No. 1
Meridian Minerals
By Ellen Pfister
926 Yale
Billings, Montana 59102

Regarding the proposed rail route from the mine site to Broadview, it should be noted for a matter of public consideration that the 1984 Hawk Creek Fire which burned 148,000 acres of mostly private land, including the mine site, began approximately 9 miles west of U.S. 87 on the ridge where Meridian proposes to put its trackage. The prevailing winds on those late August-early September days were out of the Northwest. The other prevailing wind direction on that divide is out of the Southwest, and if that had been the case, that fire could just as easily have gone to the Northeast through the heavily timbered country into Halfbreed Creek. Trains are notorious for starting fires. On the Majerus Road Route, with low population density and low water availability, one would have limited means to fight fire. By the time Meridian could get heavy equipment to the fire, it could already be out of control and unstoppable. When the 1984 fire came off the East end of Dunn Mountain, it was a fireball that sounded like a tornado, and was clocked traveling 1 1/8 miles in 8 minutes. Halfbreed Creek is already a fire waiting to happen, but Meridian locating a track on a windy ridge all but ensures something like that happening. One of the advantages of putting the tracks in an alternate location in Musselshell county would be the higher visibility to ensure fire suppression and more water with which to do it. Montana law also consigns severe liability to those who start fires. I would like to find the legendary woodcutters who started the western end of the Hawk Creek Fire. They are still in hiding. Everyone will know Meridian. 33-1

September 24, 1992

(34)

State Historic Preservation Office
Montana Historical Society

Mailing Address: 225 North Roberts • Helena, MT 59620-1201
Office Address: 102 Broadway • Helena, MT • (406) 444-7715

September 17, 1992

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SEP 25 1992
STATE LANDS

Mike DaSilva
Environmental Specialist
MT Dept. of State Lands
Capitol Station
Helena, MT 59620

RE: DEIS - Meridian Minerals Co.'s Bull Mountains Mine No.1

Dear Mr. DaSilva:

Thank you for the opportunity to review the draft environmental impact statement for the above cited undertaking. Our comments with respect to cultural resources are presented below under two separate headings--the proposed railroad corridor and all other mining-related activities. This reflects the fact that the rail spur has been the subject of previous review by our office and OSM pursuant to 36CFR800, the federal regulations implementing the National Historic Preservation Act. Formal review and consultation among DSL, OSM, and this office on the survey of the mine plan area has not yet occurred; therefore, substantive DEIS comments and input on cultural resources in the framework of survey coverage and results, site significance, impacts, etc. cannot be offered at this time.

Proposed Rail Spur

In reviewing our own files on this project, we found that a total of 32 cultural resource properties were identified as a result of the intensive survey work within the rail corridor. Of this total number of sites, this office concurred with OSM that four historic sites did not meet National Register eligibility criteria and that one historic homestead appeared eligible under at least National Register eligibility criterion a. This homestead may also be found to meet other National Register criteria once further investigations have occurred. The eligibility of the remaining 27 sites is unresolved, pending similar additional investigations. This work will include subsurface testing at the 15 prehistoric archaeological sites (one with an historic component) and additional recordation/archival research at the 12 historic sites. Our current understanding of the status of cultural resource matters in the rail corridor is that until such additional work is carried out to refine assessments of site eligibility, there is a total of 28 sites which can be considered potentially eligible for listing in the National Register of Historic Places. Summary statements appearing in the DEIS do not correspond with this, and discrepancies were noted on pp.III-50 and IV-61 at least in terms of total numbers. Since the discussion on p.IV-61 concerns the 24 sites that will be adversely affected by railroad construction and operation, this lower number may reflect the fact that impacts are not expected at the other four potentially eligible sites. In conjunction with OSM, this office can address effect and proposed mitigative measures after site significance has been determined, following the procedures of 36CFR800. If testing or archival research demonstrates that any of the 24 sites do not possess significant historic associations or have no potential to yield important archaeological data, no special mitigation effort would be warranted. **34-1**

One issue identified during our review of the rail corridor survey concerned the adequacy of the 150-foot wide survey width and whether this corresponded with the anticipated area of environmental impact from the railroad's auditory and visual intrusions and other indirect impacts upon standing historic structures and properties with traditional cultural values. **34-2**

9/17/92
p.2

Finally, for both the Proposed Mine Area and the Proposed Railroad Spur, we strongly recommend that substantial work be accomplished at this stage to identify the presence or absence of sites that would qualify for the National Register for their values to traditional Native American cultures. As the EIS generally acknowledges, if such sites exist within project areas, they are not readily mitigated by methods used for archaeological properties or Euroamerican architecture. In order to give EIS readers and decisionmakers adequate information to assess project impacts, substantial consultation with tribes and reconnaissance level field work should have occurred by this time. In addition, the EIS should at least outline the specific steps taken and the general status of consultation with Native American groups, describe how impacts might be avoided or treated, and demonstrate that sufficient study has occurred to understand likely impacts to any possible National Register eligible properties in the project areas. **34-3**

Proposed Mine Area

In contrast with the cultural resource inventory of the rail spur corridor, no formal review of the survey(s) of the life-of-mine area has taken place. This office has not received comments from OSM or DSL on the adequacy of survey methods and coverage nor has there been any consultation to date about anticipated disturbances. Judging only by the cursory summary presented on pp.IV-61-62 of sites that may be disturbed during mine construction and operation, the review and compliance process promises to be a lengthy one. To facilitate this process, we recommend that the role, responsibilities, and timeframe of lead agency be made explicit with regard to coordinating determinations of eligibility and effect and recommended mitigation plans, particularly if there are actually 230+ properties to contend with in the mine area as stated in this draft document. **34-4**

Thank you for the opportunity to comment.

Sincerely,

Diana L. Vanek
Archaeologist

BLP
(35)

DEPARTMENT OF COMMERCE
LOCAL GOVERNMENT ASSISTANCE DIVISION

STAN STEPHENS, GOVERNOR — 1424 9TH AVENUE

STATE OF MONTANA

(406) 444-3757 — HELENA, MONTANA 59620-0423

September 22, 1992

RECEIVED
SEP 24 1992
STATE LANDS

Mike DaSilva
Environmental Specialist
MT Department of State Lands
Capitol Station
Helena, MT 59620

Dear Mr. DaSilva:

The Montana Coal Board at its meeting held in Billings on September 19, 1992 took official Board action by unanimously passing a motion stating the Board would take no position on the draft EIS for Meridian Minerals Company's Bull Mountain Mine No. 1.

Sincerely,

Murdo A. Campbell
Administrative Officer
Montana Coal Board

627.0
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"AN EQUAL OPPORTUNITY EMPLOYER"

BLP
(36)

County of Yellowstone

COMMISSIONERS

(406) 256-2701
Box 35000
Billings, MT 59107

September 22, 1992

Mike DeSilva
Environmental Specialist
Montana Department of State Lands
Capitol Station
Helena, MT 59620

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SEP 2[illegible] 1992
STATE LANDS

Dear Mr. DeSilva:

This Commission has reviewed the Draft EIS for Meridian Minerals Company Bull Mountains Mine No. 1, and we are in general consensus with the estimates of socio-economic impact.

However, we feel that the employment of people in a rural primary industry such as the Meridian Mine needs to be more appreciated. Your EIS merely refers to it as of minor impact (Table IV-5). Your summary statement also refers to the denial of the permit as having only "negligible to moderate impact;" the employment of upwards of 300 people in basic industry in Montana merits more consideration. **36-1**

Please consider this in your final EIS.

Sincerely,

BOARD OF COUNTY COMMISSIONERS
YELLOWSTONE COUNTY, MONTANA

James A. Ziegler, Sr., Chair

Mike Mathey, Member

H. Elwood English, Member

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App (37)

RECEIVED
SEP 25 1992
STATE LANDS

2116 Virginia Lane
Billings, MT 59102
September 22, 1992

Mr. Mike DaSilva
Environmental Specialist
MT Dept. of State Lands
Capitol Station
Helena, MT 59620

Dear Mr. DaSilva:

I support the development of the Bull Mountains Coal Mine Project. The project has undergone extensive environmental and socio-economic review. The coal to be mined offers a unique energy resource for the State of Montana. The higher BTU, lower sulphur content of the coal provides an environmentally superior fuel for many energy needs both within the State and in the surrounding region. The jobs that would be provided by this mine are badly needed in eastern Montana.

The socio-economic impacts of this mine need to be assessed in terms of the natural need for growth and change in western communities. The idea that socio-economic impacts result only from growth in the economy is ridiculous and a short sighted way to approach the topic of socio-economic impacts assessment. Western communities have always undergone growth and change. That's a characteristic of our region. Mining also has played an integral part in the culture of the West throughout its entire history of European settlement.

One needs only to look at the devastating socio-economic impacts of economic stagnation which has occurred in the State of Montana during the past decade, with families being wrenched apart as children and neighbors have had to move out of the region in order to find jobs, as schools have been deteriorating or closing down for lack of an economic base to provide the funds needed, and as health care has nearly vanished in many rural portions of our state, to realize the real impacts of the lack of economic development in Montana.

The notion that growth and change are not a normal part of life anywhere, let alone in the Western U. S., is a recent peculiar notion developed primarily as an expedient to halt energy developments by those who are in a privileged position regarding the status quo. Masquerading as progressive, this no-growth attitude is a profoundly conservative approach which would exclude opportunity for others while maintaining privileged status for the few, for whom the status quo during this brief moment in history appears to them to be the eternal order of things, and the way things should be forever after.

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app 144

Mr. Mike DaSilva
September 22, 1992
Page two

Clearly attempts should be made to handle development in the most environmentally sound way possible, and in a manner which minimizes disruptive socio-economic impacts to the extent reasonable. However, to proceed on the notion that change is a negative socio-economic impact is to go counter to the entire history of this State and the tradition and culture of the American West. Indeed, nothing has more characterized the history of North America than change and growth. Communities must change and evolve in order to remain vital. Without change and growth, opportunities for the young are sacrificed in order to maintain privileges for the old.

I have two children who are growing up in Montana. I would like a future for them and this State in which young people might hope to find productive employment in some field other than as a servant in the tourist industry. I urge that this project be allowed to go forward for the good of the State of Montana, and to provide some hope for devastated rural communities elsewhere throughout this state and region that progress is possible, and that their futures are not doomed to a zoo-like existence in somebody's else's concept of what the American West should be.

Sincerely,

Douglas Richardson, PhD
2116 Virginia Lane
Billings, MT 59102

BLM (38)
627.0
144
App

101 Eastbrook
Chadron, NE 69337

RECEIVED
SEP 28 1992
STATE LANDS

Re: Bull Mountain Mine No.1

Dear Mr. DaSilva:

Our names are Charles and Barbara Cropp. We bought the land next the the proposed mine site September, 1987, Sect 23, township 6 North, Range 26 East, Tracts 59 and 60. The purpose for buying this plot of land was for retiring, building a home, enjoying the beautiful scenery, observing the wildlife, and relaxing in the peaceful tranquility of the mountains. This particular plot was our choice because of the abandon mining and the knowledge that we would only have neighbors on the one side of us. We voiced these objectives at the last meeting in Roundup.

We received the Environmental Impact Statement and would like to point out some of our concerns about even considering the possibility of trying to retire there now.

AIR QUALITY-- Coal dust is a major problem, no matter how much watering is done. The dust creates the possibility of explosions at the mine site as well as the dust related to the trucks that will be passing the property constantly. 38-1

GROUND WATER-- We were planning on putting down a well a few years ago so we could proceed with the building plans. When we attended the meeting we became concerned about the effects that the mining process will have on the direction of the water flow as well as the quality of the water that will be available. There is even the possibility that the mining could change the water flow to such an extent that we will now be unable to even get water for a well. 38-2

WILDLIFE ENVIRONMENT--The wildlife has already disappeared from the area we own. We saw many kinds of wildlife on the property and were looking forward to encouraging the wildlife to remain in the area. Because of noise and the altering of the terrain around our property that is no longer possible. 38-3

TRAFFIC-- The amount of traffic that will be necessary in order to transport the coal, we will be experiencing a constant caravan of trucks to haul the coal from the site. This will create a noise level equal to living on a busy highway, the exact reason we choice this area so we could avoid noisy traffic. This vibrations from such traffic will also make building a risky proposition. There will be no way of protecting the building from becoming unstable from the constant vibrations. The development of a railway to the site will only increase the noise and vibrations. One of our first considerations when we look at property is to make sure there are no railways near by. 38-4 38-5

On page IV-41, it appears to us that our residence would be closer that the 4500 feet stated. We're not only concerned with the noise level but with the vibration levels from the underground mining activity. 38-6

I know employment is a big consideration but we feel that the quality of life for those who bought property or owned property in the area is being denied and ignored. It seems that big companies generally have their way because of the big bucks. What considerations have been made concerning those of us who have the unfortunate fate of being in the wrong place at the wrong time? 38-7

We would not have considered this property if we had even suspected something like this would be coming along. At the time of the purchase we asked about the possibility of the mine being reopened. We were led to believe that the mine had been abandoned and that mining there was not at all likely. The area around the site should be included in the plan and those in this area should be compensated in some way. It is not fair to destroy peoples dreams, hopes, years of saving and laboring without some consideration. 38-8

Sincerely,

Charles and Barbara Cropp

101 Eastbrook

Chadron, NE 69337

(39)

HUNTLEY COMMUNITY CLUB, HUNTLEY, MT 59037

RECEIVED
SEP 28 1992
STATE LANDS

September 22, 1992

Dennis Casey, Commissioner
Mike DaSilva, Environmental Specialist
MT Dept of State Lands
Capitol Station
Helena, MT 59620

RE: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR MERIDIAN MINERALS COMPANY'S, BULL MOUNTAINS MINE NO. 1 AND HUNTLEY LOAD-OUT FACILITY. 39-1

Dear Mr. Casey:

The Huntley Community Club/Environmental Committee would like to request of you a 30-60 day extension on the comment period for this document.

The reasons for this are:

1. We are a local grass roots group whose main concern until 1990 was taking care of the Barkemeyer Park. Since then, Meridian Minerals was allowed by MT Dept of State Lands to use this Community for its temporary load-out facility. Shortly after the load-out was in operation the HCC/EC was forced to address the concerns of the Huntley Community and surrounding area, regarding the load-out.

2. Since the Community of Huntley was not on the original list of communities to even have a scoping meeting planned for it, this Community had to go to the MT Dept of State Lands and request a meeting, which was held after the closing dates to even comment. All ready this Community was being treated as a write off in this project and yet has the most to lose in its quality of life. Because of this meeting and subsequent meetings sponsored by the Huntley Community Club the Draft EIS that was supposed to be out in the Fall of 1991, has now just been released. A WHOLE YEAR LATER! 39-2 39-3

3. Since this Community Group does not have the expertise at our disposal, that both Meridian Mines and MT Dept of State Lands does, we wonder WHY we are expected to assess this document in 30 days. We are sharp, but not that sharp! 39-4

4. For these reasons we are requesting an extension of time for us to be able to find the experts that can help us review this document so that our comments will be valid comments and will stand up to an appeal, if needed. We think this is the only fair thing that you Mr. Casey can do to make sure that our Community is just not railroaded into a load-out facility that is only being placed here because Meridian Minerals doesn't want to spend the time nor the money to address another site location and its impacts. To date this group HCC/EC does not feel that the Montana Environmental Protection Act has been adequately addressed. 39-5

Sincerely,

Steven M. Erb

Steven M. Erb, Pres.

(40)

Robert Knickerbocker
P O Box 81
Huntley MT 59037

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SEP 29 1992
STATE LANDS

September 24, 1992

Mike DaSilva
Environmental Specialist
MT Dept. of State Lands
Capitol Station
Helena MT 59620

Dear Mike DaSilva,

My name is Robert Knickerbocker. I am the President of the Huntley Water and Sewer District.

As a member of the local government that over see's the safety and quantity of our citizens water, I'd like to make a statement:

Our goal and #1 concern is to see that everyone, now and in the future, has a safe and steady supply of water at an affordable price. We the board of directors, take this job very seriously. Over the last 2 years we have taken much needed steps to insure the quantity and quality of our water.

We have applied to the state for a grant for well head protection. We feel that it is very important to know what could and/or may contaminate our source of water.

We have also contracted Morrison/Maierly Engineers to do a water system deficiency study and recommended improvements. In the study it was determined that we have 4 priorities that must be done.

1. Is the most critical. This calls for a new well and pumphouse. A new well and pumphouse "must" be installed to provide a second source of water for the town, which is a MDHES requirement for small community water systems.

2. Includes the looping of existing deadend lines, adding mainline valves to the existing system, replacing 2 fire hydrants, and adding 7 new ones. This will provide the necessary circulation of water in the existing system and provide the back bone for fire fighting protection to the town.

3. Would install a new 100,000 gallon elevated storage tank which would increase the domestic water supply and provide complete fire protection for the town.

4. Is to add a gas chlorination system to the existing well house.

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pp

The district has already spent thousands of dollars and many, many hours of donated time on this project. The engineers have estimated the cost of improvements at $700,000.00.

I have given you some of the information of what the District is planning. Now I'd like to voice some of my concerns.

What concerns me the most is that in Chapter V of the EIS the one local government that directly over sees the quality and quantity of water for the town of Huntley is not listed. I am talking about the Huntley Water and Sewer District. 40-1

If we were contacted for consulation and coordination, some of my other concerns would probably have been eased.

I'm concerned about Meridians 30,000 gallons a day well. The final site for our 2nd, state mandated, well is not finalized. How will it effect our quantity and quality? 40-2

I'm concerned about our projected 1993 mid-season construction, depending on our ability to get funding. How will the expected increase in traffic affect the people and streets when they have to be detoured around construction? 40-3

I'm concerned about the financial health of the water district. There is only approximatly 98 users on our system at present. Because we have so few, we have to charge these users more. I'm in hopes that with the improvements being planned, more people will move to Huntley. We already have beauty, with the load out located in Huntley I don't expect to see many new hook ups. If anything the odds are that we'll see some disconnects. We found out when Meridian was in town the last time, that we can't depend on them for much financial input. As a district we are impowered to request a tax if we are unable to meet our financial obligations. In this day and age when every politician tries to add a new tax at the drop of a hat, I'm dragging my feet. I don't want to levy a tax on someone who is a ½ of a mile from our water main, simply because they are in the district. We can not loose "any" users. I can not stress the point too much. We can not loose "any" users! 40-4

To sum up my statement I'd like to say that the EIS is incomplete. I would like to see an extension on the study. 40-5

Thank you very much for listening to me and I hope you take into consideration my concerns.

Sincerely,

Robert Knickerbocker

Robert Knickerbocker
President of the Huntley Water & Sewer District

(41)

MERIDIAN
Minerals Company

September 30, 1992

RECEIVED
OCT 01 1992
RECLAMATION DIVISION

Montana Department of State Lands
Attn: Mike DaSilva
Environmental Specialist
Capitol Station
Helena, Montana 59620

Re: Draft Environmental Impact Statement (DEIS) for the Bull Mountains Mine No. 1

Mike:

I am writing to comment on the DEIS for the Bull Mountains Mine No. 1. My concern is focused on certain language regarding failure of the proposed mitigation plans. I object to such commentary and am requesting that all references to mitigation failure be removed throughout the DEIS. 41-1

As the Department is aware, if the permit application is approved, then lawful mitigation is required in accordance with the Montana Surface and Underground Mine Reclamation Act (MSUMRA). If such mitigation cannot be attained, then no mining permit would be granted from MDSL. In either instance (approval or disapproval of the mining permit), the commentary which declares irreversible and irretrievable losses in the event of mitigation failure is not accurate. 41-2

If the mining permit is approved, then MSUMRA requirements must be met and therefore the DEIS commentary regarding mitigation failure is in conflict with the approved mining permit. If the mining permit is not approved then there are no mine impacts.

The DEIS includes a statement in Chapter II, Subpart A, item 1 (page II-1) and Chapter IV, Subpart A, item 1 (page IV-1), and both accurately present an assumption that an approved permit application "is in compliance with MSUMRA and other applicable State and Federal laws". 41-3

P.O. Box [illegible]
Roundup, Montana 59072
406-323-1010

Therefore, I am requesting removal of certain language regarding failure of the proposed mitigation plan which is found on pages iv, II-6, IV-20, IV-25, IV-32, IV-55, IV-85, IV-87 and IV-89. 41-3

Sincerely,

Robert Ochsner

Robert E. Ochsner

REO/lgb

(42)

September 30, 1992

RECEIVED
OCT 01 1992
STATE LANDS

Mike DaSilva
Environmental Specialist
Montana Department of State Lands
Capitol Station
Helena, MT 59620

Dear Mr. DaSilva:

As a retired, life long resident of the Huntley community, I am totally opposed to the proposed Meridian coal load-out facility in Huntley. Since the public hearing held in Huntley on September 22, 1992 was not a question and answer session, perhaps you can answer some questions regarding the draft E.I.S.

1. Air Quality

In the last paragraph in Chapter III, Page III-6, the agency would lead readers to believe that monitoring was done at Huntley during the temporary load-out in 1989 and 1990. It is stated that the maximum 24-hour PM10 concentration was about 41ug/m3 with an annual average of about 14 gu/m3. Since no monitoring was done near the load-out site during that period, how can these figures be used as fact? 42-1

In Chapter IV, Page IV-11, it stated that the maximum 24-hour PM10 concentration (37.6 ug/m3) resulting from the operation indicates that the degradation of air quality would occasionally exceed the allowable PSD increment by out 1.7 times, but PSD permit requirements would not be applicable because the estimated particulate emission would only be about 12 tons per year. Was the 12-ton emission figure also taken from the aforementioned non-existent monitors? Through the duration of one load-out in 1990 there was enough emissions to nearly blot out the street lights. What should residents with respiratory problems do during the duration of this project if approval is given? 42-2 42-3

2. Noise Levels

On Page IV-13 it is stated that a water spray system will be installed to minimize fugitive dust emissions. How can this system remain operable during freezing weather? On Page IV-42 it is stated that noise generated during the load-out operation 42-4

7.0 (app 144)

would be noticed by Huntley residents and would occasionally be above acceptable levels recommended by E.P.A. The noise noticed by Huntley residents is an under statement if I ever heard one. During the load-outs in 1990, the noise from dozers pushing coal onto the conveyor belt and train locomotives moving empty and full cars, blowing their whistle with each move, along with diesel exhaust and coal dust made it impossible to leave windows open during summer nights. It was also impossible to get a decent night's sleep even with windows closed. 42-5

The agency admits that both air degradation and noise levels will exceed some standards, so how can they state that the impact to the Huntley community will be minor? 42-6

3. Recreation

Page IV-51 states that recreation opportunities and quality in Huntley would be impacted from coal dust. Yet the agency concludes that impacts to recreation opportunities will be minor. Do you also conclude that breathing coal dust when exercising and doing every-day activities is a minor impact? 42-7

In regard to the mis-quote by Tetra Tech which I mentioned at the public hearing on September 22,1992, the road that I referred to was not Heath Street but Old Highway 10 leading northeast out of Huntley. The other streets in that area of town, namely Date, Elm, Fir, Grape, Heath, Jute, 2nd North, and 3rd North, are all used for walking, jogging, biking, etc. 42-8

4. Transportation

Throughout the entire section on transportation from the mine to Huntley, your findings indicate there will be more traffic accidents, trucks having difficulty negotiating turns at the intersection of Highway 87 North and Highway 312 East, the LOS reduction at the intersection of Heath Street and Highway 312 East, and at the entrance to the load-out site, the deterioration of the roads, especially Highway 312 East and Heath Street. 42-9

Mike DaSilva
Montana Department of State Lands
September 30, 1992
Page Three

Why wasn't there more consideration given to alternate haul routes away from already congested roads? There can be no dollar amount place on those that will die or be maimed due to the truck-related accidents caused by this needless haul route. 42-10

I can only hope that you will take the concerns as expressed by people of the Huntley community seriously and not permit the load-out facility to be placed in Huntley.

Sincerely,

James Pope Box 41 Huntley, MT. 59037

James V. Pope

cc: Dennis D. Casey, Commissioner

1673 Goulding Creek Road
Roundup, Mt. 59072
Sept 29, 1992

(44)

Montana Dept of Lands
Environmental Coordinator
Capital Station
Helena, Mt. 59620

RECEIVED
OCT 01 1992
STATE LANDS

Mike Desilva,

We support the Bull Mountain Landowners association, an affiliate of the Northern Plains Resource Council, in their list of minimum requirements for permitting the Bull Mountain Mine No. 1.

A photo copy of list is enclosed. Item no 3 is extremely important to us and other land owners in Broadview area, due to the destruction to land and ranch operation, causing lowering of property values, by the proposed railroad to Broadview. Answer would be appreciated. 44-1

Sincerely

George and Eleanor Carlson

P.S we don't feel northern plains Railroad co should destroy private owned agriculture land when inerstate owns the Milwaukee Railroad. 44-2

627.0 App 144

(43)

September 16, 1992

RECEIVED
OCT 01 1992
STATE LANDS

Mike DaSilva
Environmental Specialist
MT Dept. of State Lands
Capitol Station
Helena, MT 59620

Dear Mr. DaSilva:

For the last seven years I have leased the Brown Ranch which consists of roughly 25 sections, and lays directly east of the designated life of mine area. I know water is one of the issues in the permitting process and I would like to comment on that subject.

I utilize a number of springs on the ranch to water livestock. Some are good, but many are not dependable and either dry up or freeze up at different times of the year. 43-1

I realize that the proposed mining operations could have an impact on some of these springs. After looking over the planned mitigation measures I'm not so sure that would not be a blessing. Anyone that says springs are a no maintenance dependable supply of water hasn't tried to utilize the majority of the springs in the Bull Mountains. Mitigation measures like horizontal drains, deeper wells, etc. would most likely give me a more dependable water supply. From what I understand from the DEIS my wells are below where the coal is to be mined and in all probability will not be effected, although mitigation measures apply there also. I also have a hunch that after mining has occurred for a few years we will very possibly have more and/or larger springs than we have now 43-2

I support Alternative #1 in the DEIS. Let's get the project going.

Sincerely,

Lessee, Brown Ranch

627.0
App 144

Northern Plains Resource Council

The Bull Mountain Landowner's Association, an affiliate of the Northern Plains Resource Council (NPRC), feels there are serious problems with the permit application of Bull Mountain Mine No. 1 *as it is currently proposed.* In light of this fact we have developed a list of conditions we feel must be implemented if the mine is to be permitted. These conditions have the full support of NPRC.

MINIMUM REQUIREMENTS FOR PERMITTING THE BULL MOUNTAIN MINE NO. 1

1. Realistic bonding and a permanent trust fund to restore water resources likely to be disrupted by mine subsidence both on-site and down through tributary drainages.

2. Realistic bonding and a permanent trust fund to stabilize slopes and control subsidence-caused erosion

3. Disapproval of interim coal hauling to Huntley as a threat to public safety. Require coal transportation from the outset to be by conveyor, built down Halfbreed Creek to Roundup and then by a common carrier rail spur built from Roundup along the old Milwaukee right-of-way to the mainline at Cushman.

4. A state-of-the-art covered tipple for the coal loadout.

5. Formal notice given to interested parties on development and revisions of permit requirements.

Persons interested in adding their support for adoption and enforcement of these mine permit conditions please contact the Montana Department of State Lands, Capital Station, Helena 59620 or the NPRC office at (406) 248-1154.

Sincerely,

Jeanne Charter

Jeanne Charter
BMLOA Secretary/Treasurer

419 Stapleton Building Billings, MT 59101 (406) 248-1154

(45)

RECEIVED
OCT 01 1992
STATE LANDS

Mike DaSilva
Environmental Specialist
MT Dept. of State Lands
Capitol Station
Helena, MT 59620

September 24, 1992

Dear Mr. DaSilva:

I'm writing in response to the draft EIS released earlier this month by your office. Let me start by saying that I am 100 percent in favor of the Bull Mountain Mine Permit. I have been employed by Meridian Minerals in Roundup since April, 1989.

I cannot say enough about my work experience with Meridian. They are a super company to work for. They make promises to their employees and to the community and they follow through with them. Meridian helps make Roundup a better place to live through their many grants and donations. You have no idea how much and how many different organizations they support in this small town. Whenever possible, we buy supplies locally, and keep as much business as we can right here in town.

Meridian is more than willing to work with the community on any problems. If the local staff can't solve the problem all I have to do is call the Billings or Englewood office and someone else from the company flies in to help. Meridian is a caring company and shows genuine concern for their employees. I recently endured an extensive hospital stay and Meridian kept my job open for me. Meridian provided support at a time when I needed it more than ever. After working 10 years full time for the last company, I had a heart attack was off for a month, then got my hours cut, all benefits taken and when got down to twelve hours a week quit. It is wonderful to work in the caring, open environment Meridian provides. It has been over two years since I had bypass surgery and still working.

As of August 31, 1992, I have received 438 applications from Montana alone for the jobs this mine will bring. These jobs will provide the opportunity to keep our community alive and growing. I only hope others have the chance to experience what I have working with Meridian.

Sincerely,
Johanna (Jo) Soennichsen

637.0 app 144

Dept. 25, 1992

Dear Mr. DaSilva,

My name is Al Landwehr, and I am currently employed by Western Energy at the RoseBud mine in Colstrip, Mt. I am a working man, employed as a serviceman / oiler for the mine.

I fully support the mining operation for the jobs it would create, and the revenue it would bring to the county, as well as the state of Montana.

The frivolous complaints of uninformed people are unwarranted, because regulations concerning the mining industry, being monitored by the Federal Government, the State Government, MSHA, and the EPA are so strict that the well being of the land, animals, air, water, the general public and the mine workers themselves will all remain environmentally sound.

(46)

RECEIVED
OCT 01 1992
STATE LANDS

Please forward the enclosed letter to Mr. DaSilva at the Dept of State Lands.

Thank You Very Much for your assistance

Sincerely, Al Landwehr

I would very much like to see the Bull Mountains mining project proceed forth.

Thoughts and Comments of a Modern Day Miner.

Sincerely, Al Landwehr

637.0 app 144

GERALD BARTOW, President of Council
ELLEN LEE, Clerk/Treasurer
VIOLET OLSEN, Assistant Clerk
GARY THOMAS, Commissioner of Public Works
VICKI EMERSON, Attorney
ROBERT MRKUSICH, Police Magistrate
DONALD MOORE, Fire Chief

SALLY ARMSTRONG, Mayor

City of Roundup
Montana

ALDERMEN
LINDA DITCHELL, 1st Ward
JAMES SCHLAD, 1st Ward
GERALD BARTOW, 2nd Ward
DAVID SATTERTHWAITE, 2nd Ward
JOYCE BREWER, 3rd Ward
WILLIAM EDWARDS, 3rd Ward
WILLIAM MYKK, 4th Ward
BRUCE HOILAND, 4th Ward

(47)

September 16, 1992

RECEIVED
OCT 01 1992
STATE LANDS

Mike DaSilva
Environmental Specialist
MT Dept. of State Lands
Capitol Station
Helena, MT 59620

Dear Mr. DaSilva:

In the DEIS it is stated that "impacts to public sector fiscal conditions from mining - related activities would be minor and beneficial over the short term." Over the life of the mine I believe the economic benefits to the City of Roundup will be far from minor. Your assumptions on local hire ratios and how many workers will live where, are arbitrary to say the least. No one can give a definite answer as to who will live where or where they will come from. Simple logic tells me that 300 well paying secure jobs, fifteen miles from Roundup will have a dramatic positive effect as time goes along. It seems reasonable to assume that over time our proximity to the mine will encourage workers to live here and also aid in the logistics of the mine operation. **47-1**

In a town with the stagnant economy we have endured for the last few years, any increase in the economy can be dramatic. Our taxable valuation has fallen to 1.5 million and remained there since 1988. We see nothing in the future to keep our valuation from continuing downward without this project.

Overtime, I believe this project will have a very strong beneficial impact on the economy and fiscal condition of the City of Roundup.

I urge you to approve Meridian Minerals proposal under Alternative 1.

Sincerely,

Ellen J. Lee

Ellen J. Lee
Clerk/Treasurer
City of Roundup

627.0 app 144

(48)

September 30, 1992

RECEIVED
OCT 02 1992
STATE LANDS

Department of State Lands
Attn Mike DeSilva
Capitol Station
Helena, Montana 59620

Dear Sir:

We, the Musselshell County Republican Central Committee, do hereby go on record as being in favor of the Jull Mountain Mine #1 permit being granted.

Thank you.

Cordially yours

MUSSELSHELL COUNTY REPUBLICAN
CENTRAL COMMITTEE

Alan D. Evans

Alan D. Evans, Chairman

627.0 app

Montana Department of Fish, Wildlife & Parks

RECEIVED
OCT 02 1992
STATE LANDS

(49)

Mike DaSilva, Environmental Specialist
Mt. Dept. of State Lands
Capitol Station
Helena, Mt 59620

September 30, 1992

Mr. DaSilva,

The following comments address the Draft Environmental Impact Statement (DEIS) for Meridian Minerals Company Bull Mountains Mine No. 1.

Technical Adequacy

1. Table III-3 and Appendix E, Table E-3-7. Who developed the criteria used to determine which springs were of "high, moderate and low" importance to wildlife? Who actually rated each spring? This information is important if one is to judge whether or not the system used will adequately protect wildlife values. **49-1**

2. Page III-21, paragraph 3. In 1991 we harvested 43 elk in hunting district 590. Approximately 74% of the elk harvested in this hunting district came from the Bull Mountains. Although total counts or population estimates based on marked elk have not been made in recent years we do know that there are more elk now than when Dusek did his counts in 1978. There are a large number of elk wintering on the north side of the Bull Mountains at the confluence of Fattig Creek and the Musselshell River. **49-2**

3. Page III-22 paragraph 1, 4, etc. Throughout the sections on wildlife and vegetation references are made to the "western portion of the area." When referring to the western portion of the area are you talking about the western portion of the life of mine area or the western portion of the area which also includes the railroad right-of-way? **49-3**

4. Page III-44. One of the major recreational activities which takes place in this part of Montana is hunting. In 1991 4134 deer hunters alone generated 16521 hunter days of recreation in hunting district 590. Although elk hunting with a rifle is controlled by permit any individual can archery hunt and in 1991 130 elk hunters generated 871 hunter days. In 1991 762 turkey hunters in Musselshell county generated 2235 hunter days. The importance of hunter recreation to the local economy received little recognition in this document. **49-4** **49-5**

5. Page IV-51, paragraph 1. There is no evidence or data to support your conclusion that big game may relocate to state and federal lands and actually increase hunter opportunity. **49-6**

627.0 app 144

(49)

6. Page A-50-51. The wildlife monitoring which will be conducted is fine but what will be done if there is degradation of habitats and populations of elk, deer and/or turkeys decline. **49-7**

7. There is no mitigation proposed for loss of habitat due to subdivisions. **49-8**

Mitigation and Conditions of Mining.

1. Meridian proposed mitigation measures for 42 of 130 existing springs and seeps which could be disrupted by the mine. For the remaining 88 water sources Meridian proposed that appropriate mitigation methods would be employed if monitoring indicated a problem. Identified below are those water sources which Meridian rated with a 3 or 4 for wildlife values in Table III-3 but did not offer mitigation in Table A-3. There should be a mitigation plan offered for the following springs and seeps: 52165 rating 4, 52275 rating 4, 52375 rating 3, 52455 rating 3, 53285, rating 3. In addition, there should be a mitigation plan for at least one water source per section throughout the area. **49-9**

2. Page III-22, paragraph 5. There is a population of sage grouse. Does the railroad right-of-way impact any of the remaining sagebrush areas? If the right-of-way impacts any native vegetation, especially sagebrush, mitigation should be offered. **49-10**

3. Page IV-51. Paragraph 2. "Reseeding of the railbed after construction would attract deer and elk." Is this an impact or a benefit? **49-11**

4. Page A-48, paragraph 2. What is the justification for the number and size of rock piles being established in the reclaimed zones? **49-12**

5. On page IV-4 it is stated that there will be 450 jobs created and that 75% of the people hired will be from the local area. Of the 25% that migrate into the area 7% will locate to rural Yellowstone County and 6% to rural Musselshell County. If those numbers are correct it is likely that there will not be a large impact to wildlife from increased subdivision. If the numbers are low, which testimony given on September 24, 1992 at Roundup would indicate, there will be a significant impact to wildlife from increased subdivision. That impact was partially recognized in this DEIS on page IV-30, "As human activities (e.g., mining subdivision) increased, elk would redistribute their activities for avoidance when possible. Spreading subdivision, and adding more people, dogs and livestock to adjacent elk habitat may have a far greater impact on elk **49-13**

(49)

distribution than mining. When human activities increased to the point where adequate isolation for elk would be unavailable, elk numbers should decrease." Other species, including mule deer and bobcat, will also be impacted by increased human activity. 49-14

6. Appendix B. Cumulative effects. There are three major developments taking place in the Bulls which have or will have an affect on wildlife populations: logging, subdivision and mining. The DEIS did not acknowledge that a very large area in the Bulls has recently been logged and that there are numerous acres which will be logged in the near future. In the short term these timber sales will greatly reduce the availability of secure habitat in lands adjacent to the mine. A second cumulative impact which was not adequately discussed was the increase in building on 20 acre tracts and the increased potential for subdivision in the Bull Mountains. The document mentioned the Hidden Springs Subdivision but it failed to recognize the significance of habitat fragmentation in the Bulls and the impact to wildlife and hunter recreation from increased subdivision. A check of an outdated land ownership map for Musselshell County (1982) indicated a minimum of 35 sections have been subdivided in Halfbreed Creek, Goulding Creek, and around Roundup. In addition, there is a new Subdivision, Cedar Ridge, between Roundup and Billings, and land being sold in Goulding Creek. The cumulative effects of logging, subdivision and mining on species less tolerant of human disturbance such as elk, mule deer, and bobcat will likely result in a degradation of habitat and therefore a reduction in numbers of these species for the life of the mine. 49-15

Many of the mitigation procedures outlined in the DEIS were satisfactory and should help maintain wildlife populations. An impact which the mine will be partially responsible for and for which no mitigation was offered was subdivision. Subdivisions will have the most profound short and long term impact to wildlife and hunting recreation. The MDFWP would encourage Meridian to take the mitigation procedures proposed one step further and aggressively work to protect wildlife values and hunting heritage in the Bull Mountains. These values could be maintained by placing conservation easements on land owned by Meridian and additional ranches at the headwaters of Fattig, Rehder, Railroad and Pompey's Pillar Creeks. We would encourage Meridian to work with the MDFWP and local landowners to establish an area around the mine site which is protected from further subdivision and where the habitat might be enhanced for wildlife. 49-16

Sincerely,

Ray Berntsen

Ray Berntsen, Acting Supervisor
MT Dept Fish Wildlife & Parks, R-5

(50)

RECEIVED
OCT 02 1992
STATE LANDS

To: Mr. Mike Desilva
Environmental Specialist
MT Dept. of State Lands
Helena, Montana 59620

From: Dennis Johnson
320 2nd Street West
Roundup, Montana 59072

September 29,1992

Dear Mr. Desilva,

Having been a lifetime resident of Klein and Roundup, Montana; being a property owner in Roundup and Musselshell County, having lived around Mining and Miners and near Klein Mine, during times of full operation, I can tell you that, during those times, our wells did not dry up; nor did our quality of life suffer.

I feel, if the people living near the Mine Site can get solutions for their dust problems from Meridian, that any small change in our traffic and in the upper aquafers or in the aesthetic beauty of the Area,is much out weighed by the benefits and jobs.

I also want to thank you and all the people that put time, effort and study into this EIS. A JOB WELL DONE!!

Dennis Johnson

(51)

YELLOWSTONE COUNTY WEED CONTROL
P.O. BOX 35023
BILLINGS, MONTANA 59107-5023
(406) 256-2708
FAX (406) 256-2736

September 29, 1992

Mike De Silva, Environmental Specialist
Montana Dept. of State Lands
Capital Station
Helena MT 59620

RECEIVED
OCT 02 1992
STATE LANDS

RE: BULL MOUNTAIN MINE WEED CONTROL

Dear Mr. De Silva:

The Draft EIS and the public hearings of the Bull Mountain Mine #1 covered most of our concerns. However, with the growing noxious weed problem in Yellowstone County, (as well as the entire State), we would like to have the following added to the permit, and accepted by Meridian Mineral Company.

1. NOXIOUS WEED MANAGEMENT PLAN

A. A Noxious Weed Management Plan will be submitted to the Yellowstone County Weed Board and be updated on a yearly basis. This management plan would include:

The railroad spur.

The loading site in Huntley.

Any other site affecting Yellowstone County.

All control measures will be identified.

Chemicals and rates will be identified.

Date of application if chemical control.

Mapping of Noxious Weeds will be updated yearly. 51-1

Page #1

72 app 144

(51)

PROPOSED BULL MOUNTAIN MINE #1

2. RAILROAD CONSTRUCTION

A. All construction equipment will be steam cleaned just prior to taking it to the construction site.

B. Source of Road Bed Material.

Ballast must be steam cleaned to be noxious weed seed free, or come from a certified noxious weed seed free source.

Other fill materials will come from a noxious seed free source area.

C. Ties, rails and other hardware will be new, and the ties will come from a source certifying them noxious weed and noxious weed seed free. 51-1

3. HUNTLEY LOAD OUT SITE

A. All materials used will be noxious weed seed free.

B. All used machinery will be steam cleaned just prior to work.

4. NOXIOUS WEEDS IN CONSTRUCTION AREA

A. All noxious weeds in any construction area will be sprayed prior to any construction.

RECLAMATION

1. All reclamation needing mulch or straw will be noxious weed seed free.

Page #1

487 0 app 144

(51)

PROPOSED BULL MOUNTAIN MINE #1:

2. All seed will be noxious weed seed free.

3. All equipment used for reclamation work will be steam cleaned just prior to moving to site.

4. Control of noxious weeds on abandoned rail bed and other rights of way will be in effect for a minimum of ten years.

5. We will require a noxious weed bond of a minimum of twenty thousand dollars ($20,000.00) which will be held for a period of ten years after reclamation has ended. 51-1

6. A representative of the Yellowstone County Weed Board will inspect all sites at the end of reclamation and at also immediately prior to bond release time.

Prevention is a major key to our program. Any time we can prevent an infestation from becoming established we are all much further ahead.

Sincerely,
Ed Kirby
ED KIRBY, WEED SUPERVISOR
County Surveyor's Office

EK/jlv

pc: file

LAVE\WEED\BULLMTN.DOC

Page #1:

(52)

Alan Olson
18 Halfbreed Creek Road
Roundup, Montana 59072

September 21, 1992

RECEIVED
OCT 02 1992
STATE LANDS

Mr. Mike DeSilva
Montana Department of State Lands
Capital Station
Helena, Montana 50620

Dear Sir;

I am writing in regards to Meridian Minerals mine permit for the Bull Mountain Mine #1. As a resident of the Bull Mountains, and not a member of the Bull Mountains Land Owners Association, I would encourage you to grant Meridian Minerals the permit they are seeking.

For an individual to say they have no concerns as to possible hydrological damage from this mining project is to say they are not well informed. However the mitigation plans worked out between the DSL and Meridian on possible hydrological impact and mine reclamation as proposed in the draft EIS go a long way towards relieving any concerns I may have had. In the past, while working for a major oil field service company, I have worked for Meridian on numerous projects and I have seen few companies as dedicated to environmental concerns as this company. Meridian consistently exceeded the norm. As for the people in your department, they have always been forthright, honest, impartial, and although we don't always agree, a pleasure to work with.

I am looking forward to your department approving this permit as soon as possible. Thank you.

Sincerely,
Alan Olson

627.0 app 144

Box 553
Roundup, Montana 59072
October 1, 1992

(53)

Mike DeSilva
Montana Department of State Lands
Capitol Station
Helena, Montana 59620

RECEIVED
OCT 05 1992
STATE LANDS

Dear Mr. DeSilva,

Since the initial phone survey of local opinion regarding Meridian mining in Bull Mountains I have been opposed to this operation and I feel the E.I.S., which was quite a fantastic report, recognizes my fears that the mine is harmful to flora, fauna, water sources, and residents of the region. I am one of those who will be directly affected since my small ranch borders Pete and Ronda Sully's place to the north.

At the recent Roundup meeting I was heartened by the group from Huntley who were very dubious of Meridian's measures to safeguard the quality of life in their community and who were unwilling to sacrifice the present lifestyle and safety of even a few for the sake of economic benefits that might be forthcoming. Would that my own community of Roundup were as farsighted! Many here are willing to sacrifice long time residents, air and water quality, etc. on the gamble that (1) that Meridian will bring about a 30 year economic boom (2) that Roundup will benefit by that financial life saver (3) that Meridian cares about the community and its residents.

Presupposing I and the rest of the "mini-farmers" in tract residents can afford hydrological studies of our water sources and chemical analysis of the water at these sources, I hope and beg that you will insist that Meridian deposit sufficient funds to restore our water. I realize I will have to underwrite the initial costs mentioned above plus additional expense of lodging an official complaint against 53-1

(51)

this company. Frankly I don't know if I can afford to take the necessary steps but I plan to be protected even if I have to borrow the money. Unfortunately many of my neighbors will not be able to take these measures and will be forced to depend on you to have their best interests in mind when putting restrictions/procedures on Meridian.

I seriously doubt Meridian's claims that they can stabilize slopes, control erosion, and reclaim disturbed top soil. In a test pit area several miles west of the Consolidated Coal attempted a similar reclamation with unsatisfactory results and gave up their mining of the area as a result. 53-2

Frankly, as a teacher, it disturbs me to have children waiting along the roads at bus stops and in buses with coal trucks hindered by icy roads, falling snow, darkness, fog, dust, etc passing every few minutes endangering those young lives. Why are we putting these kids at risk? If Meridian has the right to mine, then they should shuttle the coal to the railroad or build their own roads. The present space is a serious invasion of local residents and should even be considered. 53-3

After listening to the glowing testimony Meridian shuttle at the meeting, I hope you will also realize that this company sent 6 p.r. person here to count "their" figures, hoping many to believe he and others would not be permanent community members but a generous source of jobs and economic favors. Anyone who expressed concern or opposition was intimidated or censured. Meridian refused to bring a "15 ad" on our school bus convenient booklet (maybe because I was the sponsor). They snubbed Ronda Sullys' land for three decades and gave them to neighbors while they snubbed in local feelings, ran unnecessary strife w Sullys (who are fine stewards of the land), and an influx of cattle from far & wide onto the lease would have, at times, wandered into my place bringing a disruption to my operation which I never appreciated with the Sullys 53-4

53-5

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(3)

In 35 years my home and 200 acres have been my investment for my retirement years which will begin soon. I hope you and your bureau will safeguard not only my future but the legacy I have built to pass on to the next generation and generations to come. Don't sacrifice Montanans for a company that has sworn to ruin this state.

Yours truly,

Mary J. Brewer

(55)

DEPARTMENT OF
HEALTH AND ENVIRONMENTAL SCIENCES

WATER QUALITY BUREAU

Room A-206

STAN STEPHENS, GOVERNOR

COGSWELL BUILDING

STATE OF MONTANA

Phone: (406) 444-2406
Fax (406) 444-1374

HELENA, MONTANA 59620

October 5, 1992

RECEIVED

OCT 05 1992

RECLAMATION DIVISION

Mike DaSilva
Environmental Specialist
Mt Dept. of State Lands
Capital Station
Helena, MT 59620

Dear Mr DaSilva:

I have the following comments on the draft EIS for the Meridian Minerals Company Bull Mountain Mine No. 1. From a hydrology/water quality perspective the draft EIS is rather general and indefinite. Our comments are listed below.

Page #	Comment	
IV-17	In the discussion of impacts to ground and surface water, dewatering is mentioned but I have been unable to find in the draft a discussion of where the dewatering water goes.	55-1
	Also in this section the potential drawdown in five years is stated as "could be less than 2 miles". What will it likely be in forty years?	55-2
	Also in this section it is stated that after mining water will discharge to PM Draw. Where does this draw discharge to?	55-3
IV-21	The statement in the third paragraph on this page that "subsidence is not predicted to have a very large impact on concentrations of inorganic constituents" is not supported in the cited reference by Thompson. Thompson (1982) concluded that an average dissolved solids concentration of 3,100 mg/L would result in underground mine spoils water. This is 2.6 to 2.7 times the existing dissolved solids concentrations given for springs, alluvial ground water, and deep overburden groundwater given on page III-16.	55-4
	This section does not discuss the impacts to ground and surface water quality from the mine dewatering operation. Where will the pumped water be placed? What will its quality be? How will it affect the quality of receiving waters?	55-5 55-6 55-7
IV-22	In the first full Paragraph on this page it is stated that "The quality of surface and ground down-gradient from the coal preparation operations could be affected by the discharge of the brackish water pumped from the Madison Formation." This affect should be analyzed. What is the quality of the "brackish" water pumped from the Madison Formation? How will the quality of this	55-8

"An Equal Opportunity Employer"

(54)

RECEIVED

OCT 05 1992

STATE LANDS

Mike DaSilva
Environmental Specialist
Montana Department of State Lands
Capitol Station
Helena, Montana 59620

September 25, 1992

Dear Mr. DaSilva:

We the undersigned are taking this opportunity to express our support for the Meridian Minerals Bull Mountains Coal Mine and urge acceptance of the draft Environmental Impact Statement (EIS) for the project.

According to the EIS (pages III-33), Musselshell County lost 162 jobs in mining between 1980 and 1989. The Bull Mountains Coal Mine will bring those high paying jobs back to our area. They are sorely needed. We still have an unemployment rate of nearly 8% and we need a 30-year project like this so that our community has a future to offer our children.

We agree with the EIS with regard to the ability of this area to accommodate the impact the project will have on housing, water and sewage systems and schools. We look forward to the growth the Bull Mountains Coal Mine will mean to our community. We know we can handle it.

We also know that the non-mine businesses in our community will be benefitting greatly from mine-related business -- supplies and services in particular.

Thank you for your attention. We appreciate your consideration of this project and, again, strongly urge acceptance of the draft EIS.

Sincerely,

	NAME	ADDRESS
1	Bob McHenry	Roundup, Mt.
2	Doris Stefan	Roundup
3	Gary Olson	Roundup
4	Lou DeLorme	Billings, Montana
5	Virgil McHenry	Roundup

CONTINUE NEXT PAGE

Total of 543 signatures

	water be affected by the preparation process? What is the discharge water quality? At what rate will it be released into the surrounding environment? How will the discharge affect receiving ground or surface waters?	55-9 55-10 55-11
IV-23	Section d. does not analyze the impacts to State Waters resulting from percolation through the waste disposal area. What are the chemical and physical properties of the waste and what constituents are likely to be mobilized by percolating water? Where will discharge from the rock drains beneath the waste disposal area go? What are the impacts? How long will they persist?	55-12 55-13 55-14
A-10	What will be the impacts to ground water from discharges through "weep holes" in sedimentation ponds?	55-15

GENERAL COMMENTS

The primary municipal water source for the town of Roundup is an abandoned coal mine adjacent to the Musselshell River valley. A pump test of the Jeffery mine in 1989 demonstrated a hydrologic connection between this mine and overlying Fort Union aquifers (DNRC files undated). The EIS does not address the potential long term impacts of mining up-gradient Fort Union coal on this municipal water supply. This deficiency cannot be justified by the agency's arbitrary "geographical limits for the analysis" as stated on page IV-3. The potential long term impacts of mining on the municipal water source should be assessed. 55-16

On page III-18 water quality regulations are discussed. This discussion refers to national secondary drinking water standards. Please note that these are not mandatory levels. 55-17

It appears that this operation will have both a public water supply and a public waste water treatment system. Thus, these systems will require approval from the appropriate authorities. 55-18

It should also be noted that the storm water ponds will require storm water permits from the Department of Health and Environmental Sciences. In fact, if any water other than storm water is placed in these ponds a MPDES permit from the Department will be required. 55-19

Thank you for the opportunity to comment.

Sincerely,

Abe Horpestad

Abe Horpestad Ph.D.
Water Quality Bureau
Environmental Sciences Division

(56)

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Montana State Office
222 North 32nd Street
P.O. Box 36800
Billings, Montana 59107-6800

IN REPLY TO:

3460 (921).

October 5, 1992

RECEIVED
OCT 06 1992
STATE LANDS

Mr. Mike DeSilva
Environmental Scientist
Montana Department of State Lands
Capitol Station
Helena, Montana 59620

Dear Mr. DeSilva:

Personnel in the BLM Branch of Solid Minerals, Montana State Office and the Miles City District Office have reviewed the Bull Mountains Mine No. 1 Draft Environmental Impact Statement. The following are Montana BLM's comments.

Preface: Apparently, Appendix F was changed to Chapter VIII, although the preface was not changed to reflect this. 56-1

Pages iii and I-1: Disturbed acre figures discussed in the summary on Pages iii and I-1 are not entirely in agreement. 56-2

Pages iii, I-4 and I-5 (Figure 1-3): Acres of Federal coal identified on Pages iii (paragraph 5) and I-4 (paragraph 1) do not agree with the map (Figure 1-3) on Page I-5. 56-3

Page I-7, Table I-2: *Temporary jobs.

Page I-10, Paragraph 3: Only those tracts being considered for the Powder River Round I sale were addressed in the EIS. The Socio-Economic Supplemental EIS only addressed tracts in Montana. 56-4

Page II-1, Paragraph 1: The statement in the EIS concerning Meridian lease status is correct, but should be expanded upon for clarification. 56-5

Page III-13, Paragraph 1: A portion of the Rehder Creek was identified as unsuitable for mining due to floodplains and potential alluvial valley floors in the Bull Mountains Exchange analysis. (T6N, R23E, sec. 18, N1/2, N1/2 - 24.5 acres.) 56-6

Page III-13, Paragraph 3: Since Madison water is being proposed for use, its quality should be addressed here. 56-7

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2

Page III - 23: A figure (map) would be helpful. 56-7a

Page IV-13, Last Paragraph: Why are the State parcels treated differently? Should the entire railbed be reclaimed? 56-8

Page IV-16, Paragraph 2: Stockpiles of material should be seeded to prevent excessive erosion, and to enhance the retention of soil productivity. 56-9

Page IV-22, Continued from Page IV-21: Why are these wells being plugged and sealed? 56-10

Page V-22, Paragraph 1: The EIS states that water from the Madison Formation is brackish. Is the Madison water naturally brackish, or is it made brackish by use? Why would brackish water not be treated instead of simply being discharged to surface and ground water? Mitigation strategies are not discussed. 56-11

Page IV-26, Last Paragraph: Upon conclusion of rail use, the base grade should be smoothed, shaped, and reclaimed in a manner to best fit with adjacent land use. Wherever reseeding is necessary, raw soil should be mulched to enhance erosion abatement and assist plant establishment. 56-12

Page IV-27, Paragraph 2: Disturbed areas must be managed to avoid establishment of noxious weeds. This should be a requirement of the permitting process. 56-13

Page IV-28: What are the impacts to wildlife from mine-related truck and train traffic? 56-14

Page IV-41, Paragraph 1:

The last sentence reads, "Truck hauling would be temporary during a 2- to 3-year period, after which noise levels would return to previous levels." The word "temporary" is somewhat misleading where it is used in this sentence. During this 2-year period, trucks from the mine will have to be making the run from the mine to the Huntley loadout facility 24 hours per day. 56-15

Page IV-53, Paragraph 2: Are there existing buildings that are located in the areas of subsidence? 56-16

Page V-2: Should the Office of Surface Mining be included on the consultation list? 56-17

Page V-4, Paragraph 3: Why is it assumed that the permit application package is in compliance here and Chapter IV? Is there a question whether the application meets applicable State and Federal laws? 56-18

3

Appendix A, Page 33, Part 4: After topsoil emplacement, the material will be analyzed to determine that no unsuitable material was used. The analyses would be performed on the saturated paste extract. Not all suitability criteria can be determined using a paste extract. Carbonaceous material and acid forming material, as mentioned above, will require other methods of analysis to determine suitability as topsoil. 56-19

Appendix A, Page 39: If water is piped from a spring to create a wetland elsewhere, wouldn't this reduce the size, or eliminate, the wetland at the spring and defeat the purpose of the mitigation? 56-20

Appendix C, Page C-14, Paragraph 2:

Reference is made to a strain criterion recommended by Messrs. Singh and Bhattacharya. It would be extremely helpful to the reader if this criterion would be defined and otherwise explained how it was applied to the specifics of this case. 56-21

Appendix D, Page D-4, Paragraph 3: The list of BLM offices referred to in Chapter I cannot be found. 56-22

Appendix E, Page 11, Table 2 Heading: Relative is misspelled. 56-23

There does not appear to be any discussion regarding Threatened or Endangered Species. 56-24

Thank you for this opportunity to review and provide comments on this important document.

Sincerely,

Francis R. Cherry, Jr.
Associate State Director

(57)

Montana Department of Transportation — 2701 Prospect Avenue, Helena, MT 59620-9728 — Stan Stephens, Governor

October 5, 1992

RECEIVED
OCT 05 1992
STATE LANDS

Mike Dasilva
Montana Department of State Lands
Capitol Station
1625 11th Avenue
Helena, MT 59620

Subject: Draft EIS - Bull Mountain Mine

Thank you for the opportunity to review the draft EIS. All of the issues that we had previously addressed as potential conflicts or issues of concern were properly identified in the EIS. However, there are still three major issues that are actively being negotiated with the applicant, that we are hopeful will be resolved before the issuance of any permit. We realize that these are mitigation measures that need to be resolved between the applicant and the MDOT, however are being identified as yet unresolved issues.

As stewards of Public Transportation, we feel that it is in the public's best interest that these three major issues are satisfactorily resolved.

(1.) Repair of 312 after the trucks quit hauling coal to Huntley. 57-1

As stated previously, there are no funds earmarked for this route once the pavement damage has occurred and the applicant begins hauling the coal by rail. We are currently negotiating with the applicant and hopefully some mitigation measures can be agreed upon.

(2.) Proposed At-Grade crossing just south of Broadview on Montana Route 3. 57-2

Montana Route 3 will be one of the major routes between Great Falls and Billings and will be on the final composite listing of routes identified as National Highway System (NHS) routes.

Possible delays of traffic, proper protection for the crossing, and possible future developments that may warrant a railroad overpass are currently being negotiated.

(3.) A proposed grade separation on Highway 87 N. is also under evaluation for similar concerns as those mentioned in item number two and includes maintenance considerations. 57-3

Sincerely,

Don W. Croner, Supervisor
Statewide Planning

cc: Roy Ventura
Billings District Engineer
Sandra Straehl
Bureau Chief, Highway Planning
Rail and Transit Division - Helena
Utility Section - Helena

(58)

PO Box 37, Huntley MT 59037 406-348-2079

RECEIVED
OCT 06 1992
STATE LANDS

October 5, 1992

Dennis Casey, Commissioner
Mike DaSilva, Environmental Specialist
MT Dept. of State Lands
Capitol Station
Helena, MT 59620

RE: DRAFT ENVIRONMENTAL IMPACT STATEMENT, BULL MOUNTAINS MINE NO. 1 AN ASSOCIATED FACILITIES.

Dear Mr. Casey & Mr. DaSilva:

I realize I have given you probably more than my fair share of comme but this is and issue that not only affects "me" but the people of this community and my children and grandchildren.

Therefore I do have some other points to bring up on this document and what I feel are serious non-compliance with regulatory mandates of both the MEPA process but also the MEPA process.

I will again state the MEPA Regulations I feel that you have not adequately addresses:

1. 1502.14 Alternatives including the proposed action. On affected Environment and the Environmental Consequences, It should present the environmental impacts of their proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decisionmaker and the public. In this section agencies shall:

(a) rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated. 58-1

(b) Devote substantial treatment to each alternative considered in detail including the proposed action so that reviewers may evaluate their comparative merits.

(c) Include reasonable alternatives not within the jurisdiction of the lead agency.

(e) Identify the agency's preferred alternative or alternatives, if one or more exists, in the draft statement and identify such alternative in the final statement unless another law prohibits the expression of such a preference. 58-1

(f) Include appropriate mitigation measures not already included in the proposed action or alternatives.

Under 1502.16 Environmental Consequences: States "It shall include discussions of: 58-2

(a) Direct effects and their significance (1508.8)
(b) Indirect Effects and their significance (1508.8)

Under 1502.24 Methodology and scientific accuracy. It clearly states: "Agencies shall insure the professional integrity, including scientific integrity, of the discussions and analyses in EIS.

Under MEPA I feel these regulations apply to alternatives sites and siting.

28. 2. 642 Definitions: (2) (a) Alternative' means:
(i) An alternate approach or course of action that would appreciable accomplish the same objectives or results as the proposed action. 58-3

(ii) Design parameters, mitigation, or controls other than those incorporated into a proposed action by an applicant.

(b) The agency is required to consider only alternatives that are realistic, technologically available, and that represent a course of action that bears a logical relationship to the proposal being evaluated.

I feel that ALL ALTERNATIVES PRESENTED TO DSL ARE ALL OF THEE ABOVE.

Under 26. 2. 642 (7) Cumulative impact' means the collective impacts on the human environment of the proposed action when considered in conjunction with other past and present actions related to the proposed action by location.

Now there seems to be some confusion for MS Lovelace on what is "Human Environment" so in this same section under # 12 it states: 58-4

"Human Environment includes, but is not limited to biological, physical, social, economic, cultural, and aesthetic factors that interrelate to or from the environment. Economic and social impacts do not by themselves require and EIS. However, whenever and EIS is prepared, economic and social impacts and their relationship to biological, physical, cultural and aesthetic impacts must be discussed.

Under 26. 2. 8642 (18) Secondary impact' means a further impact to the human environment that may be stimulated or induced by or otherwise result from a direct impact of the action. 58-5

Under 26. 2. 643 General Requirements of the Environmental Review Process Section 75-1-201 requires state agencies to integrate use of the natural and social sciences and the environmental design arts in planning and in decision making, and to prepare a detailed statement (EIS) on each proposal for projects, significantly affecting the quality of the human environment. 58-6

Part of the problem to date may be the fact that only a scoping was done and that an Environmental Assessment was not done before a draft EIS was prepared.

Within the EA process 26.2.643 (b) evaluation of "reasonable" alternatives is to be made as part of the proposed action, (d) to ensure the fullest appropriate opportunity for public review and comment on proposed actions, including alternatives and planned mitigation.

Under 26.2649 Preparation and contents of draft environmental impact statement:

(3) an analysis of reasonable alternatives to the proposed action, including the alternative of no action and other reasonable alternatives that may or may not be within the jurisdiction of the agency to implement. 58-7

(8) an explanation of the tradeoffs among the reasonable alternatives.

Section 10 part (c) a summary list of source materials used in the preparation of the draft EIS.

I'm hoping by now that you are getting the message that you should have either put out and EA with several sites for the load-out facility to the public for comment and consideration; with not only the facility listed, but also the tradeoffs and mitigation that should have taken

page 4

place or could take place for each site.

Not only so but the Community of Huntley has requested numerous times that alternate sites be looked at and evaluated by MDSL, and all to no avail.

DSL has struck with the facts and figures and a one day whirlwind trip with the members of the company for which they were writing this document and a member of Geo Research. No one was asked from the Huntley Community to participate in this trip.

So I would like to take some facts and figures given to DSL from Meridian Minerals dated April 3, 1991; over a year & half ago on 13 alternate sites.

In going though these figures and checking out the sites of both Huntley and Coor site (Highway 312) near Huntley we have found discrepancies.

For one thing at the Coors site which in a letter dated January 31, 1992. Geo Research. it clearly states that the Coors Site is not at the Coors Elevator but a 1/4 mile from proposed load out site at Huntley.

If this is true then there is no 3 phase power to this site, there is no well at 85' ft and no city water. In checking with the Power Company the 3 phase power line ends at road 3 and a power company cannot build a power line across a railline. The siding on the south of the tracks will hold 115 cars as this siding goes all the way back into Huntley. The North side of the tracks where the Load out is proposed to be placed will only hold 29 cars. In these same sheets of comparisons MM lists the travel miles at 41.1 to Huntley Loadout and 41.9 to coors (hwy 312) site. Yet operation miles for RR to Laurel in listed 24.5 from Huntley Loadout and 28. from Coors site. Why the extra mileage on the RR line?

58-7

In total estimated Capitol outlays under "Track Costs", under Cushman, where in letter dated Jan. 31, 1992 they would have to build 2300 ft of track, the cost would be $435,000 and yet at the Coors site where there is enough track to hold all the cars on the south side of the tracks it will cost them $740,000 to build tracks that are all ready there?

All of these figures need to check and cross checked.

Under "Equipment" all figures are $150,000. Is this for state of thee art equipment or what Meridian though they could get away with in providing for the same load out facility they had put forth when they were doing the test run?

page 5

I would like a set of cost figures for the test pit run and equipment projections. Ho where in the Draft EIS do we get a comprehensive list of equipment costs with all new equipment projected.

Under "Highway" which I take to be road costs or maintenance, they list $80,000 for both Huntley and Coors (312). The Coors site is across the tracks to the South and would require a road being built and railroad crossing. Still the road costs are the SAME?

Under "Stockpile" the cost is $15,000 at Huntley which is all ready and "industrial site" (quote from DEIS) and yet the land at Coors would need to be made into an industrial site the cost figures are only $5,000 more.

Under "Generator" and I for one would like to know why they need one and what will it be used for, the list a price of $13,000 for one in Huntley and yet a 1/4 mile away they will spend $20,000. ???

58-7

The total capital summary is rather interesting in there figures. Cushman which they are saying is the farthest to haul too, must have a bed made for stockpiling, all equipment placed and some track built is only showing a difference in price tag to the Coors site of $95,000.

This whole process is up for question and my assumptions are that DSL was and is willing to live with clearly fictitious figures provided to them. DLS is clearly in violation of all the above stated regulations on this issue and has done a great disservice to not only the people of Huntley but the State of Montana.

On water issues for these same figures, WHY??? use figures for wells of 63 ft when Meridian all ready had a well at 20 ft.

A second point is the approval or disapproval for the Federal Surface Use Permit. Why is this needed and WHOM will be the agency issuing this permit? My interpretation of this is that because you are requesting one from a federal agency YOU ARE required to use NEPA Regulations. Also, because this 5 year plan will mine federal owned land you are doubly required to use NEPA.

58-8

The other is that I'm awfully uncomfortable knowing that the only agency that would be monitoring this mine will be DSL, mining division. An agency that has never had to deal with this process, has no rules or reg's governing it and is highly over worked all ready.

The DSL did not address a full range of alternatives under the NEPA

58-9

page 6

process nor MEPA for that matter and is negligent in its collection of data for these alternate sites.

58-9

I therefore must state again that I disapprove of a Montana 5-year permit to mine coal, (2) a MT land use agreement for mine
1 Successive amendments of the Montana permit to mine coal, (2) a MT coal lease (3) a federal permit to mine coal, and (4) a federal surface use permit.

Sincerely.

Nicol Price

Nicol Price

Enclosure: For your reading "Environmental Impact Assessment Review" published in affiliation with the Center for Technology, Policy and Industrial Development, Massachusetts Institute of Technology. Vol 8, # 3. Sept. 1988

Hearing Sept 23
Nicol

Dennis Casey, Commissioner
Mike Dasilva, Environmental Specialist
MT Dept of State Lands
Capitol Station
Helena, MT 59620

Comments on the Draft EIS for Meridian Minerals Bull Mountains Mine No 1 and Huntley Load-Out Facility for Public Hearing Sept. 23, 1992

I would like to thank State Lands for holding these public hearings and giving all of us a chance to speak. I spoke at the hearing last night in Huntley on Noise Pollution and the Huntley Load Out Site and its non-analysis. Tonight I would like to address the Social and Economic Impacts to Huntley and the Surrounding Area and the Tax and Fiscal Responsibility of this Project. I would also like to add some mitigative measures for this project.

First off, last night we discussed the Regulations that govern an EIS and what that entails. Since I don't have a copy of all the MEPA regs I will use the NEPA regs. Which I'm told are very similar.

I do not feel this EIS followe the regulation set forth in NEPA for these criteria.

1. Use the NEPA process to identify and assess the reasonable alternatives to proposed actions that will avoid or minimize adverse effects of these actions upon the quality of the human environment.

2. Use all practicable means, to restore and enhance the quality of human environment and avoid or minimize any possible adverse effects of there actions upon the quality of the human environment.

3. Prepare analytic rather than encyclopedic environmental impact statements. Of which this document is.

Under NEPA 1502.14 (a) It states agencies shall: Rigorously explore and objectively evaluate ALL REASONABLE ALTERNATIVES, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated.

(c) Include reasonable alternatives.

(e) Identify the agency's perferred alternatives or alternatives if one or more exists.

(f) Include appropriate mitigation measures not already included in the proposed action or alternatives.

None of these have been done for this document. There are no analysis for the other load out sites, including Broadview, Acton, Roundup or Musselshell. A one day trip to look at all these various sites is not rigorously exploring information. There are no alternative routes shown and data to help the public and the Commissioner make a decision. There are no mitigative measures listed in this document for any of the impacts for the Huntley Site or Community.

In part 1502.14 (a) It states, and EIS shall include discussions of (a) direct effects and their significance and (b) indirect effects and their significance.

In the area of Social and Economic Impacts to the Huntley Community this is what is written:

A recent survey done in 1991 stated 90% of the respondents were aware of the coal hauling and load out and 43% responded they were affected. It states we value our quiet, rural environment with open spaces, clean air and diversity of wildlife. Thats it! No where do you analysis the Quality of Life, the economic depression to the community, the stress to mental health, the impacts to the elderly who reside here.

Under Visual Resources/Aesthetics: It states the scenic quality of this area has been substantially impacted by cultural modifications. What does that mean? That we have houses an a elevator? We still have the hills, river and farm ground we think of as special. A huge coal pile does not fit in with this scene.

In the area of taxation and fiscal responsibility there is very little information but what is there is interesting

Cost to repair road 312 per year $38,654. the diesel fuel tax and GVW will total over a 2.5 yr $378,691. or $151,476. per year.

MM says payroll will be 10 million per year. 10M divided by 300 is $33,000. per year. This is a cheap work force since decker and coal strip pay 35,000 to 65,000 per year.

Taxes paid by MM will be 9M of which mussalshell Co will receive 1.2M to the County and $1.7M to the Schools. Yet projections say most people will reside in Billings or surrounding areas.

Billings share of the tax will be $20,000.

Yet in this Draft the cost of just fixing 312 will total 1.9M to 2.0M because of increased maintenance and operations cost. It states that DSL conclude that impacts to the public sector fiscal conditions from mining related impacts would be minor and beneficial. Does not picking up the tab for rebuilding 312 to the tune of 2M seem more than minor?

I would like to offer some mitigation proposals since none were printed or mentioned in this document.

1. That the Load Out and Stock Pile be totally covered such as the facility at the Absaroka mine on sarpy creek.

2. There be an eight hour work day at this facility and truck hauling and rail car loading be done from 8 to 5 each day; weekends off.

3. There be a small engine used to pull the cars while being loaded.

4. The trucks used for hauling be of a distinct color, have governors on them so speed limits are obeyed and a phone number printed on the truck so if something does happen people could call.

5. A signal light put at the intersection of 87 and 312 function.

6. The 4% severance tax that would be paid by Meridian be put into a special account ear-marked for the repairs and maintenance of 312. Which would equal $44,000. per year. Which over a three year period would equal $132,000. Not nearly enough for a 2 million dollar repair bill to 312.

7. That Meridian purchase land in the Huntley area out of the housing development to build itself a road to use for hauling instead of Heath Street.

8. That a yearly review team be set up of staff from DSL, MM and the Community of Huntley to review the permit each year and work out problems that may arise. The Huntley Load Out would only be permitted for three years maximum.

Dennis Casey, Commissioner
Mike DaSilva, Environmental Specialist
Mt. Dept. of State Lands
Capitol Station
Helena, MT 59620

Comments on the Draft EIS for Meridian Minerals Bull Mountains Mine No. 1 and Huntley Load-Out Facility for Public Hearing Sept. 22, 1992.

First off I would like to Thank You for holding a hearing in Huntley, something that was not scheduled during the scoping process. This Community and surrounding area will, according to the Draft EIS be moderately to significant impacted in many negative ways, Coal Hauling on 312E, Coal Hauling down Heath Street, Noise pollution, Dust Pollution, Quality of Life impacts and as far as I could determine, this Community will not receive any of the benefits, including tax dollars. Our Quality of life will be impacted significantly over a three year period OR LONGER, so an industry that evidently must live on a shoe string budget can get on its feet, so to speak.

I would like to address both the Huntley Load Out Facility and the Noise Pollution from this facility.

Areas that I feel were not adequately addressed in this Draft EIS is the considerable noise pollution that will go along with this operation. We live in a QUIET Community. At night we can hear the trucks going down the Highway. The echo levels in this valley are high, because of the River and how we are situated in the hills. We sleep with our windows open in the spring, summer & fall, an on a very few nights when alot of trains go through at one time, is the only time there is any noise. I request that you stay around after the meeting till the cars are gone and listen to how Quiet it is.

NOISE POLLUTION

Noise is listed in this document as an unwanted, unpleasant sound. I consider the crashing of railcars a noise, I consider the beeping of equipment when it backs up, noise, I consider trucks gearing down or up, Noise. I consider the augers rumbling, Noise.

Yet in this document the noise levels for equipment working at

HUNTLEY LOAD OUT FACILITY

I for one am very disappointed to not see any new base line data on the other 4 proposed sites for the load out facility. It appears to me that the data used is still the same old figures submitted by Meridian Minerals Company in april of 1991. Why has not the Dept of State lands done its own analysis of costs figures for at least four proposed sites.

To bring the audience up to date on what the Huntley Load-out Facility will be, here are some figures.

A coal stockpile, and 1/8 mile long, 200 ft wide and 25 ft high. (1.1 million tons), a 50-ton hoppered product bin, a medium capacity radial stacker using a 250 ft belt conveyor and flexible chute, a 375 foot reclaim tunnel, and a 25 ft by 100 ft belt conveyor and flexible chute, a mobile trailer for temporary office facilities, an existing 20 ft well to furnish 30,000 gallons of raw water for equipment washdown, service water for machines and dust control, 115 car unit train with 3 engines and a caboose, a waste water pit and a 8 ft high fence.

The Agency concludes that impacts to visual resources/aesthetics in Huntley from the Huntley loadout would be major and significant in the short term.

The analysis that was done by Mike DaSilva in Jan. of 1992 lists the review team as, Bob Ochsner, MM, Mike DaSilva, DSL, Anne Cossitt, GeoResearch. Sites were evaluated based on existing site conditions and facilities, environmental and safety considerations and economic factors. Haul Route consideration were secondary, but costs of route upgrading and haul distances were considered.

I look at this as Human Life to be secondary to economic factors for Meridian Mines. Data used for figures were again the april 1991 correspondence of Meridian Mines.

Huntley is still listed as the most advantageous because it would cost MM only $135,000 to start up. In checking with equipment companies they felt this figure was low, unless they planned to use surplus equipment. The other factor here is what was MM planning to do as far as the load out facility in april of 1991. I do not feel it is what is proposed in the draft EIS to date.

The only disadvantages listed is its relatively close to the town

page 4

of Huntley and within a quarter mile of a low development subdivision.

Now I would like to have you listen to other site evaluation.

Acton-disadvantages-located within Acton, there could be community impacts from the site. Residence and bar are located with the direction of prevailing winds.

Commanche-disadvantages-there may be some potential impacts on residences.

Broadview-disadvantages-Broadview school and the majority of the town population are located directly opposite tracks and in the prevailing wind direction.

Lavina-disadvantages-due to the proximity of the town, there is potential community impact.

Mossmain-advantages-there is sufficient siding, power and water available, the area is currently disturbed and used for stockpiling, the site is situated so that prevailing winds are not likely to impact residence. estimated cost $330,000. This does have the longest haul route.

Disadvangtages-this site is farthest from the mine (52.1 miles to Huntleys 47) although almost all is on paved highway and interstate. Operational costs for truck hauling would be greatest at this site.

The Montana Dept of State Lands needs to address alternative sites with a more comprehensive analysis then has taken place here. Its still going along with "WHAT MERIDIAN WANTS! MERIDIAN GETS" and the people of Huntley and surrounding community can just learn to live with it.

You the Dept of State Lands need to do studies on Wind Direction for the Community of Huntley and NOT USE base line data from Billings. We are different.

You the Dept of State Lands need to do studies on the Huntley Water Supply and how our city well will be effected by 30,000 gallons of water being pumped when the Community of Huntleys well only produces 18,000, and the law suit that was filed against Huntley on its well and the added cost to the Community water

page 5

users.

You the Dept of State Lands need to do studies on the Noise Pollution that will ingolf this Community throughout the 3 to 4 year period you are asking us to live with this facility.

You need to address all traffic that uses not only Heath Street but Northern Ave to the load out facility. I found no assessment of traffic coming from the east going west and a blind corner on heath street and northern ave.

The Social Impacts and survey done of this community should have been printed in this document along with a list of the people contacted. The survey was used to show that 90% of the people of Huntley were surveyed, but alot of people in the phone book that would be listed under Huntley are not Huntley Proper residents. Therefore your figure of 43% may be incorrect.

In every since of the word the best facility in Huntley is only here from Oct to Jan. We don't consider that a big industrial site and truck hauling is maybe for only a month and the trucks for this come and go from the interstate not 312. In this document the industrial site is made to sound like we have both Billings Grain Terminal and Western Sugar right in our backyard.

Therefore, I must add my voice of disapproval to the Montana 5-year permit to mine coal, a disapproval to the Montana Land Use Agreement for the operation of the Bull Mountain Mine No. 1 and its associated support facilities. A disapproval of successive amendments of the Montana permit to mine coal, a Montana coal lease, a federal permit to mine coal and a federal surface use permit for future life-of-mine development.

I also feel that part japanese ownership of this mine needs to be addressed to its consequences to the Montana Coal Industry and what effect this would have on the railroad spur.

Sincerely,
Nicol Price

Nicol Price
Member of the Huntley Community Club/Environmental Committee

10-5-92

(59)

DENNIS CASEY, COMMISSIONER
MIKE DASILVA, ENVIRONMENTAL SPECIALIST
MT DEPT. OF STATE LANDS
CAPITOL STATION
HELENA, MT 59620

RECEIVED
OCT 06 1992
STATE LANDS

I DISAPPROVE OF THE PROPOSED MINING PLAN OUTLINED IN THE DRAFT E.I.S. FOR BULL MTNS MINE NO 1, DATED AUGUST 31, 1992 AS IT DOES NOT COMPLY WITH THE FOLLOWING APPLICABLE LAW AND REGULATION:

MEPA REGULATION 26.2.647 III PREP. AND CONTENTS OF DRAFT EIS

IF REQUIRED BY THESE RULES, THE AGENCY SHALL PREPARE A D.E.I.S. USING AN INTERDISCIPLINARY APPROACH AND CONTAINING THE FOLLOWING" SUB SECTION (5) AN ANALYSIS OF REASONABLE ALTERNATIVES TO THE PROPOSED ACTION, INCLUDING THE ALTERNATIVE OF NO ACTION AND OTHER REASONABLE ALTERNATIVES THAT MAY OR MAY NOT BE WITHIN THE JURISDICTION OF THE AGENCY TO IMPLEMENT, IF ANY;

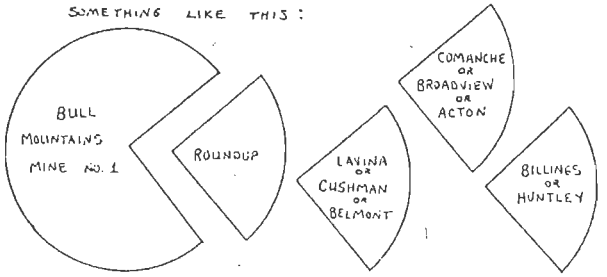
I INTERPRET THE D.E.I.S. AS INCLUDING THE HUNTLEY LOCATION FOR THE LOADOUT AS THE PROPOSED ACTION; ALTERNATIVE 2 AS NO ACTION AND FIND NO DETAILED ANALYSIS OF ANY OTHER REASONABLE ALTERNATIVES.

59-1

PAGE II-4 OF D.E.I.S., PARAGRAPH 3, READS THAT "INCREASED COSTS AND ENVIRONMENTAL IMPACTS" WERE DETERMINED TO BE EXCESSIVE AND UNREASONABLE WHEN COMPARED TO THE HUNTLEY SITE,

I FEEL DSL SHOULD HAVE INCLUDED FACTS AND FIGURES SUPPORTING THEIR DESCISION NOT TO INVESTIGATE ALTERNATE SITES. THIS INFORMATION COULD THEN BE COMPARED TO THE PROPOSED SITE AND AN INFORMED DECISION COULD BE MADE.

AS I SEE IT, A BIG PART OF THE PIE IS MISSING. HAD DSL PREPARED THE D.E.I.S AS REQUIRED, THE PROPOSED PLAN WOULD LOOK SOMETHING LIKE THIS:



59-1

IMPACT TOPICS WHICH SHOULD HAVE BEEN RESEARCHED AND GATHERED BY DSL, NOT MERIDIAN, SHOULD INCLUDE AIR QUALITY, SOILS, GEOGRAPHIC RESOURCES, TOPOGRAPHY, HYDROLOGY, VEGETATION, WILDLIFE, TRANSPORTATION, NOISE, SOCIOECONOMICS, RECREATION, LAND USE, CULTURAL RESOURCES AND VISUAL RESOURCES/AESTHETICS. "INCREASED COSTS" SHOULD NOT BE REGARDED AS AN IMPACT TOPIC.

SINCERELY, Kimberly Mueller

(60)

Medicine Wheel Alliance/Associated
With Northern Cheyenne Cultural Commission

PO Box 37, Huntley, MT 59037 406-348-2079-nicol
PO Box 763, Lame Deer, MT 59043 477-6215-tallbull

October 5, 1992

RECEIVED
OCT 06 1992
STATE LANDS

Dennis Casey, Commissioner
Mike DaSilva, Environmental Speicalist
MT Dept of State Lands
Capitol Station
Helena, MT 59620

RE: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR MERIDIAN MINERALS BULL MOUNTAIN NO 1 AND ASSOCIATED LOAD OUT FACILITIES.

Dear Mr. Casey & Mr. DeSilva:

I would like to address the cultural resource part of the DEIS on behalf of Board Members and Tribes. Bill Tallbull, Northern Cheyenne, John Hill, Sr. Crow, Naaman Wise, Sr., Shoshone, Floyd Youngman, Fort Peck Sioux & Phillip Underbaggage, Pine Ridge Sioux.

I would like to address the mining underground of coal and a Traditional Elders viewpoint on this matter.

Mother Earth is a power in itself-ALL ONE. Just because mining takes place under ground it does not negate the consequences of harm to the people. The deeper you go the more damage you do.

To probe into Mother Earth is disturbing the always quiet spiritual environment. The quiet waters underneath should not be disturbed, also. The deep earth is the quiet zone. Those spirits that shun the sunlight and thunder always remain in this under ground environment. The noises of the upper earth are apart from the quietness underneath.

Water from this quiet waters area has special life giving properties.

The watermakers select the place of springs. Many offerings and gifts are given to these watermakers.

Those who probe the earth and probe the sky and oceans are usually the ones who tread anywhere and touch everything, be

cause they hold nothing sacred. These people have trampled the sacred areas and touched these things that are not to be touched. These people do not carry a prayer and a prayer maker to the universe for all that is sacred.

It is our belief that the spirits of animals who have died and are now extinct reside spiritually in hills and mountains and underwater for those animals that were water animals. The vision quester of today and yesterday are visited by the animal spirits that come from hills, mountains, lakes & prairies. The sprit world is a vast unseen world and we have had and still do have a spiritual relationship with it; since the beginning of man. 60-1

The deeper one goes into the earth the more damage that is done as you are disturbing layers & layers of Quietness. Quiet waters. Quiet Earth. Quiet Spirit life. You are messing with something and are releasing sickness out into the world by the disturbance of the spirit life that dwells within.

We hope this helps you understand our concern for this mine and its effects upon the Indian Peoples of this Nation.

We have never had to deal with the subsidence of pictographs before. These are areas where spirits dwell and are considered sacred areas. To let these just fall into the earth is very disturbing to us. 60-2

Your mitigation procedures are all of a scientific nature and are not taking into concern Native American impute into how these things might be handled. 60-3

We do realize that up until two weeks ago Sherri Deaver and Ethnoscience were still collecting data from Tribes and we do know the Shoshone have not been in yet and so we are surprised that you can make any judgements. 60-4

To say that the impacts to Native Americans from mining related activities would be minor and permanent, is and understatement and there needs to be more impute in this area from your contacted help and Native Americans.

You are disturbing spirits which will be permanently destroyed and these cannot be replaced.

Therefore the Indian People of this group must disapprove of

this project and (1) a MT 5-year permit to mine coal, and (2) a MT land use agreement being requested by Meridian Minerals Company for the construction and operation of the Bull Mountains mine # 1 and its associated support facilities.

In addition, disapproval of (1) successive amendments of the Montana permit to mine coal, (2) a MT coal lease, (3) a federal permit to mine coal, and (4) a federal surface use permit.

We thank you for giving us the opportunity to address this issue and look forward to being part of any programmatic agreement reached between, DSL, MM and MT SHPO.

Sincerely,
Nicol Price
Nicol Price
Coordinator

The Board Members of MWA feel this information is confidential and should not be printed for people review.

(60-A)

Medicine Wheel Alliance/Associated
With Northern Cheyenne Cultural Commission

PO Box 37, Huntley, MT 59037 406-348-2079-nicol
PO box 763, Lame Deer, MT 59043 477-6215-tallbull

10-12-92

RECEIVED
OCT 14 1992
STATE LANDS

Mike DaSilva
MT Dept of State Lands
Capitol Station
Helena, MT 59620

Dear Mike:

Per our conversation on Oct. 8 and Oct 12 over the publishing of our comments submitted on the Bull Mountain Mine # 1. I have talked to all of the Board Members on the printing of our coaments and they have o'kayed the printing of the letter in the final EIS.

Sincerely,
Nicol
Nicol Price
coordinator

(61)

RECEIVED
OCT 06 1992
STATE LANDS

October 2, 1992

Mike DaSilva
Environmental Specialist
Montana Department of State Lands
Capitol Station
Helena, Montana 59620

Dear Mr. DaSilva:

This letter is being sent as written comment on the Draft EIS for Meridian Minerals Company Bull Mountain Mine No. 1, located in Musselshell and Yellowstone Counties, Montana, dated August, 1992.

If I understand the text of this EIS statement, Meridian is proposing to open an underground coal mine in the Bull Mountain area, approximately 35 miles north of Billings, Montana, or about 16 miles south of Roundup, Montana. The proposal is to develop mine and haul the coal by truck to a loadout site in Huntley, Montana. The truck hauling would cease when the 33 mile rail spur to the Broadview area is completed.

I don't have any problem with the mining of coal if people in the mine area are satisfied with Meridian's proposal. I do have a strong position on the loadout site, and also the truck traffic from mine to loadout site.

The truck hauling and loadout site are temporary. During the test loadout during the summer of 1990, the dust from the loadout site was unbearable. I had special frames made to put filters in my bedroom windows, and still had to breathe coal dust. I have a lung problem, and my doctor says any coal dust I breathe will continue to deteriorate my lung capacity. 61-1

We tried to get Meridian and/or Montana Rail Link to not load out when we had adverse wind conditions. They gave us lip service, but continued to haul and load out as they pleased. It seems to me that if the mine is approved, it will also approve the truck hauling and loadout site. I am opposed to this type of approval. I would suggest that some alternate route, rail line, conveyor belt, or some other means to move the coal to the railroad be explored. I am not about to put up with the dirt we experienced in the summer of 1990. 61-2

Please give this community of Huntley some consideration as to alternate ways to handle the coal. Thank you.

Sincerely,

Howard E. Zahller
Huntley, Montana 59037

cc:Steve Duganz, Yellowstone County Air Pollution Control
Chairman Jim Ziegler, Yellowstone County Commissioners
Dennis D. Casey, Commissioner, Department of State Lands ✓

(62)

Subject: Proposed mine in Roundup Montana

RECEIVED
OCT 05 1992
STATE LANDS

Mr. Mike DaSilva
Montana Dept. of State Lands
Capital Station
Helena, MT 59620

Donna Marsh
4683 Hwy 87 so.
Roundup, MT 59072

Mr. DaSilva,

My husband has been fortunate enough to have worked at the P.M. Coal mine for approximately 10 years. He has worked both above and below ground, amoung large amounts of coal dust. He has no health problems from the coal.

If he had not had this job at the mine he would have been forced to move to another town or state to make a living. I am grateful he did not have to do that so we could be close to our families here. We have raised 4 children here and are greatful we were able to be in Roundup to do it. A small town has so much to offer.

People that are concerned about the added traffic that the proposed mine will add, must be made aware to use caution. We have lived next to Hwy. 87 for the past 20 years, with the highway about 100 feet from our front door. Our children have been taught from an early age that there is danger there and they never did go near the highway. The danger was always there but we were always alert. You can live close to well traveled roads if you have to.

Montana has to wake up to some facts. Do they want people to live in this state or others. People will have to go where the jobs are. Our whole community could benefit from this mine, not only Roundup but the whole state. The schools, with the added tax revenue would be better equiped to serve our children and make our lives easier to live.

We do totally support the proposed mine project in the Bull Mountains.

The majority could and should be effected by the decision to go ahead with the mine or not. We do urge you to permit this mine to happen.

Sincerely,

Donna Marsh

627.0 app144

October 2, 1992

Mike DaSilva
Environmental Specialist
Montana Department of State Lands
Capitol Station
Helena, Montana 59620

RECEIVED
OCT 06 1992
STATE LANDS

Dear Mr. DaSilva:

This letter is being sent as written comment on the Draft EIS for Meridian Minerals Company Bull Mountain Mine No. 1, located in Musselshell and Yellowstone Counties, Montana, dated August, 1992.

If I understand the text of this EIS statement, Meridian is proposing to open an underground coal mine in the Bull Mountain area, approximately 35 miles north of Billings, Montana, or about 16 miles south of Roundup, Montana. The proposal is to develop mine and haul the coal by truck to a loadout site in Huntley, Montana. The truck hauling would cease when the 33 mile rail spur to the Broadview area is completed.

I don't have any problem with the mining of coal if people in the mine area are satisfied with Meridian's proposal. I do have a strong position on the loadout site, and also the truck traffic from mine to loadout site.

The truck hauling and loadout site are temporary. During the test loadout during the summer of 1990, the dust from the loadout site was unbearable. I had special frames made to put filters in my bedroom windows, and still had to breathe coal dust. I have a lung problem, and my doctor says any coal dust I breathe will continue to deteriorate my lung capacity.

We tried to get Meridian and/or Montana Rail Link to not load out when we had adverse wind conditions. They gave us lip service, but continued to haul and load out as they pleased. It seems to me that if the mine is approved, it will also approve the truck hauling and loadout site. I am opposed to this type of approval. I would suggest that some alternate route, rail line, conveyor belt, or some other means to move the coal to the railroad be explored. I am not about to put up with the dirt we experienced in the summer of 1990.

Please give this community of Huntley some consideration as to alternate ways to handle the coal. Thank you.

Sincerely,

Howard E. Zahller
Huntley, Montana 59037

cc:Steve Duganz, Yellowstone County Air Pollution Control
Chairman Jim Ziegler, Yellowstone County Commissioners
Dennis D. Casey, Commissioner, Department of State Lands

627.0 app 144

(63)

RECEIVED
OCT 05 1992
STATE LANDS

Chalentz A. McKown
2 P. M. Coal Road
Roundup, Montana 59072
October 1, 1992

Mike DaSilva
Environmental Specialist
MT Dept. of State Lands
Capitol Station
Helena, MT 59620

Dear Mr. DaSilva,

The Landowners and Residents of the route for hauling coal from the proposed Bull Mountains Mine No. 1 to State Highway 87, propose an alternative solution.

We propose that a road be built from the Load Out Site, west to Highway 87 along the proposed railroad right of way. This would be a solution to several potential problems. Not to mention all of them, we have listed six: 63-1

1. It would be away from any closely populated areas
2. Maintenance of 1½ miles (approx.) opposed to 5½ miles (approx.)
3. Less health hazard to residents because of dust
4. Not having to apply a Dust Agent to P. M. and Fattig Creek Roads
5. Keeping trucks away from School Bus Route
6. Less noise level for all residents along proposed route

We think this proposed solution is a much more viable alternative.

Thankyou for your attention to this proposed solution.

Sincerely,

Chalentz A. McKown and
the following Residents

627.0 app 144

M. Conley 167 Old Divide Rd Roundup, MT 59072
Joan B. Conley 167 Old Divide Road, Roundup MT 59072
Tom R Jensen 171 Old Divide Rd Roundup MT 59072
Hayden Jensen 171 Old Divide Rd Roundup MT 59072
Jim Price 24 PM COAL ROAD ROUNDUP, MT 59072
Margaret Price 24 M. Coal Rd, Roundup, MT 59072
Mack Carmack 454 old Divide Road Roundup MT 5907
Diane Carmack 454 old Divide Rd Roundup MT 59
Gerri Zigich 365 Old Divide Rd. Roundup MT 5907
Mary K. Rich 365 Old Divide Rd. Roundup, MT. 59072

10-1-92

RECEIVED
OCT 05 1992
6270 app144 STATE LANDS

Dale Marsh (64)
4683 Hwy 87 So.
Roundup, Mt 59072

Dear, Mr. DaSilva,

I have worked at the P.M. Coal mine for about 10 years. I have worked below ground and done strip mining. There is only one time that I can remember that I was injured on my kind of work - I did get my left thumb smashed and was unable to work using that hand for a few days. Every precaution possible is taken to insure safety on the job. I have never been ill from coal dust and do not have any health problems.

As in any line of work where machinery is used, a person has to use common sense and use caution at all times. Earplugs are only one type of special equipment that is used at the mine, a Chard hat, steel toe shoes and respirator masks are also used. These are all used in any type of construction project - again common sense is used all the time.

This job has been important to me and my family. I have fed my family with the money earned at the coal mine. The job is one of convenience, it is close to Roundup where I live so I don't have to go to another town to find work. My four children have benefited from my time here at the mine.

While working at the mine I have observed much wild life watering at the mine water. Deer, Elk, turkeys, coyotes, to name a few. Cattle have been raised on the mine property, all the grass drunk the water and grown healthy among all the coal dust.

In regard to the traffic the proposed mine will incure, like common sense must be used again. Anyone living on a busy road must be aware.

I support this mine project and hope the whole community will benefit from it. I have always shopped in Roundup & supported the merchants, I have done my share to help the community.

* Montana has to wake up to the fact that industry is our only hope for survival. If the majority can feel comfortably and benefit from this industry it is time to allow them to benefit and improve their lives.

Because of strict State regulations much industry cannot survive here, people cannot survive here. It is time for support from our State - People need to survive here. Thankyou, Dale Marsh

(65)

October 2, 1992
25 Gibbtown Ave
Roundup, Montana 59072

RECEIVED
OCT 05 1992
STATE LANDS

Mr. Mike DaSilva
Montana Department of State Lands
Capitol Station
Helena, Montana 59620

Dear Mr. DaSilva:

I have read the draft E.I.S. and support alternative #1.

Anyone who feels that the miniature impact on the environment is more important than people working, spending money, and paying taxes is simply out of touch with reality and are evidently wealthy enough to not have to earn a living like those who are not so fortunate.

Please put 300 people to work and lets work together for the environment.

Sincerely,
Jo Ann E. Mills

6270 app144

(66)

6270 app144

RECEIVED
OCT 05 1992
STATE LANDS

10417 Highway 87 South
Roundup, Montana, 59072
October 2, 1992

Mr. Mike Da Silva, Environmental Specialist
Montana Department of State Lands
Capitol Station, Helena, Montana 59620

Dear Sir:

I have read statements that said that were not going to let the ecology slip away by the people who support the Meridian Minerals Company Bull Mountains Mine Number One. There is a problem with that Meridian Minerals has been donating a lot of money to non profit organizations in what appears to me to be an attempt to buy support for the mine.

It is up to you and I, once the eco-system is disturbed by mining, it will never return to its original state.

The reduction of pollution I live with every day because I was permanently injured by air pollution and industrial chemicals. I know first hand what happens. The World Health Organization has stated many times the warning and many leading physicians as to the health problems that occur and companies always say they are not responsible.

I purchased a new home and moved to Roundup, Montana because of the life style and the quality of the Bull Mountains. Now this is threatened. Should the environment change it would be very sad for my health. Possibly death.

There is very simple Question should this happen to the good people of the state of Montana

86-1

going to pay my medical and Hospital expenses and take care of my family.

I DO Not Support the Mine AT All

Sincerely,
Johnadyce Lee

PS. I am not a member of any group of organizations. I am just a citizen that has a health problem. The medical services + family more pronounced everyday.

66-2

(68)

Steve and Jeanne Charter
13838 Hwy. 87 N
Shepherd, MT 59079
947-2151

October 5, 1992

Mike DaSilva
Environmental Specialist
Montana Department of State Lands
Capitol Station
Helena, MT 59620

RECEIVED
OCT 06 1992
STATE LANDS

Dear Mr. DaSilva,

Enclosed are our written comments on State Lands' draft Environmental Impact Statement for Meridian Minerals Company's proposed Bull Mountain Mine.

Thank you for your attention to our concerns.

Sincerely,

Charters

627.0
app 144

Oct 1, 1992

(67)

Mike Da Silva
Environmental Specialist
MT Dept of State Lands
Capitol Station
Helena, MT 59620

RECEIVED
OCT 05 1992
STATE LANDS

I have lived on the edge of the PM Coal Company's mine yard for thirty two years, where coal has been mined and processed from underground strip mining. This is where I've raised my two children.

The Children have raised cattle on the mine property for twenty years successfully, with no decrease in water, due to mining.

Wild life and game animals feed and water here and around the mine property.

Approximately 200,000 tons of coal from Meridian's Test Pit were processed and hauled out by trucks from the PM Coal Plant.

627.0
app 144

The Children and I, or the cattle, have had no adverse effects on our health or lives, due to Coal dust, road dust, noise, water pollution, mining or traffic.

Mining and Living are very Compatible.
I recommend that the Meridian mine permit be approved.

Mrs. Beverly Meged
127 PM Coal Road Roundup, MT

Charters detailed comments on State Lands Draft EIS on proposed Bull Mountain Mine No. II

SUBSIDENCE:

The draft EIS analysis is inadequate. Given the area's rough, steep terrain, a geology that includes extensive massive sandstones and precipitation patterns involving seasonal "gully washers", major impacts from subsidence are likely--including extensive slope failure, slougning, and erosion started by surface fissures and altered drainage patterns. The draft EIS concludes that impacts to the stability of slopes will be "minor", but never explains why. It neither analyzes the area-specific factors that would result in such damage nor proposes mitigation measures nor analyzes their effectiveness or cost. The final EIS needs to do so on a section by section basis including the lands in the potential "angle of draw". Creation of buffer zones should be considered as a valid mitigation alternative that has been used in other western longwall mines that include steep terrain and valuable water resources.

68-1

It should be noted that officials with Utah Power and Light have publicly identified problems with cracking, spalling, sloughing and slope failure when longwall mining under steep slopes and escarpments (1). The Utah Power and Light mines have overburdens of 1500 feet and more over 9 foot seams (2).

68-2

The draft EIS appendix C notes that longwall mine areas with massive sandstones in the overburden may experience more surface impacts. The federal Bureau of Mines recognizes this kind of geology as a major factor in severity of subsidence impacts which tends to make subsidence more violent, as the overburden holds and then breaks all at once, and caving profiles more extreme (3) (4). The draft text never addresses the massive sandstone layers (up to 60 feet thick) that occur in the Bull Mountains. The final EIS needs to identify the existence of massive sandstones in the life-of-mine area overburden geology on a section by section basis and evaluate their influence on subsidence impacts and mitigation measures.

68-3

Dunrud (5) observes that the weight of ridges in rough country produces more tension fracturing than occurs in flat or rolling terrain. He reports large--some hundreds of feet long and up to as much as three feet in width--surface cracks migrating up from 900 foot deep mine subsidence.

68-4

In the eastern United States, large scale longwall mining has altered drainage patterns of entire watersheds and created serious erosion and drainage problems. The Illinois South Project has documented such situations in Illinois, Ohio, Pennsylvania, and the Appalachian states over mines with 500-900 foot thick overburdens (2) (6). Edward Hollop of the US Bureau of Mines reports significant drainage impacts (1).

68-5

2

The Old Ben Coal Company longwall mines in Franklin County, Illinois lie 650 feet below gently rolling farmland (2). Local landowners report longwall subsidence of up to four feet from a seven foot seam extraction, serious drainage disruption and field cracks that started 2-4 inches wide and grew to 12-15 inches wide (6).

Ingram's subsidence study provides photo documentation of severe sloughing, cracking and erosion over longwall panels in rough terrain in West Virginia (7).

According to Diane Nielson, director of Utah's Department of Natural Resources mining division, Utah has had subsidence areas posted and fenced to keep the public away from surface hazards (1). Overburden depths in Utah longwall mines are generally quite thick: 1500 feet or more (2). 68- 6

WATER RESOURCES:

The draft EIS is inadequate and inaccurate. We believe the flows on a number of our most important springs are underestimated. Some important water resources are not identified at all. The draft EIS "bell curve" rating system unfairly undervalues consistent live springs for both livestock and wildlife use. Anyone who has ever "fought water" in eastern Montana would agree with us. The final EIS should revise its spring inventory so that it recognizes practical significance. We believe that inventory should be done in direct consultation with operators like us. 68- 7

The draft EIS never addresses or documents the quantity of shallow groundwater flows in tributary drainages either in the life-of-mine area or downstream from it. This alluvium water is an important resource to ourselves and our neighbors. The information should be available as gaging wells have been installed for several years. The final EIS should include this information and a realistic analysis of the feasibility and cost of "repairing" natural drainage to restore shallow groundwater flows. We feel that the flow volume of most of our lower springs is underestimated because the draft EIS never recognizes them as intermittent surface expressions of significant shallow groundwater flows throughout the Railroad and Fattig Creek drainages. 68- 8

The draft EIS proposes to rely extensively on "horizontal drains" to replace lost springs, but it never provides a realistic analysis of the feasibility and cost of such technology. We are familiar with horizontal drilling that has only limited applications. Is this what is proposed? The final EIS should address the practical application of this proposed mitigation measure in detail. 68- 9

The draft EIS never recognizes the importance of Dunn Mountain's highly permeable clinker cap as a regional water recharge area, nor does it justify its conclusion that longwall mining will not affect this extensive perched aquifer and its related springs and shallow groundwater discharge into surface drainages. The final EIS should 68-10

3

specifically address potential impacts to the hydrologic balance of the Dunn Mountain water resource.

Dunrud (5) found in the Geneva mining area in central Utah that large tension cracks migrated to the surface 900 feet above the mine area and diverted all surface and groundwater flow. A geologic cross section shows about 40% of the overburden there to be shale and mudstones, with some strong sandstones. Dunrud found in the Somerset mining area in Colorado that large tension cracks migrated to the surface up to 600 feet above the mine workings and diverted surface and groundwater flow into the cracks. A geologic cross section shows over 75% of the overburden there to be shale and mudstones with thin sandstones that pinch out. 68-11

Moebs and Barton (8) document water loss with 950 feet of overburden. The geologic cross section shows about 50% of the overburden there to be siltstone and clay. 68-12

Keith Thompson's report (9) estimates Bull Mountain coal overburden to be only about 30% clay, shale and siltstones. 68-13

In general, the way the draft EIS was organized made it extremely difficult to correlate data and conclusions about specific water resources important to us. A section by section appraisal would make the final EIS a much more useful study for everyone involved.

What follows are comments on our water section by section. A US geological survey map is attached that we hope makes our concerns and questions clearer. (Appendix A)

Section 22 (T6N, R27E)

Big Spring #71115
Why do you rate this spring of low importance? We water over 350 pair at this spring. Why do you conclude that the potential for impact is moderate and severity of impact will be negligible? We have never known this spring to run as low as 1.3 gallons per minute. We would also estimate the total average flow as better than 4.3 gallons per minute. It should be recognized that RR Creek flows live through section 22 below this spring year round which is significant for wildlife and vegetation as well as livestock use. The draft EIS claims that the average quality of water in the Bull Mountains is not very good. The final EIS should explicitly recognize the very high quality of water in Dunn Mountain's higher springs. 68-14 68-15 68-16

Raspberry Spring #71125
Why do you rate this spring of low importance? This fork of RR Creek is also live year round down through section 22, and flows at least as strong or stronger than the Big Spring fork. Why is the average flow estimated at only .4 gallons per minute? Why do you conclude that the potential for impact is moderate and the severity of impact will be negligable? 68-17 68-18 68-19

4

Dunn Spring #16135
Why do you rate this spring of low importance? Why do you estimate the potential for impact as low and its severity negligible? 68-20

Section 23 (T6N R27E)
The forks of RR Creek flow live through the east half of this section year round and springs up consistently through the west half. The draft EIS makes no mention of the significant water resources in this section at all. It predicts no potential for impact in this section--half of which is in the life-of-mine area. Why have the water resources in this section and the impacts to them been ignored? 68-21

Section 24 (T6N R27E)

Tipi Spring #71445
The draft EIS only recognizes this one spring whereas RR Creek springs up repeatedly through the SW quarter of section 24. Groundwater is very shallow in the creek alluvium; there should be a way to measure its flow. It is more significant than .4 gallons per minute. We can consistently dig down with a backhoe and get several feet of standing water. Why does the draft EIS estimate the potential for impact as negligible? Why doesn't the draft make any estimate of the value of this water? 68-22

Lower RR Creek Spring #71465
This spring has never run as low as 2 gallons per minute in our experience since the 1984 fire. Our experience with this spring is that its flow is very stron and consistent. The draft EIS makes no estimate of the value of this spring. It is in fact extremely important to our operation. The draft estimates the potential for impact as negligible. We have been told informally by both company and OSM staff to expect to lose this spring if Dunn Mountain were undermined. What is your rational for expecting no impact? 68-23

Section 25 (T6N R27E)
RR Creek usually springs up in pools below the Lower RR Creek Spring through the NE quarter of section 25. Again groundwater is very shallow in the creek alluvium in this section and backhoe work would expose several feet of standing water. This shallow drainage groundwater resource should be recognized and evaluated. 68-24

Section 15 (T6N R27E)

Red Tank Spring #14115
This spring heads in section 15, not section 16. In our experience, the Red Tank spring is as strong and consistent as the Big Spring in section 22 and capable of watering as many cattle. We question your estimate that its average flow is only 1.8 gallons per minute. Why is it rated as of low importance? Why do you estimate that the potential for impact is low and the severity negligible? It 68-25

5

should be noted that the Red Tank fork of Render Coulee flows live through the SE quarter of section 16. 68-25

Escape Draw Springs #14155 and 14165
Why is potential for impact to these springs considered low? 68-26

Black Canyon spring-fed reservoir #53175
Why do you rate this spring-fed reservoir as of only moderate importance? We realize flow into a large pond is hard to measure, but we question your estimate that it only flows an average of 2.4 gallons per minute. The reservoir level maintains itself consistently year round and can water a very large number of animals. Our impression is that most of the flow goes on out underground at a shallow level, and evaporation off this big a surface area is signficant. Why do you estimate the potential for impact as only moderate? 68-27

The upper length of the Black Canyon fork of Fattig Creek flows year around in the SE quarter of section 15. The final EIS should recognize this resource. 68-28

Section 11 (T6N R27E)

Upper Section 11 Springs #53195
The draft EIS only recognizes one spring whereas Fattig Creek springs up in a very strong series of pools through the SW quarter of section 11. We question the draft's conclusion that this rich spring area is only of moderate importance. Why do you estimate the potential and severity of impact as both negligible? 68-29

Buffalo Head Spring #53285
Again, we realize calculation of spring flow into a reservoir is hard to measure, but we question your estimate that this spring only flows an average of .5 gallons per minute. You do not rate the value of this spring: it is in fact important because of its location in rough terrain. Why do you estimate its potential for impact as negligible? 68-30

Fattig Creek often springs up in pools through the north half of section 11. The shallow groundwater resource should be recognized and evaluated. 68-31

Section 2 (T6N R27E)

Swimming Hole # 53465
This hole has very strong water supply and can water a large number of animals. We believe it is inaccurate to represent it as only flowing an average of .1 gallons per minute. It just flows out underground at a very shallow level. Why do you rate its potential for impact as negligible? Why don't you evaluate it as a water resource? 68-32

Road Spring #53485

Why do you estimate the potential impact to this strong creek alluvium spring as negligible? Why don't you evaluate it as a water resource? 68-33

Lake Louise #53755

We question your estimate that Lake Louise only flows an average of 1.4 gallons per minute. Our impression is that the majority of the flow goes on out underground at a shallow level and a significant amount is lost to evaporation. You estimate the potential for impact as none. The spring comes right out in the coal seam--how do you justify this conclusion? 68-34

Fattig Creek consistently flows live through the south third of section two. It is an important water resource that should be recognized and evaluated. 68-35

Section 10 (T6N R27E)

Fat Woman Spring #53575

We question your estimate that the spring only flows an average of.2 gallons per minute. Our impression is that most of the flow discharges underground at a shallow level. You do not rate the importance of this spring. It is in fact valuable because of its persistence and location. Why do you estimate that there is no potential for impact? 68-36

Picnic Spring #52165

We question your estimate that the spring only runs a gallon a minute. Our impression is that most of the flow discharges underground at a shallow level. Why do you estimate the impact to this spring as negligible? You do not rate the importance of this spring. It is in fact valuable because of its persistence and location. 68-37

Section 9 (T6N R27E)

Lower Two Dam #52145

We question your estimate that this spring does not flow. Our impression is that most of the flow discharges underground at a shallow level. Why do you estimate the potential impact to the springs in this drainage as only moderate? 68-38

#9 Spring #52225

We question your estimate that this spring only runs an average of .7 gallons per minute. Our experience is that it is a strong spring and most of the flow must discharge underground at a shallow level. Why do you estimate this spring to be of low importance? Why do you estimate the potential for impact to be only moderate and the severity of impact negligible? 68-39

Section 3

Sam Place Springs #52455

These are very consistent springs. Why do you not rate them as to importance? Why do you estimate the potential for impact to be negligible? 68-40

This fork of Fattig Creek springs up consistently through section 3. This shallow alluvium groundwater resource should be recognized and evaluated. 68-41

Section 34 (T7N R27E)

Wedding Cliffs Springs #52655

These are very strong springs. We question your estimate that they only average 3.5 gallons per minute. Our impression is that most of the discharge goes out underground at a shallow level. Why do you not rate them as to importance? Why do you estimate the potential for impact to be negligible? 68-42

Section 35 (T7N R27E)

#35 Spring #52855

We question your estimate that this spring only averages a flow of .2 gallons per minute. It maintains its level while watering a significant number of animals. Why do you consider mining upstream will have not effect on its flow? Why do you not rate it as to importance? 68-43

Attached is a copy of our grazing and exploration and mining access lease with Glacier Park Company-Meridian Minerals Company. We are dependent for the continued viability of our ranch operation on the adequacy of the terms and conditions required in any mining permit issued to Meridian by the State of Montana. We need and expect to be welcomed to participate throughout the State Lands Department's decision-making process. (Appendix B)

NOTES

(1) Subsidence Seminar, American Mining Congress, December 1989, Salt Lake City, Utah

(2) Coal Age Census of operating longwall installations in the United States, August 1986

(3) Thick Seam Mining in the Western United States, D L Boreck, Bureau of Mines Information Circular 9116, 1986

(4) Mine Subsidence Control, Bureau of Mines Information Circular 9042, Precalculation of subsidence over longwall panels in the Northern Appalachian Coal Region, Vladimir Adamek and Paul Jeran, 1985

(5) Some Engineering Geologic Factors Controlling Coal Mine Subsidence in Utah and Colorado, C Richard Dunrud, Us Geological Survey Professional Paper 969, 1976

(6) Illinois South Project, Memorandum on Underground Mining Issues, Herrin, Illinois

(7) David Ingram, Bureau of Mines Information Circular 9242

(8) Mine Subsidence Control, Bureau of Mines Information Circular 9042, Short term effects of longwall mining and shallow water sources, Noel Moebs and Timothy Barton, 1985

(9) Groundwater and Potential Coal Mining in the Bull Mountains, South Central Montana, by Keith Thompson, Montana Bureau of Mines open file, report 100, 1982

Appendix B

JAN 11 1991

LEASE COPY

Lease No. E12420

AGREEMENT made this 11th day of January, 1991, but effective April 1, 1990, between GLACIER PARK COMPANY, of P. O. Box 579, Miles City, MT 59301, hereinafter called "Glacier," and CHARTER RANCH, INC., of Route 1, Shepherd, Montana 59079, hereinafter called "Charter."

GLACIER LEASE TO CHARTER

1. Glacier, in consideration of the payments and agreements hereinafter stated, does hereby lease unto Charter for the sole and exclusive purpose of grazing livestock thereon, until this Lease is terminated as hereinafter provided, the following described tract of land (hereinafter referred to as "Glacier's Property"):

All of Sections Three (3), Nine (9), Eleven (11), Thirteen (13) and Fifteen (15), the Northeast quarter (NE/4) of Section Twenty-two (22), all of Section Twenty-three (23), the Northeast quarter of the Southeast quarter (NE/4SE/4) of Section Twenty-four (24), all of Section Twenty-five (25), Township Six (6) North, Range Twenty-seven (27) East, and all of Section Thirty-five (35), Township Seven (7) North, Range Twenty-seven (27) East, Montana Principal Meridian, in Musselshell and Yellowstone Counties, Montana, containing 5,314.63 acres, more or less.

EXCEPTING AND RESERVING to Glacier and to Meridian Minerals Company, a Montana corporation, Glacier's Attorney-in-Fact authorized to conduct all operations and activities relating to minerals in, under or upon Glacier's Property, (sometimes hereafter collectively referred to as "Glacier/Meridian") the right to enter upon and use or consume such part or parts of the surface of Glacier's Property as may be necessary or convenient for the purpose of exploring for (by geological, geophysical or other methods), drilling for, producing, mining (by any method, including, but not limited to, surface mining), extracting, taking, storing, processing, transporting, marketing and selling all minerals of every nature whatsoever, including, but not limited to, uranium, coal, iron, natural gas and oil in, upon or under Glacier's Property, and including all steam and waters and the minerals and gases therein, and for the purpose of erecting and maintaining on Glacier's Property such buildings, shafts, devices, wells, roadways, shops, ditches, powerlines and all other structures and improvements in, on, over, under or across Glacier's Property as Glacier/Meridian may desire or deem necessary in any operations and activities relating to minerals in, under or upon Glacier's Property or in, under or upon any other lands. In addition, Glacier/Meridian specifically reserve the right to enter upon and use any portion of the

surface of Glacier's Property for conducting any and every type of environmental reconnaissance, monitoring, surveying, measurements, drilling, pumping, sampling, testing or other environmental work that may be required by any regulatory agency or deemed necessary by Glacier/Meridian for the purpose of obtaining permits or regulatory agency approvals, complying with permits from any regulatory agency, or gathering data for feasibility studies. The rights and interests of Glacier/Meridian set out above are hereinafter collectively referred to as "Mining Rights."

2. In addition to the Mining Rights, Glacier reserves the right to use Glacier's Property for any purposes not inconsistent with the grazing rights herein leased to Charter. As a courtesy to Charter, Glacier will notify Charter in advance to the extent practicable when it wishes to use Glacier's Property for hunting or other recreational uses.

3. Charter shall have the right to use such water, except geothermal waters and steam, found in, upon or produced by Charter from Glacier's Property as may be necessary or convenient for Charter's grazing operations on Glacier's Property. This Lease is subject to all existing easements, servitudes and rights-of-way as reflected by public records and records of Glacier.

4. For the purpose of determining rent to be paid by Charter hereunder, the grazing capacity of Glacier's Property is 1,020.00 Animal Unit Months (AUM's) and the number of animals grazed by Charter shall not exceed that number except as provided in Paragraph 5. The annual rental rate to be paid by Charter for each of the first five years of this Lease shall be $8.00 per AUM or Eight Thousand One Hundred Sixty Dollars ($8,160.00) per annum, payable in advance to Glacier at P.O. Box 579, Miles City, Montana 59301. The annual rental rate of $8.00 per AUM shall be subject to change at the end of each five year period during the term hereof, commencing with the sixth year of the term, based on the change in the Producer Price Index for Cattle, Comaodity Code Number 0131, as set forth in Table 6, Producer Price Indexes and Percent Changes for Commodity Groupings and Individual Items (the "PPI"). The new rental shall be equal to the product obtained by multiplying a fraction, the numerator of which shall be the PPI for the month of December preceding each fifth anniversary hereof, and the denominator of which shall be the base PPI for the month of December, 1989 (117.3) times the base annual rental rate of $8.00 per AUM. If the PPI is no longer published or is substantially modified, a comparable index, acceptable to both parties, shall be substituted.

To illustrate how the adjustment to the annual rental rate per AUM would be calculated for the lease period from April 1, 1995 through March 31, 2000, the following example is provided:

(1) Assume the PPI for Commodity Code 0131 for December 1994 is 131.7

(2) Annual Rental Per AUM for Period from April 1, 1995 through March 31, 2000 shall be $8.98 in accordance with the following calculation:

Current PPI for December 1994 (131.7) x $8.00 = $8.98
Base PPI for December 1989 (117.3)

5. Glacier and Charter shall periodically review the season of use, stocking rate and range condition of Glacier's Property. In the event that Glacier asserts that Charter has exceeded the stocking rate or grazing capacity of Glacier's Property, Glacier shall give written notice to Charter. Within 30 days of such notice, Charter and Glacier shall each select one person who is not an agent or employee of Charter or Glacier or any Burlington Resources Inc. related company or any relative of the Charter family, who shall jointly examine the property and review its use and who shall jointly issue a written report which recommends a stocking rate or grazing method. If the two persons thus selected find that the stocking rate or grazing capacity has been exceeded, Charter shall have 30 days from the date of the report to comply with the recommendation of the two persons. If Charter shall fail to follow such recommendations, Glacier may terminate this Lease by written notice to Charter.

6. Charter may assign or sublet all or any portion of this Lease upon giving 60 days written notice of such assignment or sublease to Glacier.

7. This Lease shall be effective as of the 1st day of April, 1990, and shall remain in effect for a term of forty (40) years thereafter unless terminated as hereinafter provided in this Section 7 or Section 8 hereof. Glacier/Meridian may terminate this Lease, in whole or in part, upon written notice to Charter, if it determines, in its sole discretion, that its exclusive use of all or any portion or portions of Glacier's Property is necessary for the exercise of Glacier/Meridian's Mining Rights in accordance with an approved mine plan. Any such termination by Glacier/Meridian shall not have an effective date which is more than eight months or less than six months prior to Glacier/Meridian's anticipated actual use so that Charter will have at least six months written notice of any such termination. In the event this Lease is terminated in part by Glacier/Meridian pursuant to this Paragraph 7, a rent adjustment shall be made as follows: the annual dollar loss in use to Charter shall be calculated by multiplying $1.56 per acre times the total acres eliminated from the Lease and multiplying such product by the fractional part of the lease year, measured to the nearest day, in which Charter was unable to use the acreage eliminated. The assigned value of $1.56 per acre shall be subject to change in the same manner and at the same time as the rental rate per AUM contained in Paragraph 4 of this Lease. Charter shall have the choice of either having the following year's annual rent reduced by the amount of the rent adjustment, or having Glacier/Meridian refund to Charter the amount of the adjustment within 60 days of its determination. The loss so calculated shall be limited to the acres deleted from this Lease and will not be calculated on the use of existing roads and trails or for disruption of ranching operations caused by activities arising out of the Mining Rights or other activities of Glacier/Meridian. In the event this Lease is terminated in whole by Glacier/Meridian pursuant to this Paragraph 7, a rent adjustment shall be made by Glacier/Meridian promptly refunding to Charter the appropriate pro rata share (based upon the effective date of termination) of the rent paid by Charter for the lease year in which such termination occurred. At the termination of the Lease, in whole or in part,

Charter may, within ninety (90) days remove fences and other improvements installed by Charter, except any water wells.

8. If Charter shall fail to pay the annual rent when due hereunder or shall fail to perform any other covenant hereof, Glacier may terminate this Lease upon sixty (60) days notice in writing to Charter and Charter shall forfeit all rent previously paid and may remove any fences or other improvements (except water wells) installed by Charter in the event of any such termination; provided, however, that Charter may avoid such termination by curing said default within said sixty (60) day period. Charter may terminate this Lease upon 90 days written notice to Glacier.

9. Charter may construct fences and other improvements on Glacier's Property, provided written approval is received in advance from Glacier and the improvements comply with the laws of the State of Montana and of the United States. All existing improvements shall be maintained by and at the expense of Charter during the lease period; provided, however, that Charter shall not be responsible for maintaining any fences or other improvements of Glacier/Meridian which are used by Glacier/Meridian in carrying out or supporting the above-described Mining Rights. If it so desires Glacier shall have the right to construct fences or other range improvements on Glacier's Property which do not unreasonably interfere with Charter's ranching operations.

10. If any part of Glacier's Property lies within any National Forest, grazing on Glacier's Property will be subject to regulations of the United States Forest Service, and Charter hereby agrees to comply therewith and Charcer will hold harmless and indemnify Glacier from and against any and all loss, cost (including reasonable attorneys' fees), damage, suit or expense, fines and penalties in any manner arising out of Charter's failure to comply with such regulations.

11. Glacier/Meridian shall have the right to enter upon Glacier's Property at all times for the purpose of inspecting Charter's operations thereon. Glacier/Meridian shall have the right of ingress and egress on and over Charter's Property (as described in Paragraph 1 of the below set forth Charter Lease to Glacier/Meridian) as required to inspect said operations.

12. Charter hereby assumes all risk and responsibility for, and shall indemnify and save harmless Glacier/Meridian from and against any and all claims, demands, costs (including reasonable attorneys' fees), suits or causes of action, for any injury, including death, or damages sustained by any third party or parties, Charter or Glacier/Meridian, their agents, employees, invitees, licensees or guests while upon Glacier's Property that is proximately caused by the negligence or willful misconduct of Charter, or its agents, employees, invitees, licensees or guests.

13. If this Lease is not in default, within 90 days after the expiration or other termination hereof, Charter shall remove Charter's property from Glacier's Property at Charter's own expense and shall leave Glacier's Property in a clean and sanitary condition satisfactory to Glacier. In the event of failure to do so, Glacier may remove such property and cause the cleanup work to be accomplished at the expense of Charter.

CHARTER LEASE TO GLACIER/MERIDIAN

1. As a material consideration for Glacier/Meridian having entered into the above set forth long-term grazing Lease with Charter and without which Glacier would not have given such grazing Lease to Charter, for the same consideration Charter hereby leases and demises to Glacier/Meridian for a term of forty (40) years from and after April 1, 1990, those lands of Charter described below ("Charter's Property"), for the purpose of allowing Glacier/Meridian to enter upon and exercise the mining and exploration rights reserved in favor of the mineral estate owner or its lessee or licensee in the pertinent patent covering Charter's Property, provided Glacier/Meridian has the proper approvals, permits, licenses, and/or leases that may be required by any regulatory authority or mineral owner that may be needed for Glacier/Meridian to exercise the mining rights reserved under the applicable patent. In addition, Charter grants Glacier/Meridian the right to enter upon and use any portion or portions of Charter's Property for conducting any and every type of environmental reconnaissance, monitoring, surveying, measurements, drilling, pumping, sampling, testing or other environmental work that may be required by any regulatory agency or deemed necessary by Glacier/Meridian for the purpose of obtaining permits or regulatory agency approvals, complying with permits from any regulatory agency or gathering data for feasibility studies. Glacier/Meridian shall have the right of ingress and egress on and over Charter's Property and the right to use any and all roads thereon in order to conduct, direct or perform any work in connection with such exploration and mining rights and environmental studies. As a courtesy to Charter, Glacier/Meridian will notify Charter in advance to the extent reasonably practicable when it will begin exercise of its rights hereunder which Glacier/Meridian anticipates will result in significant surface activity being carried out by Glacier/Meridian on Charter's Property. Nothing in this lease to Glacier/Meridian is to be construed as granting surface owner's consent for strip mining. Additionally, nothing in this lease to Glacier/Meridian is to be construed as relieving Meridian of the responsibility to comply with the terms and conditions of any mining permit issued to Meridian by the State of Montana.

CHARTER'S PROPERTY
MUSSELSHELL AND YELLOWSTONE COUNTIES, MONTANA

Township 7 North - Range 27 East
Section 34: S/2S/2 (also described as Lots 1 (38.72 acres), 2 (37.78 acres), 3 (40.31 acres), & 4 (35.88 acres)

Township 6 North - Range 27 East
Section 2: All (641.08 acres)
Section 4: That part of the E/2 lying east of the County highway that runs in a NE-SW direction through the E/2 of said Section (aporox 150.00 acres)
Section 10: NE/4, S/2NW/4, NE/4SW/4, NE/4SE/4 (320.00 acres)
Section 14: All (640.00 acres)
Section 22: NW/4, S/2 (480.00 acres)
Section 24: All except the NE/4SE/4 (600.00 acres).

Containing 2,980.28 acres, more or less

④ ENTER WORK, TAKE, USE, OR EXCLUSIVELY USE 72H a&e

2. Glacier/Meridian is also expressly granted the right, in the exercise of the rights granted under this lease or otherwise provided by law, to ~~take and exclusively use~~ all or any portion of Charter's Property, whereupon Charter shall be compensated by Glacier/Meridian for all portions of Charter's Property taken by reason of the exercise of such right by Glacier/Meridian. In the event of any such taking, Glacier/Meridian shall, at Charter's option, either (i) pay to Charter $3.00 per lease year, prorated to the date of such taking, for each acre thus taken or used during each lease year, together with such amount as will reasonably compensate Charter for all physical damage to Charter's improvements, damage sustained by Charter by reason of the destruction of or injury to any of Charter's livestock, or damage to water and water sources of Charter sustained by Charter by reason of such taking and use by Meridian, or (ii) purchase the portion or portions of Charter's Property so taken by Glacier/Meridian or all of Charter's Property described above. The above-referenced option provided to Charter in this Paragraph 2 shall be exercised by Charter within 90 days after Glacier/Meridian's exercise of its right to take and use all or any applicable portion of Charter's Property as aforesaid. If Charter shall fail to elect option (i) or (ii) above within the 90-day period, then Charter shall be conclusively deemed to have elected option (i) above; provided, however, the Charter's right to elect option (ii) above shall apply to all or any part of Charter's Property previously taken or used by Glacier/Meridian each time Glacier/Meridian exercises its right to take and use any additional portion of the Charter's Property irregardless of Charter's previous election or deemed election of option (i) above. The purchase price shall be the greater of (a) $150 per acre, or (b) the appraised value of such taken property. The $3.00 per acre and $150 per acre values shall be subject to change in the same manner and at the same time as the rental rate per AUM contained in Paragraph 4 of the Lease from Glacier to Charter. To obtain the appraised value, Glacier/Meridian and Charter shall each promptly select and pay for one qualified appraiser, who shall, within 30 days of the appointment of the last of such appraisers, each appraise Charter's interest in the taken properties independently and determine the fair market value thereof in a pre-mining condition. If the fair market values determined by the two appraisers so selected differ by less than 10% of the higher appraised value, the fair market value shall be equal to the average of the fair market values determined by the two appraisers. If, however, the fair market values determined by the two appraisers differ by more than 10% of the highest appraised value, then the two appraisers shall jointly select a third appraiser, the cost of which shall be shared equally by Glacier/Meridian and Charter. The third appraiser shall conduct his appraisal independently within 30 days of appointment, and the fair market value shall then be the average of the two fair market values which are the closest of the three values thus obtained. Each such appraiser shall be a disinterested person of recognized competence who has been involved in the real estate industry for a period of not less than five years. Notwithstanding anything contained herein to the contrary, it is expressly agreed that if Meridian shall become liable to Charter for damage to the water and water sources of Charter as aforesaid, then Meridian's total liability to Charter for such damage shall be limited to, and shall in no event ever be greater than, an amount determined by multiplying the acreage of Charter's Property (2,980.28 acres) times $150 (provided that such $150 value shall be subject to change in the same manner and at the same time as the rental rate per AUM contained in Paragraph 4 of the Lease from Glacier to Charter) and subtracting from the product thereof the then appraised value of Charter's Property. The appraisal

2551H -6-

a&e 72H

procedures to be utilized to determine the then appraised value of Charter's Property shall be those above set forth in this Paragraph 2. The foregoing limitation on Meridian's liability to Charter for damage to water and water sources of Charter sustained by Charter by reason of the aforesaid taking and use by Meridian is just that, a limitation, and nothing herein shall be construed as relieving Charter from verifying the actual damages sustained by Charter to its ranching operation by reason of such taking and use by Meridian.

In addition to the payments provided for in the preceding paragraph, unless Glacier/Meridian has previously purchased the applicable portion of Charter's Property, Glacier/Meridian shall pay Charter a one-time payment of $250.00 for each site where either exploration drill holes or water monitoring wells are installed on Charter's Property. A drill site shall include all holes within a 100 foot radius of the initial hole drilled at any given area.

3. Glacier/Meridian, jointly and severally, hereby assume all risk and responsibility for, and shall indemnify and save Charter harmless from and against, any and all claims, demands, costs (including reasonable attorneys' fees), suits or causes of action, for any injury, including death, or damages sustained by any third party or parties, Glacier/Meridian or Charter, their agents, employees, invitees, licensees, or guests while upon Charter's Property, that is proximately caused by the negligence or willful misconduct of either Glacier/Meridian, or their agents, employees, invitees, licensees or guests.

4. If Glacier/Meridian shall fail to perform any covenant hereof, Charter may terminate this lease upon sixty (60) days notice in writing to Glacier/Meridian; provided, however, that Glacier/Meridian may avoid such termination by curing such default within said sixty (60) day period. Glacier/Meridian may terminate this lease upon 90 days written notice to Charter; provided, however, that Glacier/Meridian shall not have the right to so terminate this lease as to any portion of Charter's Property which is covered by Meridian's State of Montana reclamation bond until such bond is finally released as to such portion of Charter's Property by the State of Montana. In the event of termination by Glacier/Meridian, Glacier/Meridian shall remove its property from Charter's Property within 90 days after such termination and shall leave Charter's Property in a clean and sanitary condition satisfactory to Charter. In the event of failure to do so, Charter may remove such property and cause the clean up work to be accomplished at the expense of Glacier/Meridian.

5. Glacier/Meridian may assign or sublet all or any portion of this lease upon giving 60 days written notice of such assignment or sublease to Charter.

MISCELLANEOUS PROVISIONS APPLICABLE TO BOTH LEASES

1. Service of any notice hereunder by Glacier shall be deemed complete if such notice is either personally delivered or is sent by certified mail with a return receipt requested deposited in the United States Post Office, addressed to Charter at Route 1, Shepherd, Montana 59079. Service of any notice hereunder by Charter shall be deemed complete if such notice is either personally delivered or is sent by certified mail with a return receipt

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a&e 72H

requested deposited in a United States Post Office, addressed to Glacier at Glacier Park Company, P.O. Box 579, Miles City, Montana 59301, with a copy to Meridian Minerals Company, 5613 DTC Parkway, Englewood, Colorado 80111.

2. Glacier will pay all taxes levied or assessed upon Glacier's Property and Charter will pay all taxes levied or assessed upon Charter's Property.

3. This document incorporates the entire agreement of the parties. No prior representation, stipulation, agreement or understanding will be valid or enforceable unless incorporated herein.

4. This Lease shall be binding upon and inure to the benefit of the successors and assigns of Charter, Glacier and Meridian.

5. This document contains two separate leases and they have been placed in one document simply as a convenience. The continuation, default, termination or any other event with respect to one of the leases shall have no effect on the other lease. For as long as both leases remain in effect, there is no rent payable to Charter hereunder. In the event the Lease to Charter herein is terminated for any reason, the lease to Glacier/Meridian shall continue, and Glacier/Meridian shall pay to Charter rent in the annual amount of $3.00 per acre (less, however, any amount paid to Charter under Paragraph 2 of the lease to Glacier/Meridian for the same acreage) or at Charter's option Glacier/Meridian shall purchase all of Charter's Property set forth above in accordance with Section 2 of the Charter Lease to Glacier/Meridian. The $3.00 per acre figure contained in this paragraph shall be subject to change in the same manner and at the same time as the rental rate per AUM contained in Paragraph 4 of the Lease from Glacier to Charter.

IN WITNESS WHEREOF, the parties hereto have executed this instrument, in duplicate, the day and year first above written.

CHARTER RANCH, INC.

By Anne F Charter
Its President

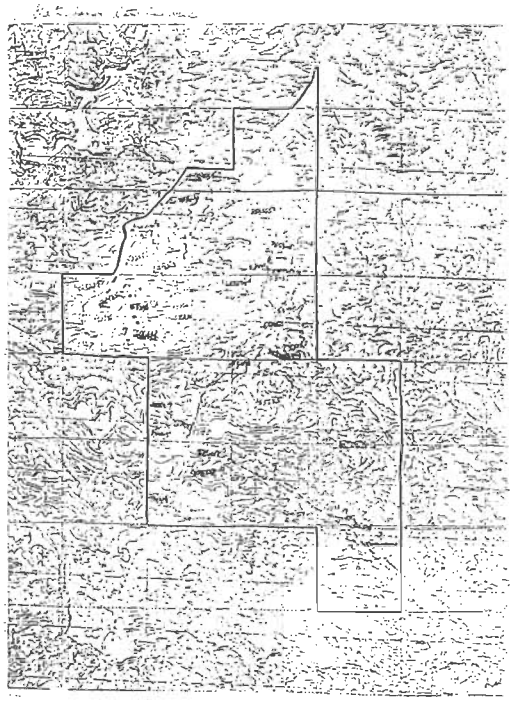
GLACIER PARK COMPANY by its Attorney-in-Fact, MERIDIAN MINERALS COMPANY

By
Its PRESIDENT AND CEO

MERIDIAN MINERALS COMPANY

By
VICE - President

2551H -8-



(69)

Huntley Community Club. PO Box 161. Huntley. MT 59037

October 3. 1992

RECEIVED
OCT 06 1992
STATE LANDS

Mike Desilva
Environmental Specialist
MT Dept of State Lands
Capitol Station
Helena. MT 59620

RE: WRITTEN COMMENTS CONCERNING THE DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE BULL MOUNTAINS MINE NO 1.

Dear Mr. Casey & Mr. Desilva:

(1) I disapprove of Dept of Montana's 5-year permit to mine coal, and (2) a Montana land use agreement being requested by Meridian Minerals company for the construction and operation of the Bull Mountain mine No 1 and its associated support facilities.

I also disapprove of (1) successive amendments of the Montana Permit to mine coal (2) A Montana Coal Lease. (3) a federal permit to mine coal, and (4) a Federal surface use permit may be requested in the future for life of mine development.

I disapprove of all the proposed actions due to the fact that MDSL has not adequately addressed alternative sites in this Draft EIS.

My major concern is that NO ALTERNATIVE SITES for the load-out facility are analyzed to the same extent that the Huntley Site was in the DEIS. I realize that mine alternatives to the use of the existing coal loadout facility at Huntley were evaluated. I question to what extent YOUR AGENCY [DSL] did your own evaluation as opposed to the information Meridian Minerals provided for your agency. I will attempt to support my concerns about the inadequacy of alternative sites analysis in the DEIS by citing the Montana Environmental Policy Act (MEPA). 69-1

Meridian Minerals considered 13 sites for a load-out facility. Under MEPA Section 26. 2. 642 (2) (a) (i); I believe all 13 of the applicants sites fall under this definition.

In recognition of Section 26. 2. 642 (2) (i); Section 26. 2. 649 (3) states in part..."an analysis of reasonable alternatives to the proposed action. including the alternative of no action and other reasonable alternatives that may or may not be within the jurisdiction of the agency to implement. if any"... Also MEPA Section 75-1-201 (1): Explains how the EIS "MUST INCLUDE", to the fullest extent possible, the analysis of alternatives. And that analysis must accompany the proposal through the existing agency's review processes. I do not feel after reviewing these regulations that MDSL has adequately addresses alternative load-out

627.0 app 144

page 2

sites in the DEIS!

In determining the scope of this EIS the agency may have benefited by including the Huntley Community Club's (HCC) inputs into alternative sites by allowing the HCC to work more closely with the agency as prescribed in MEPA Section 26. 2. 647 (2) (a) (b) (c) (d) and especially (e). The HCC feels it has developed some ideas concerning other load-out sites that may have been beneficial in your analysis. MT Dept of Transportation offered a recommendation and several mitigation measures concerning the transportation issue. which the HCC feels should have been included in this DEIS. 69-2

Up to now it appears MDSL has accepted only Meridian Minerals inputs which the HCC feels has been heavily influenced by Meridian Minerals financial position and support.

MEPA Section 26. 2. 649 (8) calls for an explanation of the tradeoffs among the reasonable alternatives. I feel that the public is entitled to know what the other alternative sites were. what the trade offs & what other sites had to offer.

Due to MEPA Section 26. 2. 644 (f) MDSL would be wise to consider more that one load-out site and all of the related impacts. especially transportation & human environmental elements. to insure that NO PRECEDENTS ARE SET BY THIS DECISION. FOR OTHER COMMUNITIES TO HAVE TO LIVE WITH.

The questions asked in the telephone survey. the answers. and to whom the questions were asked. should have been included in the DEIS as per MEPA Section 26. 2. 649 (10) (b) & (c). 69-3

The success of the Bull Mountains Mine # 1 seems to hinge on the use of a load-out site. MEPA Section 26. 2. 648 (2) states. in part..."The agency shall discuss the impacts of a proposed action in a level of detail that is proportionate to their significance"... Therefore I feel that the Load-Out sites must be more carefully analyzed and alternative's considered on a basis other that "Short Term". Many of the related impacts to the use of a load out site; mostly impacts to the human environment and transportation aspects. could have long term effects. The loss of just ONE Child or One Person would NOT BE short term effects.

Inclosing: IF MDSL would choose to include. in the Final EIS. a Supplement with at least (4) additional sites for a load-out. with the load-out facilities allowed a 30 day comment period. then a decision to permit the mine would not weigh so heavily on a temporary load-out. The Agency could permit the mine and choose a load-out which would not impact the Human Environment or transportation. so heavily. 69-4

page 3

MEPA Section 26. 2. 653 (1) (b) provides for a supplement to an EIS. As it stands now Commissioner Casey must choose between a 40 year mine plan. which could help stabilize one area of the state. and the use of a load-out. for 1-4 years. In a community which feels it is BEING FORCED TO BEAR MAJOR IMPACTS TO ITS HUMAN ENVIRONMENT AND TRANSPORTATION ROUTES. 69-5

Thank You.

Sincerely.

Steven M Erb. Chairman
Huntley Community Club and private citizen.

Stacy Erb. Wife of Steven Erb and Mother to Ashley (5) and Cameron (2)

(70)

Pete and Rhonda Tully
1196 East Parriott Cr Rd
Roundup, Montana 59072

October 2, 1992

RECEIVED
OCT 06 1992
STATE LANDS

Mike DaSilva
MT Dept of State Lands
Capitol Station
Helena, MT 59620

Dear Mr. DaSilva,

The following comments contain additions or deletions I feel should be included within the Final EIS for Meridian Minerals Company's Bull Mountains Mine No. 1.

Chapter IV, page II-1, Alternative 1; I feel this condition should be included: Condition No. 4- The operator shall submit a detailed evaluation of the life-of-mine area and its perimeter to the Agency identifying all springs, wells and groundwater that may be disrupted due to mine related subsidence and mine pumping (necessary to keep mine workings dry). This evaluation must include a detailed plan of mitigation enabling the operator to restore or replace all impacted waters, including groundwater, to their original quality and quantity. The Agency shall then require the operator to post a bond sufficient to cover the cost of restoration or replacement of these waters into infinity should they be irretrievably lost. The Agency should bear in mind that if this bond is not sufficient and the operator relinquishes it to the state, then the state shall be liable for all damages incurred. 70- 1

Chapter II, page II-4 and II-5; I believe the Agency should reevaluate the alternative method of permanent coal transportation from the Mine, at its outset, using a conveyor belt down Perdue and Halfbreed Creeks to the Milwaukee right-of-way. Here the Agency should require a permanent coal load out facility with a state-of-the art covered tipple. The operator should be required to rebuild the old Milwaukee railbed from Roundup to Cushman. This alternative would eliminate both the public safety hazards due to trucking and the environmental degradation due to a new and unnecessary railspur. 70- 2

Chapter III, page III-16; Although much of the water in the Bull Mountains is characterized as Class II water, it is generally suitable for public and private water supplies without treatment. Therefore, under law, the nondegradation standards apply. 70- 3

Chapter III, page III-21; The Agency should ask for a more recent elk herd count since elk tend to procreate and their numbers have increased significantly since 1978. I doubt the Fish, Wildlife and Parks would issue permits for half of the elk herd to be harvested annually by rifle not to mention those taken each year during bow season. 70- 4

Chapter III, page III-42; The Bull Mountain Landowner Association is not a newcomer to the area. This group of mainly ranchers has been organized for over 20 years and has members whose families have lived here for generations. 70- 5

Chapter IV, page IV-2; Does the agency include water resources as reclaimed acres unavailable for postmining land use until the end of mine life? If so, this assumption is not within the law.
It is unreasonable to term a 44 year impact as short term. I believe the Agency should change the words "short term impacts" to read "mine life impacts". 70- 6

627.0 app 144

Chapter IV, page IV-5: I would like the Agency to add their assumption of the cost of production per ton of coal for the life of mine. | 70- 7

Chapter IV, page IV-14: The Agency conclusion that impacts to stability of slopes and cliffs from mining subsidence are "minor" seems optomistic if not entirely unrealistic in light of what actually may occur. I feel the wording should be changed from "minor" to "major".

Chapter IV, page IV-17 through 23, No. 6 Hydrology: Somewhere within this section the Agency needs to include an evaluation of how much water will be pumped to keep the mine workings dry and where this water will be discharged. Within this evaluation the Agency needs to determine how this will impact the water rights held by others and include how these impacts will be mitigated. Obviously, if water from the Mammoth and above are removed, those water supplies down gradient dependent up them will be diminished. Rather than pumping this water down some draw is should be reinjected back into the proper strata for continued flow down gradient. | 70- 8

Also, somewhere within this section, the Agency needs to determine and then explain their determination as to whether or not the more important springs within the life of mine area are considered unique and critical and are not to be impacted under any circumstances. If mitigation measures do fail and these critical hydrologic resources are irretrievably lost then the original issuance of this permit becomes questionable.

Chapter IV, page IV20-21, Water quality: If groundwater in the Bull Mountains is classed unfit for human consumption due to high levels of sulfates and the subsidence will increase sulfates even more, why does the Agency not perceive it possible for this mine related contamination to curtail use of groundwater for livestock as well? Also, because groundwater in the Bull Mountains is now being consumed by humans, any increase in contaminants would certainly limit present use. Therefore, the conclusion that impacts to water quality from mining and mining related subsidence should be changed from "negligible to minor" to "minor to major over the short and long terms". | 70- 9

Chapter IV, page IV 30: Subdivisions may increase as a result of mine related influx of people. Therefore, wildlife numbers would decrease as a direct result of mining. | 70-10

Chapter IV, page IV 36: The last sentence in paragraph five should be changed to read: "Impacts should be negligible over the long term unless the railspur is not constructed and truck hauling continues indefinitely." | 70-11

Chapter IV, page 43: All of these figures are based on full production and are misleading. Not many coal mines actually operate at full production, particularly when there is so much competition for so few contracts. | 70-12

Chapter IV, page 52: I find it highly unlikely that should 7041 surface acres be progressively disturbed that they would return to equal or better than premining production capacity. This generalization should be deleted since there is no basis to back it up. | 70-13

Chapter IV, page 55: Wherever the word "spring or springs" is used, the word "groundwater" should be added as well. | 70-14

Chapter V, page V-6 and 7, Whitney Benefits: When considering this issue, the Agency entirely missed the point. Our concern is that enforcement of any State or Federal law in regards to this mine in the future may be jeopardized by this case since the mining company will have precedent to argue against any enforcement limiting their operations as a taking of their property. Under this restraint, it becomes unlikely that the State or Federal government will vigorously enforce regulations against the mining company for fear of suit. | 70-15

Chapter V, page V-7, Management: Line four should be changed to read "when Meridian canceled lease agreements." The word "if" should be deleted.

Again the Agency refused to face the issue. Meridian Minerals cancellation of leases to local ranchers who opposed their project is of economic consequence and is a direct result of the proposed mine. Meridian Minerals heavy handed attempts to coerce ranchers into allowing Meridian Minerals to impact the rancher's deeded surface while limiting damage settlements is very much related to the proposed mine. The Agency failed to understand the severity of these consequences because they neglected to consult anyone else concerned other than the company. Unfortunately, ethics seem to play no part in mine analysis and permitting, a major drawback for the future of the Bull Mountains. | 70-16

Appendix A, page A-5, Wetlands: The following sentence should be added to the end of this section on wetlands enhancement; "These activities shall not infringe upon the water rights held by other landowners outside of the permit area nor shall these activities damage existing development nearby." | 70-17

Appendix A, page A-28, Land Use: I believe this assumption in paragraph three is an error, since both Johnsons and Charters have old improved pasture lands within the proposed life of mine area. | 70-18

Appendix A, page A-37, Revegetation: Does the Agency realize how difficult it is to control knapweed and spurge? Mowing is not an effective control method. | 70-19

Appendix A, page 41: I would like to see a dollar figure amount on this permanent trust and an accounting of the interested earned in the Final EIS. How will an adequate trust fund be maintained?

The Agency must establish parameters upon interim water supplies. Water hauling becomes physically impossible at times and should not be allowed to carry on indefinitely. Page 41-c: If these springs disappear from fracturing, how does the Agency assume there will be any water left to tap with the horizontal drains? Please clarify. | 70-20

Appendix A, page 43 and 44: The Agency should bond for more than four wells within a life of mine area of approximately 14 sections. I would suggest using solar pumps on wells rather than windmills. Also, large underground storage and underground distribution on any system would enhance year around usage. Furthermore, I suggest the Agency not expend too much time or money on guzzlers since under optimal conditions they are unreliable as a water source. They do not work for livestock or wildlife as this country goes too long between rains. | 70-21

Appendix A, page 445 through 47: This bank of wetlands will hardly take the place of wetlands lost miles away in the mine area. Also, these enhancement plans do not take into consideration property lines and water rights on already established wetlands off of Meridian's property. I would like to know what is planned, specifically on springs numbered 41125, 11125, and 11115, and how the Agency plans to safeguard outside water rights and use. | 70-22

On the whole, I believe that the Agency needs to go into greater depth on mine subsidence related damage including slope failure, fracturing, and surface and groundwater degradation. The final Environmental Impact State should address actual reclamation costs and subsequent bonding to cover those costs. | 70-23

Finally, if there remains any doubt about the mining company's ability to completely restore or replace surface and groundwater to as good or better quantity and quality as it was prior to mining, then the Agency should disapprove the applicants proposal to underground mine in the Bull Mountains.

Sincerely,

Pete and Rhonda Tully

Northern Plains Resource Council (72)

Supplemental Comments of the Northern Plains Resource Council and the Bull Mountain Landowners Association on the Draft Environmental Impact Statement for the Meridian Minerals Bull Mountain Mine No. 1

October 5, 1992

RECEIVED
OCT 06 1992
STATE LANDS

The following are supplemental comments on behalf of Northern Plains Resource Council and the Bull Mountain Landowners Association on the Draft EIS fort the proposed Bull Mountain Mine No. 1.

This Draft EIS is inadequate because it does not provide an interdisciplinary approach to assessing and mitigating environmental impacts from the proposed mine. Most glaringly is its lack of consultation with the Montana Department of Health & Environmental Sciences Water Quality Bureau in its assessment of mining impacts to water resources. 72-1

The Montana Department of State Lands' lack of consultation with the Water Quality Bureau in its unnecessary haste to permit this mine has resulted in: inadequate assessment of the potential adverse impacts to water resources that will be caused by the proposed mine; inadequate mitigation measures to lessen the impacts of the mine on water resources; and the omission of data that, if provided, would most likely demonstrate the need for additional permits and exemptions under the Montana Water Quality Act. The Draft EIS is inadequate in the following areas.

The DEIS fails to address the need for an exemption from the nondegradation policy of the Montana Water Quality Act from likely degradation of to Class I groundwater (as defined by MT ARM 16.20.1002 according to specific conductance) that feeds 24 springs listed in Table E-2 as being potentially impacted by mining. Class I groundwater is protected by the Water Quality Act's nondegradation policy, and cannot be circumvented by lumping the Class I groundwater with Class II groundwater as is apparently the intention in the DEIS. 72-2

More data needs to be collected to determine the impacts on Class I groundwater, and a determination--with a justification--needs to be made as to whether a nondegradation exemption is required for the anticipated degradation of the Class I groundwater feeding the 24 springs listed in Table E-2. Additionally, there are discussions throughout the DEIS about lowering the quality of Class I groundwater to Class II, and Class II to Class III. Please explain why the DEIS is silent on the need for a nondegradation exemption for this anticipated groundwater degradation.

It is inappropriate to classify the 24 springs listed as Class I groundwater, when in fact they should be classified as surface water, and then appropriate surface water standards should be applied. This is significant because surface water standards are more stringent than groundwater standards. 72-3
Additionally, a determination should be made as to whether the proposed mining activities will cause 72-4

627.0 App 144

419 Stapleton Building Billings, MT 59101 (406) 248-1154

mine waste discharges into groundwater connected to these springs requiring a surface discharge permit from the Water Quality Bureau. The EPA has determined that the Federal Clean Water Act requires such mine waste discharges to groundwater connected to surface water receive a surface discharge permit. If a determination is made that a surface discharge permit is needed, then any nondegradation exemption would have to meet the more stringent (than groundwater) requirements for not exceeding drinking water standards, and for protecting other beneficial uses, that are mandated in the Montana Water Quality Act and the federal Clean Water Act. 72-4

There are discussions in the DEIS about anticipated fractures in the shales from subsidence will result in contamination of surface springs. Such fractures could result in mine waste discharges into groundwater connected to surface water, and therefore require a surface discharge permit from the Water Quality Bureau. Better hydrologic studies--including baseline studies of the water quality and quantity of impacted springs--should analyze whether such discharges need a surface discharge permit, and whether a nondegradation exemption from the Board of Health is required that protects surface water quality standards and beneficial uses. If it is determined that these discharges do not require a surface discharge permit, an analysis should still be made as to whether a nondegradation exemption is needed to protect surface water quality standards and current and future beneficial uses as mandated by the Montana Water Quality Act and the federal Clean Water Act. 72-5

The permit application states that discharges will occur from the portal of the mine pool that exceed 3100 mg/L of dissolved solids. Such a discharge requires a surface discharge permit. Please explain why the DEIS does not require a surface discharge permit for this surface discharge, and why the agencies don't believe a nondegradation exemption is needed from the Board of Health for this highly contaminated water. 72-6

More baseline water quality data are needed for the springs or wells that are to be replaced by the highly contaminated mine pool water to protect water rights holders whose wells will be replaced. From table E-2, it appears that springs with 542 TDS will be replaced with mine pool water of 3100 TDS. Are any of these springs or wells being used for drinking water? If so, alternative replacement options should be developed, since 3100 TDS is undrinkable. Please explain whether the degradation of this magnitude is legally allowed for other beneficial uses such as livestock and wildlife. Please explain how such an enormous increase in contamination for wells to be replaced can be meet the water replacement requirements of the Montana Surface and Underground Mining Reclamation Act. Please develop other water replacement alternatives other than from the mine pool as proposed in the DEIS. 72-7 72-8 72-9

While groundwater discharges from mines are exempted from having to obtain a groundwater discharge permit under the Montana Water Quality, DSL is required by law to impose the same conditions for meeting groundwater standards in the coal mine permit as would be required by the groundwater discharge permit. Please explain how DSL plans to meet the requirements of the Montana 72-10

Musselshell Valley Development Corporation (71)

P.O. Box 248
Roundup, Montana 59072

October 2, 1992

Mr. Mike DaSilva
Environmental Specialist
MT. Dept. of State Lands
Capitol Station
Helena, MT. 59620

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STATE LANDS

Dear Mr. DaSilva:

The Musselshell Valley Development Corporation has been on record from the beginning of this EIS process, in support of the proposed Bull Mountain Coal Mine. It has been our belief that the DEIS, dated August 1992 absolutely does address all of the issues raised during the Scoping Process, and in fact includes many issues not raised in the Scoping Sessions.

We do not find any substantial errors in the analysis and assumptions that need to be commented about at this time. We have participated in the total process and have had ample time to provide input to the process. The final round of DEIS hearings in Huntley, Billings and Roundup were very well done, and several questions and clarifications were suggested. Since these will be responded to in the final EIS, it would be redundant to restate any of them.

Thinking back through the past 2 to 3 years, and studying the associated documentation, it is obvious that the overall conclusion should be that the only potentially significant effects on the human environment would be positive and beneficial, both in the short and long run. It is also obvious that there will be a few significant impacts in the very short run, though we believe that the proposal with suggested mitigation measures has made a genuine effort to minimize those impacts. This is a good project proposal.

When we cut through all the rhetoric, exaggerated statements and emotional jargon; just apply some common sense and look at the facts, this project, as proposed, will have less negative impacts on this area and this state, than most development currently occurring. It will also have less negative impact than many of the decisions that could come out of the 1993 Legislative Session, if history is any indication.

The Musselshell Valley Development Corporation wishes to express our thanks for the efforts of the Montana Department of State Lands in preparing this well done document. We strongly encourage approval of the applicant's proposal and hope that conditions, including those stated in Chapter II, are reasonable.

Thank you for the opportunity to provide comments about this DEIS.

Sincerely,

Donald E. Picchioni,
President

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Ground Water Discharge Permit Elimination System.

Please explain how the applicant will implement Best Management Practices for all nonpoint sources of water pollution from the proposed mining activities. 72-11

Please explain how the Office of Surface Mining and the Bureau of Land Management will meet their legal requirements for permitting this mine under the National Environmental Policy Act, the Federal Land Policy Management Act, the Federal Surface Mining Control & Reclamation Act, and the Federal Clean Water Act. What will be the additional opportunities for public review under these and/or other federal or state laws? 72-12

Please provide more information and explanation as to why the DEIS concludes that there is no need for an Air Quality Permit from the Montana Air Quality Bureau. Does the Air Quality Bureau concur with DSL's determination that no air quality permit is needed? 72-13

Does the Montana Water Quality Bureau concur with DSL and the DEIS that no groundwater discharge permit, surface water discharge permit, storm water discharge permit, nondegradation exemption for groundwater, nondegradation exemption for surface water, are needed for this proposed mine? 72-14

Thank you for your consideration.

R. Dennis Olson
NPRC Staff

on Behalf of Richard Parks, NPRC Chairman

and

Ellen Pfister, Bull Mountain Landowners Association

Wood to DaSilva—Comment on EIS—2/2/2

(3) Surface contours. What about the effects of longwall mining's so-called "planned subsidence" not only on the one hundred or so seeps and springs in the proposed mining area but also on the very shape and integrity of this sometimes rugged, slope-and-meadow terrain? Should Meridian Minerals be required not only to reclaim or replace water but also to reclaim damaged, eroding slopes? I would say yes. 73-3

(4) Transportation of coal. It is ridiculous to transport coal by trucking it on back roads and highways to the nearest railhead. For one thing, the costs to the mining company are incredibly magnified by this highly inefficient method of transportion. Plus, the impacts from dust, noise, increased road hazards, rapidly deteriorating roads, and potential pollution all along the route, are so enormous that they should add up to a quick denial of any transportation permit—even on a supposed short-term basis. It seems reasonable to require the mining company to build the railroad spur it talks of building to the mine before it begins hauling coal out of the mine. 73-4

(5) The railroad spur. This itself is another issue, with its own set of impacts that need to be addressed. Who permits the railroad? Who allows the railroad the power of eminent domain, to condemn lands for its own use? Who will ensure that these lands remain undamaged during and after the life of the mine? 73-5

(6) Reality check. It has seemed clear from the beginning of this process—certainly from the time that the Bureau of Land Management allowed the coal-for-land swap and set in motion this State Lands EIS—that BN/Meridian would attain all its required federal and state permits, eventually. The question is, once all the permits are in, will the investors in this project actually begin mining? Coal which is virtually the same quality—but from much larger seams and with a railhead already at the mine—currently can be bought in this region for one-third to one-fifth the price BN/Meridian says it must earn to make this mine profitable. If the price of coal goes up overnight, then perhaps BN/Meridian will open up a mine tomorrow. But what if they don't? Does this State Lands permit lock BN/Meridian into 1990s terms forever? If better mining technology, for instance, evolves by 2020 A.D., will BN/Meridian still be allowed to mine using 1990s technology? Can this permit be renewed as automatically as it seems about to be granted? I hope not. —Wilbur Wood 73-6

(73)

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October 5, 1992

to: Mike DaSilva, Environment Specialist, Montana Department of State Lands, Capitol Station, Helena, Montana 59620

from: Wilbur Wood, Natural Resource Writer, Box 12, Roundup, Montana 59072

regarding: Draft EIS for Meridian Minerals Company's proposed Bull Mountain Mine No. 1

(1) Water. Your EIS minimizes the effect of longwall mining on the aquifer and thus on the wells and springs and streams (intermittent though they may be) of the mining area. You understate the economic importance of a continual, renewable supply of water. Coal is a one-time product worth millions of dollars to extract and burn. But then it's gone. How many millions of dollars, or billions of dollars, is it worth to water, wildlife, livestock, people and plants for the next one hundred, five hundred, one thousand, ten thousand years along the spine of the Bull Mountains? Your Department is in charge of the health and resources of lands in what is now Montana; you need to get better at estimating the true value of longterm health, the incalculable worth of renewable, as opposed to finite, resources. You should make sure that the mining company guarantees reclamation of water resources (but how can you "reclaim" a spring that no longer flows?) or at least guarantees replacement of lost water in perpetuity (but how can we enforce this for even one hundred years, much less one thousand or ten thousand?). To ensure that renewable water resources are not damaged by finite coal mining, the Department should really prohibit longwall mining here. But of course State Lands is unlikely to do this. Why? 73-1

(2) Economics. If you prohibit longwall mining in the Bull Mountains you effectively prohibit this project, at least in the immediate future. Of the other ways to extract this finite resource, stripmining seems out of the question (too much overburden in places, too much slope, too expensive and difficult to reclaim) while room and pillar style mining seems equally out of the question (too much coal left—to prop up the ground and reduce subsidence—and labor costs are too high). So you are probably not going to do what you should do, which is prohibit longwall mining. When Burlington Northern—in its guise as Meridian Minerals—lays out such compelling short-term interests, it is difficult for governments to grant equal weight to the long-term interests of the land. 73-2

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(74)

WASHINGTON CONTRACTORS GROUP, INC

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October 1, 1992

Mike DaSilva
Environmental Specialist
Montana Department of State Lands
Capitol Station
Helena, MT 59620

Ref. No. WCGI 92.082

SUBJECT: Draft Environmental Impact Statement
Meridian Minerals Company
Bull Mountains Mine No. 1

Mr. DaSilva:

We have reviewed the draft EIS for the Bull Mountains Coal Mine and submit these comments specifically in support of the reclamation plans detailed in Appendix A.

We reference sections F.6 through F.9 of Appendix A that address revegetation and water quality topics. As an earthmoving construction company operating throughout Montana and the West, we concur with the various mitigation methods noted in the document.

Our operations involve a significant amount of highway construction for the Montana Department of Transportation as well as reclamation work for private companies. These projects involve activities addressing erosion control, revegetation, and water quality control. One project of particular interest has included restoration of a stream by constructing meandering channels, wildlife ponds, and islands. Surfaces were topsoiled and will be revegetated. Current seeding, fertilizing, and water resource replacement practices utilized by government and private sector groups correspond with those methods listed in the EIS.

We concur with the reclamation plan described in Appendix A.

Respectfully,

David K. Zinke
Senior Estimator
/kah

David P. Becker
Business Development Coordinator

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A Washington Company

(75)

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STATE LANDS

JANICH RANCH, INC.
484 Old Divide Road
Roundup, Montana 59072

October 3, 1992

Mike DaSilva
Environmental Specialist
Montana Dept. of State Lands
Capitol Station
Helena, Montana 59620

Dear Mr. DaSilva:

RE: Letter of August 31, 1992
Draft of Environmental
Impact Statement

In reviewing the subject Environmental Impact Statement, I feel that additional consideration should be given to the impact of the coal transportation on the Old Divide Road.

This road and approximately 24 households along it will be greatly impacted by noise, dust, and safety (it is also a school bus route). I own land on both sides of this road and have lived here all my life. We move livestock across, on, and along this road at present and in the past. Our use of the road for this purpose was interrupted during the test pit hauling. We are now able to move our livestock across and over this road without any problems. Also, this is a prime area for game animals (Bud Comly, State Game Warden) which cross the road in numerous places on a daily basis. 75-1

Aside from the impacts and dangers to people and animals, the road itself has not been designed for, nor can it sustain heavy traffic involved in coal hauling. This was proven during the coal test pit trucking period. Musselshell County has neither the funds, equipment, manpower, or expertise (Musselshell County Budget) to construct a road capable of this heavy hauling use. 75-2

Running these coal hauling trucks on an unsafe roadway that is parallel to Highway 87 is neither feasible or necessary. The trucks could be routed straight out to the highway approximately one mile on the existing portion of Old Divide Road if it were improved. Another alternative is that Meridian could build their own road along their proposed railroad right of way to the highway. 75-3

We ask that you consider the above alternatives as a condition to granting this permit.

Sincerely,

Nick Janich

Nick Janich
JANICH RANCH, INC.

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DEPARTMENT OF HIGHWAYS

STAN STEPHENS, GOVERNOR — 2701 PROSPECT AVE.
STATE OF MONTANA
HELENA, MONTANA 59620

November 18, 1991

Bonnie Lovelace
Strip Mining Bureau Chief
Montana Department of State Lands
1625 Eleventh Avenue
Helena, MT 59620

- Local road 312 from the junction with U.S. 87 to Huntley was U.S. 10 until it was replaced by Interstate 90 about 20 years ago. Maintenance of old U.S. 10 remained with the MDT even though all federal aid funding ceased. Local road 312 is called an orphan route because it is no longer on any type of federal aid system. Any type of future funding for major improvements on 312 would have to come from the Reconstruction Trust Fund (RTF). However, all the RTF funds that will be available through June of 1993 when the program ends, have been committed to projects.

Page 2

If the coal trucks travel on 312 for a period of 30 months, normal maintenance procedures may not be adequate to save the existing surface. Any attempts to improve 312 before the coal trucks begin running is, therefore, just not possible. Based on our Materials Bureau reports,

OTHER POSSIBLE IMPACTS

- 1) Jct. with U.S. 87 and local road 312. Once the coal trucks reach the full production mode, the truck drivers turning off U.S. 87 turning east towards Huntley may have difficulty pulling out into the intersection during rush hour traffic. Our Traffic Section has evaluated this intersection and have determined that traffic volumes meet minimum requirements so that a traffic light might be considered. However, they have made the determination that a traffic signal is not appropriate at this time. Also, those trucks turning off 312 onto U.S. 87 heading back to the mine, may experience some off-tracking problems. The free right-hand turn may be restrictive for the coal truck drivers.

Page 3

There could be some capacity and level of service problems at this intersection during rush hour traffic. See the attached capacity chart.

2) There could be potential conflicts with school buses.

3) Accidents with coal trucks could become a major problem, especially during the winter months.

(76)

10-5-92

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Dennis Casey, Commissioner
Mike DaSilva, Environmental Specialist
MT Dept. of State Lands
CapitolStation
Helena, MT 59620

I disapprove of the proposed mining plan outlined in the Draft E.I.S. for Bull Mountains Mine No. 1 as it does not analyze an alternate loadout site.

Regarding transportation, Chapter IV, Pages 32-33-34-35-36. I feel the haul route from the mine to Huntley was not properly considered in regard to the increased traffic hazards. A letter to your office from the Dept. of Highway, dated December 23, 1991 recommends that Meridian Minerals pursue other loadout sites. Portions of the letter I feel should be given more consideration, will be enclosed with this letter. 76-1

Is Montana Department of State Lands willing to accept the liability risk involved by allowing the Huntley haul route to be used, after the Department of Highways recommended the use of an alternate site? Use of the proposed route could also cause undo financial burden on the Taxpayers of Montana, when accidents involving coal trucks, school buses and existing traffic becoms more than just a possibility. 76-2

I feel the primary reason Huntley was chosen was the low start-up cost. Meridian Minerals has nothig to gain but millions of dollars profit on this mine. I feel from the liability standpoint it would be cheaper for the Department of State Lands and Meridian Minerals to pursue a different loadout facility.

If the Huntley loadout has to be used, I request it be used for no more than 2.5 to 3 years, from start-up to reclamation. 76-3

I would appreciate your serious consideration in this matter when writing the Final E.I.S.

Sincerely,

T. J. Mueller

T. J. Mueller
P O Box 142
Huntlet, MT 59037

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6) During Meridian Mineral's "test burn" conducted from January 1990 to October 1990, several motorists complained that coal dust coming off the coal trucks obstructed their vision. This was brought to Meridians attention and they have told us that all the coal trucks would be covered with "Air Foil" windscreens to prevent this from happening. We have reservations that this may not be adequate.

Page 4

RECOMMENDATIONS

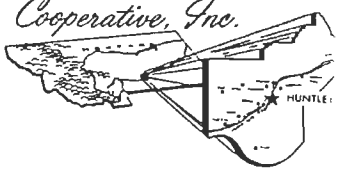
The MDT has no legal authority to regulate who can or cannot use those routes open to traffic by the general public. The only legal authority that we have is through Gross Vehicle Weight permits where we can regulate the size and weight of a truck and through encroachment permits or standard R/W 10 forms. As stewards of public transportation, we can only advise of where there could be potential impacts and make the appropriate recommendations.

Page 5

Because of projected increased maintenance costs, projected decreased pavement life, projected decrease in available funds, anticipated decrease in level-of-service and an anticipated increase in the accidents for the component route segments; the MDT would prefer that Meridian Minerals would pursue other load out sites such as Acton or Broadview rather than Huntley.

(77)

YELLOWSTONE VALLEY ELECTRIC
Cooperative, Inc.



HUNTLEY, MONTANA 59037
Telephone (406) 348-3411

October 5, 1992

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OCT 06 1992
STATE LANDS

Mike DaSilva
Environmental Specialist
MT Dept. of State Lands
Capital Station
Helena, MT 59620

RE: Meridian Coal Mine Written Testimony

Dear Mr. DaSilva:

Enclosed is a letter submitted to Fergus Electric Cooperative by Yellowstone Valley Electric Cooperative's board president.

The letter acknowledges the positive economic impact the mining project will have within the surrounding counties. The letter also states the concerns our Cooperative's board has regarding the coal loadout facility in Huntley.

Please accept the enclosed letter as written testimony of the position of Yellowstone Valley Electric Cooperative's board of directors regarding the Meridian Mining Project.

Sincerely,

Terry M. Holzer
General Manager

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Mr. Larry Descheemaeker, Board President
Fergus Electric Cooperative, Inc.
September 29, 1992
Page Two

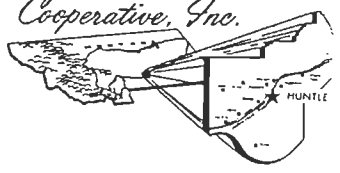
I hope this letter provides a clear understanding of our Board's position regarding the Meridian Mine Project. Please contact me if you have any further questions or if I can be of any further assistance.

Sincerely,

James W. Heimbichner
Board President

JWH/jas

YELLOWSTONE VALLEY ELECTRIC
Cooperative, Inc.



HUNTLEY, MONTANA 59037
Telephone (406) 348-3411

September 29, 1992

Mr. Larry Descheemaeker, Board President
Fergus Electric Cooperative, Inc.
HC 85 Box 4040
Lewistown, MT 59457

RE: Meridian Mine Project

Dear Mr. Descheemaeker:

At our regularly scheduled Board Meeting, held September 22, 1992, I discussed your September 14th letter which was addressed to me.

In your letter, you highlighted the economic benefits the Meridian Mine Project would bring to the counties surrounding the mine location. We are pleased to see that Fergus Electric Cooperative will be the power supplier for the mining development. As noted in your letter, the addition of this industrial load will have a significant and positive impact on Fergus Electric Cooperative. As well, Central Montana G & T and our Cooperative will also see positive effects from the economic impact of the project.

Yellowstone Valley Electric Cooperative's Board of Directors supports the Meridian Mine Project. However, our Board is also concerned about the air and noise pollution and traffic problems which will accompany the temporary load-out facility in Huntley.

Even though it is projected that the Huntley load-out facility will be a 2 to 3 year period, the negative impacts to the community could be significant.

For this reason, our Board passed a motion stating the our Cooperative supports the Meridian Mine Project, provided the concerns of the Huntley residents are addressed.

The Bull Mountain Landowner's Association (78)

October 5, 1992

Mike DaSilva
Environmental Specialist
MT Department of State Lands
Capitol Station
Helena, MT 59620
Re: Comments on the Bull Mountain Mine No. 1 DEIS

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STATE LANDS

Dear Mr. DaSilva,

The Bull Mountain Landowner's Association wishes to reiterate its support of the following points:

1. Realistic bonding and a permanent trust fund to restore water resources likely to be disrupted by mine subsidence both on-site and down through tributary drainages.

2. Realistic bonding and a permanent trust fund to stabilize slopes and control subsidence-caused erosion

3. Disapproval of interim coal hauling to Huntley as a threat to public safety. Require coal transportation from the outset to be by conveyor or truck, built down Halfbreed Creek to Roundup and then by a common carrier rail spur built from Roundup along the old Milwaukee right-of-way to the mainline at Cushman. 78- 1

4. A state-of-the-art covered tipple for the coal loadout.

5. Formal notice given to interested parties on development and revisions of permit requirements upon request.

and wishes to submit the following additional written comments and exhibits on behalf of the BMLA and the Northern Plains Resource Council for perusal and consideration.

Sincerely yours,

Ellen Pfister
926 Yale
Billings, MT 59102

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An affiliate of the Northern Plains Resource Council

Comments
Draft Environmental Impact Statement
Bull Mountain Mine No. 1
Meridian Minerals
By: Ellen Pfister on behalf of Bull Mountain Landowners Assn. and Northern Plains Resource Council
926 Yale
Billings, Montana 59102
October 1, 1992

1. It would have been useful to have had a map in this document showing the relation of this proposed project to the balance of the Mammoth-Rehder coal deposit in the Bulls. This is styled the No. 1 Mine, which implies a sequence of mines. If this is to be the case, then portions of this project, particularly regarding transportation are inefficient and inappropriate. If a sequence of mines does become reality, then, when the commitment is made to this mine, it is actually a committment to a much greater impact in many areas. With the exception of about six sections of coal immediately south of the mine plan, the rest of the coal is the checkerboard pattern of Burlington Resources and United States, and would be subject to lease by application at the present time. The mine plan strikes me that it could be very easily adjusted to the north or south, and still use the same facilities minemouth. Would such extensions be considered new permits or extensions of an existing mine permit? What are the triggering distinctions between the two? 78-2 78-3

2. Figure I-3, p. I-5, Section 32, T 6 N, R 27 E is all Federal surface, 160 acres Federal mineral estate as shown, and 3/4 mineral estate as shown in Meridian Minerals. 78-4

2. Page I-4. The mineral ownership at the end of the first paragraph should read that 3160 acres of mineral within the five year permit application are privately owned and 960 acres are federally owned. It should also be noted that none of the federally owned mineral acres will be mined. 78-5

3. Page I-4, Line 8. The word "could" is used in discussing the possibility of surface subsidence. Webster's Ninth New Collegiate Dictionary defines "could" as " an alternative to can suggesting less force or certainty. . ." The selling point for longwall mining is that subsidence is a predictable certainty. The affects of subsidence are what is in contention--not that it could occur. 78-6

2

4. Table I-1, page I-6. Please explain the difference between the figure of 7,562 acres listed for coal removal during the life of the mine and the total acreage listed as disturbed surface under coal removal. Of what does the 1303 acre discrepancy consist? Under the mine plan, all areas of coal removal are scheduled to eventually subside with the possible exception of the mains. Are the mains scheduled to subsice as well? If so, will pillars be robbed to hasten the process on final retreat? 78-7 78-8 78-9

5. It should also be noted on Figure I-3, p. I-5, that some of the proposed wild life enhancement areas are located on adjacent landowners other than Meridian, and may not be well received. Maps such as this one should show Meridian's ownership and/or control of surface, rather than just assuming that all private ownership is monolithic. 78-10

6. Page I-7, Table I-2, On mine plan maps in the permit, the last year shown for mining is year 35 with the longwall machine, which is a longer time frame than shown here. 78-11

7. Page I-6, why are so many acres in the coal buffer zone of the mine plan, particularly in the Hidden Springs Subdivision area in the Northeast zone? As of 12 months ago, all lots in that subdivision were sold. 78-12

7. Page II-1. With respect to Condition No. 1, it would be possible now to map the areas with potential for steep slope subsidence problems, and begin to address how to deal with the potential problems. Please define what is meant by "subsurface deposits". Do Conditions 1,2 and 3 pertain only to archeology? There may also be problems between archeological mitigation and reclamation techniques. I would like to see a map correlating steep slope problems and proposed reclamation techniques. This problem has been inadequately addressed all through this document. By my own rough calculations with an electronic scaler, there are at least 20 linear miles of such slopes within the life of the mine plan. This is the only time within the permitting process that the public will be presented with an overall opportunity to comment on the extent of the problem. In addition to the problem of slope instability, the fundamental makeup of the rocks comprising the hills will be altered from a relatively continuous sediment laid down over time to a fractured and broken base with highly increased permeability. Since the Bull Mountains do not lie close to an earthquake fault zone, the probability of the kind of internal rock damage done by subsidence occurring by any natural force is low to nonexistant. I also do not understand the why of listing only these four particular conditions. It seems like kind of a short, strange list. 78-13 78-14 78-15

8. Page II-3, Lines 1-5. Is "mine site" equivalent terminology for "life of mine plan"? If so, has Meridian 78-16

3

applied for and received any State or Federal coal leases? 78-16
It is my understanding that it may own the majority of the resource, but it has yet to lease about half the coal beyond the five-year permit area. 78-17

9. It is not my impression that dismissal of discussion of alternatives should be lumped in a wad and casually shunted aside without more detail than is shown on page II-2, particularly with regard to transportation. The first variable listed in the factors for negative consideration is "increased cost of construction." I think that is the real reason for the selected temporary load out site. A paper entitled Draft, Bull Mountains Mine No. 1, Temporary Loadout Facilities, Alternative Sites Summary, January 31, 1992, reviewing the conclusion of a site review team comprising Robert Ochsner, Mike Dasilva, and Anne Cossitt, visited 11 proposed loadout sites. At $135,000.00 Huntley was cheapest to Meridian, but no estimate was made of the total costs public and private.

There was no actual estimate of costs to Meridian for the Coors site. It would mitigate the direct impact on the Town of Huntley. It would not mitigate the impact on 312 or public safety.

I am intrigued by the difference in road discussion between the Huntley and the Acton site. The 12 miles of "unimproved" road are graveled, much as is Pattig Creek road. Somehow Yellowstone County can force Meridian to pay for the upgrading of the Shepherd-Acton Road, but a much more highly traveled road, 312, stands alone. I also find it hard to compare the impacts on the Acton Bar with the Huntley problem. The trailers in the Acton area lie quite a ways east of the Railroad. There would be some saving in truck transportation to use towards site development. Acton comes in at $1.467 million. 78-18

Commanche comes in with a price tag of $2.205 million, probably due to more Yellowstone County Roads. Commanche as a settlement is even harder to find than Acton. Commanche and Acton have the same disadvantages with a higher fire danger and greater problems with fire suppression.

The Broadview site has population in the direction of prevailing wind and 22 miles of road to upgrade with total cost of $1.860 million.

The South of Broadview site has no cost factors, but also few people to impact. It would be a difficult fire suppression site.

All of the sites on Montana Highway 3 would carry a decreased liability factor from the mere fact of less public exposure to traffic accidents by getting the coal truck

4

traffic off Highway 212. What kind of liability costs has Meridian factored into their expenses for transporting coal off premises on public highways? 78-19

Belmont costs factors are $1.750 million, and it, too is a water short site.

Lavina would have upfront costs in the amount of $3.423 million, including some trackage construction.

Cushman would be the next longest truck haul with 2.8 miles of gravel road and the need to rebuild a local bridge.

Mossmain would be the longest haul (52.1) miles and the second cheapest to develop. $330,000. The actual road route to get to Mossmain was not discussed, so it was not apparent if Highway 312 was involved.

Roundup had the closest route to the mine--16.8 miles, although that could probably be cut by coming directly down Render Coulee to U. S. 87. The estimated cost of development is $6.750 million, which initially seems high until one realizes that in addition to loadout construction, rolled into this figure is also the cost of the permanent railroad haulage out of the coal field. Far less than the million dollars per mile for the 23 miles to Broadview. The major problem with the $6.75 million is that it is upfront money, not the total cost. The rebuilding of the railroad on the Musselshell would carry with it an additional benefit--it need not be a one commodity railroad. Meridian could seek financing from Musselshell County in the form of industrial revenue bonds if the line were open to such other commodities as might be shipped. Alternatively, Meridian might agree to give potential buyers a price break for a capital advance to rebuild the road, the price break to end when the railroad was costed out against purchases. It would give Musselshell County an investment to try to get other business interested in Roundup as a shipping point--such as a unit grain train elevator. If the railroad were built as the mine construction went forward, it would eliminate the problem with the temporary load out site. The load out and rail line would be in a community that wants that kind of development and impact. The Roundup location would put the railroad in an area where water would be available for fire suppression and under greater public scrutinty to catch fires started by trains while they are small. The Hawk Creek fire of 1980 started on the ridge where Meridian is currently talking of putting its proposed rail route. In house consultation with Don Kendall and the State Fire Marshall's office might prove valuable. There should be a map of the proposed railroute showing the proposed county road crossings and relocations section by section to Broadview. 78-20

5

The old Milwaukee road bed is all ready disturbed. The amount of disturbance to bring that back would be minimal compared with fills on the Broadview route and five hundred foot rights of way to get enough dirt to build them. Coupled with some other engineering problems mentioned in the DEIS. There is also the factor that at the end of 30 years, there will be two abandoned railroad beds leaving permanent scars, since the state of Montana will be the only entity lucky enough to have the road bed leveled out on their land. 78-20

One of the scars will be the livestock underpass shown on page A-7, Figure A-7, dividing ranches. They ice up and get slick inside. They are especially dangerous to horses and riders. The noisy reverberations inside can spook even a gentle horse. Sometimes they are constructed with the nut end of the bolt inside the underpass, and that can peel up a horse if it tries to turn around or gets spooked. A rider leading a horse through can be run over by the horse. The proposed passages are only 5 feet wide. With the railroad right of way fenced, horses and riders don't have many options. 78-21

With the attitudes toward this project in the immediate Roundup community, and most of Musselshell County, it would seem to be no problem to get rights of way at reasonable prices, perhaps even donations; so the number of land owners with which Meridian would have to deal should not be a problem. If this is not the case along the reaches of Halfbreed Creek and the Musselshell River, then Roundup is in the position of wanting jobs and having other people suffer the nasty affects for them, while Musselshell County gets the money, especially tax money from the mine. 78-22 78-23

The only way to mitigate some of the front end impacts for the preferred Huntley loadout would be with grants from the Coal Impact Board with severance tax money. That pot is not inexhaustable, and this mine would pay in very little to reimburse the large public impact that it will have with the Huntley option. Other portions of the coal industry that are contributing more may not be too appreciative, as well as other impacted communities.

The reconstruction of U.S. 87 just about ruined Halfbreed Creek as a wetland area. It is now a damaged wetland with oxbow loops cut off from the rest of the creek by the highway. To concentrate coal haulage or transportation in some form in the corridor of Halfbreed Creek and the Musselshell River would at least confine the damage to areas all ready impacted rather than spreading it out over more country and leaving permanent scars for a short term project. After all, the rest of the coal deposit lies to the North and east of the current project. 78-24

10. Page III-2, Figure III-1. One year of windrose for the 78-25

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Bull Mountain area is hardly sufficient to predict air quality paterns. It would also heavily depend on the topographic location of the monitoring device. For the years 1985, 1986, and 1988, the prevailing summer winds on Section 22, T 5 N, R 27 E on the southern edge of the Bulls were Southwesterly. For the past two years we have been having many more Southeasterly summer winds then usual. Northwesterlies are the prevailing winter winds, but terrain can weaken them substantially--even inducing calms. Wind patterns are important if one is talking about possibly mitigating water problems with windmills. We have experienced calms lasting as long as a week to ten days in both winter and summer. Generally speaking, most of the areas within the mine plan are not good windmill areas, due to lack of wind. Those with good wind potential are probably a long ways to water. I also suspect that areas with poor wind availability for windmills will also concentrate other pollutants within the immediate area. I think the location of the facilities for the mine in Section 12 will probably have trouble dispersing pollutants. I do not know where this wind monitor was located, but one should have certainly been located at the potential mine facility site. 78-25

11. Page III-7 discusses the total coal reserve within the life-of-mine area--218 million tons. Have the other seams above the Mammoth been tested for sulfur content, BTU's etc? Are these other seams actually recoverable after full extraction mining beneath them? If so, by what methods? Isn't the usual method to use full extraction working down from the shallowest seam to the deepest seim? Wouldn't roof stability be a problem going from deep to shallow? Are these minable or recoverable reserves? 78-26

12. Page III-12 and subsequent are the Hydrology discussions. In discussing well yields in the Bulls, the general gallonage is given as 10 to 30 gpm. On the Southern and Western flanks of the Bulls, the production is frequently 5 gpm and less. We have one well in Sec. 5, 15N, R27E in the 10 gallon range, but that is very rare on the South side. With the underground flows in a general northwesterly direction, where are the recharge areas for the Bulls? Does the southeasterly-northwesterly flow extend all the way to the Yellowstone? What class of water could be expected from the Fox Hills-Hellcreek formations under the Bulls? Where are the recharge areas for the deeper aquifers mentioned? If people in the Bulls do have to go to those aquifers, they may wind up being junior water rights holders. Draw downs in those aquifers could be coming from other areas. Judging from the difference in production in wells on the South side and the North side of Dunn Mountain, one could surmise that the higher elevations in the Bulls recharge a great deal more than just the springs. What Class of water will come from the deeper aquifers under the Bulls? 78-27 78-28 78-29 78-30

7

13. The water quality is averaged for the "area" page III-16. I am not sure what the "area" is. All water is grouped as Class II. In table E-2, there are a total of 23 springs that on Specific Conductance alone would fall into Class I category. 15 of those springs are within the life of the mine, clustered in four sections. The other nine springs lie immediately North or South of the mine plan. It would seem that these waters would stand a good chance of being degraded. The springs are as follows: 13115, 14155 14165, 53115, 53125, 16125, 71115, 71125, 16145, 16165, 16255, 16275, 16355, 16365, 17635, and 41215, 52525, 52535, 17115, 17145, 17215, 17255, 72115, 73125. The rest of the data was unavailable to examine further. At least some of these springs are close to the depths for fracture zone damage. Most of us who live in the Bulls are drinking Class II water, as is probably most of Eastern Montana. But it is probably the better end of Class II, as opposed to its lower end. I suspect that degrading the water from the top end of Class II to the bottom end of Class II is a far greater degradation than degrading Class I water into the top 25% of Class II. Will Class I water be mitigated with Class I water? What is the affect on livestock drinking water at the bottom end of Class II water? 78-31 78-32

Page III-16 mentions the deep bedrock flow to the springs. It is that flow which makes the Bull Mountain Springs more than seasonal flashes in the pan. Fractured, weathered bedrock flow is probably the most important part of the flow cycle because it makes a good spring dependable in July, August, and September when all four legged creatures need water most. The big flows in the spring, probably go into recharge to be used somewhere else down the line--either in another spring or recharge to deeper aquifers for wells.

There are no technical tables given for water well quality or locations of existing water wells, including one that was mentioned as a potential mitigation well. There is certainly one well being used for domestic water within the five year permit area. Well data should be given for location, water quality and quantity. 78-33

Are the only tests that have been done to predict post-mining water quality the ones done by Keith Thompson in his Open-File Report, MBMG 100, dated August 1982? His prediction for underground mine spoils water on page 42 are well into class III standards on TDS. The sulfate levels are way up. High sulfate levels in water cause copper shortages in cows. The mitigation measures are chelated copper supplementation and/or cupric glycinate injections once or twice a year, depending on degree of severity. If copper deficiencies are not corrected in a cowherd, they fail to thrive, and can die. To deliberately cause sulfate 78-34

8

problems is a serious damage both to the cattle and the people who own them.

14. The hydrology discussion on Page III-12 taken with the impact to water discussion on Page IV-20 and 21 concludes that there is no significant impact to degrading water in the mine are from Class I to Class III, or from the top end of Class II well into Class III. Does non-degradation apply only to hardrock mining areas? 78-35

Are the only chemical analysis Meridian did of the waters in the area the ones based on the 1989-1990 sampling dates or are there later data? 78-36

Given the predicted concentrations for underground mine spoils on Page 42 of Thompson's report, as follows:

	Range (mg/L)	Mean (mg/L)
Ca	46-150	83
Mg	33-110	95
Na	460-1840	920
SO4	780-3000	1510
HCO3	540-2050	1060
Dissolved solids (calculated as residue)	1580-6110	3100

we think that significant deterioration of water quality will occur. The DEIS presents no data to rebut that prediction. 78-37

Nowhere in this DEIS do I find an estimate of the amount of increase of permeability in the overburden induced by subsidence. I understand that it increases from 10 times to 1000 times. Even at ten times, the recharge will go to the mine floor faster. The material that is in the gob zone will be fragmented and readily available to dissolution in the incoming water. The materials that I have seen adjacent to the coal don't look like the kind of material to make good water. When the mine closes and the mine pool begins to fill that material will be saturated with water which will stand there in the gob because it cannot proceed downdip in its accustomed aquifers as rapidly as it infiltrates through the fractured rock above. Since the mine entrance is at ground level, the whole mine pool will pressure against those entrance seals. What will be the quality of the water discharged from the mine pool? What plans are there to treat it? If Thompson's predicted concentrations are any indication, it doesn't sound like very good water quality. Have other chemical paste tests and studies been done that negate or modify Thompson? If so, who and what? 78-38 78-39 78-40

On page IV-21 the DEIS authors conclude that the water will remain suitable for wildlife, agricultural, and livestock uses. On Page E-7, the Montana groundwaters for class III 78-41

standard says that Class III may be used as drinking water for some wildlife and livestock (I would appreciate more delineation and definition) and for irrigation of some salt-tolerant crops using special water management practices. What does this mean for downstream water users if the mine is simply allowed to spill the mine pool out through a pipe with no treatment? Class III agricultural practices sound like the Imperial Valley of California. What negative impacts do Class III waters have on livestock and wildlife? 78-41 78-42

Mr. Thompson's conclusions can be quoted to soothe the troubled mind, but his figures are not very comforting. His conclusions also accept the degradation of water for an unspecified length of time. His conclusions for off-site users are no better . . it will be a while before it gets there, so to not worry. For whom? the mining company or the offsite water user? 78-43

15. Page IV-20 has a sentence that reads as follows: 78-44

> Mitigation systems would have the potential to provide water for longer durations during the year than springs naturally provided.

If one has a spring that provides year around water, how can it provide more than year around water? What the mitigation plan proposes to do is to rob Peter to pay Paul, providing Peter has anything left when this is all over. The springs that are proposed to be most of the mitigation source will be among the last undermined. I see no effective mitigation plan in case of their loss. The water damage predictions for this mine are almost 180 degrees different from the Eastern experience, and based solely on the hope of younger geological age shales mitigating the affects of subsidence. There is no attempt by the authors of the DEIS to calculate the depth of the various zones of subsidence. In the low overburden areas over half the overburden may be within the fragmented zone. The fractured zone could extend another 650 feet. Between the two zones that could take in all the overburden in this mine. An extensive fracture zone and ill-placed cracks from the angle of draw could very well turn the mitigation plan upside down. To deny that it could happen and not to plan for such an eventuality is very foolish. Subsidence is not a one time happening in the mine plan. The pillar areas receive subsidence shocks as the panels on both sides are subsided and also as they finally subside. According to Allgaier at Deer Creek Mine in Utah, the first panel mined got another jolt as the second panel subsided. Is the water modeling on subsidence based on the Illinois farmland subsidence references noted on page VII-1? I don't know of many high perched springs in Illinois. The overburden is evener and deeper in Illinois. The overburden in Utah ranges from 700 to 1500 feet. As of December 1990, 78-45

extensive undermining of the escarpments on the Wasatch front had not been allowed. and one experimental undermining of a portion of stream channel had been allowed. The portion of the stream that was undermined disappeared and surfaced again further down stream in the normal stream channel. The land being mined was Forest Service lands, and as nearly as I could ascertain from the discussion, lacking ground water to develop. The Forest Service was using guzzlers for wildlife. I do not know if there were livestock permittees in the area. If there were, their interests certainly didnot enter into discussion. The State of Utah showed slides where it had ordered fencing in angle of draw areas to keep the public away from the crevices reaching to the surface that didnot heal and were adjudged to be too dangerous to be left unbarricaded. These discussions took place at an American Mining Congress meeting which I attended in Salt Lake City in December 1990.

16. What relationship to the Gull Mountain Mine No. 1 does the Permit Application Package for the Deserado Mine have. It is cited on Page VII-3 as a supporting portion of the bibliography. The Deserado Mine is in Rio Blanco County, Colorado close to the Utah border on BLM land mining Federal coal. It is mining 1 ½ million tons of coal a year from the Mesa Verde formation taking coal 12 to 15 feet thick from overburden varying 800 feet to 1200 feet, depending on topography in a high plateau sagebrush, pinon, juniper country. The outcroppings are sandstone. The soils and water in the area are saline. There is one flowing stream in the mine plan. The underground mine water is being discharged to a dry gulch and is very saline, as the mine has run into old seawater. The coal is hauled out of the mine area by an electric railroad to a power plant at Bonanaza, Utah, 35 miles. The power plant and the mine are owned by the same entity. The area is permitted for sheep grazing, and the sheep depend on stock ponds. The mining is advancing in the direction of the ponds, and the outcome of what will happen is in doubt. This information was obtained from Janet Binns, Colorado Mined Lands, in a telephone conversation October 1, 1992. Citing an entire mine permit application in a bibliography is sort of like citing Funk and Wagnalls Encyclopedia without citing volume, page and entry. 78-46 78-47

17. Almost half of the material cited in the subsidence portion of the bibliography was private reports prepared for Meridian. Those are not open to public scrutiny. Allgaier's report at the Deer Creek mine dealt with substantially more overburden. According to Dr. Syd Peng of West Virginia University in his latest book, Surface Subsidence Engineering 1992 predictions based on the European experience are not necessarily predicitive of subsidence results in the United States. Only Dunrud deals with the Western United States, and his book is eight years 78-48

old. There has been a lot of country undermined since then. Surely there should be a better bibliography on Western subsidence than the one I see in this DEIS. 78-49

18. On page A-49 Section c. under "other mitigations", fences are discussed. Constuction is generally detailed as 3 wire fence with steel posts. Three wire fences between property owners are absolutely not suitable. This year in the life of the mine area two owners were pasturing separate groups of yearlings. A three wire fence would no more keep them separate than make me president of Meridian. Don Golder says that a yearling will crawl through a knothole in a fence post. A four wire fence will not stop wildlife movement; it will stop most cattle. The fences in the life of the mine area and adjacent are currently in quite good condition, due to the recent rebuilding after the fire of 1984. Those of us who paid for those fences with either sweat or money know just how expensive it is to build fence in the life of the mine area. The fence on the North line of Section 28, T 6 N, R 27 E took 84 man days to reconstruct plus 12 days of cat time, in addition to materials. The fence on the West line of Section 28, T 6 N, R 27 E took 112 man days to rebuild with no cat time, in addition to materials. We tried to get fencing contractors to come in and do the work. They took one look at the terrain and bailed out. We were fortunate that the Mennonite Church designated the fire area as one of their long term disaster projects, and half the labor was donated, but that will not be the case in the future. Of course, some of those man days were rancher man days as opposed to general labor 8 hour days. There has been no attempt anywhere to ascertain the miles of fences that will be impacted and projected repair and replacement costs. Some of the fences within the life of the mine area will be subsided in several different passes. Fences in and bordering the five year permit area were built Fred Johnson- tight and straight. Meridian will have a hard time meeting that standard. 78-50 78-51

19. A-48 Meridian had better do some consulting with the ranchers who will be actually using the proposed hydrologic structures--especially maintaining fencing exclosures. .How long? Who maintains? Those can be livestock traps. 78-52

20. Page A-43--Guzzlers. A guzzler in an area of 14 inches of rainfall a year can by calculation catch less than 1/10th the gallonage of water produced by a spring averaging a 1 gpm production per year. See Don Golder's more detailed comments on guzzler efficiency from the public hearings. 78-53

21. Page A-42. Wells. Inside diameter of 4.5 to 5 inch on casing for a deep well, might tend to limit development options, such as size and type of pipe or pump used. It should be noted that the Western Area Power Authority is looking at possible options to enable it to begin pulling 78-54

electric lines to stockwater wells due to the high cost of poles and transformers necessary to step down power at those sites. They had a meeting in April 1992 in Billings with some REA's to investigate solar power in a hands on manner. We put in a solar well to a depth of 285 feet designed to pump 5 gpm for a total cost of $16,000. Rather than using storage batteries, we are using water pumped into a 10,000 gallon storage tank. The solar system was designed to be portable and can be used at another site. Fergus electric has complained that its growth curve is flat, but the rates for its customers have not been flat. If most of them are like myself, we are doing everything we can to cut unnecessary increases in those September bills. 78-54

We have windmills still operating on the same wells for 50 years. The galvanized stove pipe casings that were used had lives varying from 30 to 40 years. We have in most cases recased with 4 inch ID PVC casing. We do not know how long it will last. Windmills need a stable base to maintain alignment vertically over the well hole. It might be some years before subsided areas would reach a sufficient degree of equalibrium. It doesn't take much to cause problems with a windmill. It also takes someone who understands their mechanics to keep them going. 78-55

12

22. Where does Meridian plan to construct temporary roads in the mine plan? Does DSL have to permit the location and construction? 78-56

23. How much more exploratory drilling does Meridian plan to undertake and where? See Page I-4. 78-57

24. If the maps in Figure I-3 are correct, the North Half of Section 8, T 6 N, R 27 E is BLM surface with very steep slopes, which in addition to subsidence, will experience slippage. According to USGS maps, the public could access it from Fattig Creek Road. How will Meridian deal with public recreation and subsidence? Does Meridian currently own the grazing permit? 78-58 78-59

25. If Meridian cannot put their plans together as laid out, i. e., 3 million tons of coal sales in three years to build the rail spur, how long will Meridian be permitted to haul to Huntley? Once the load out is permitted at Huntley, can Meridian be stopped from hauling permit or no? 78-60

26. There is roughly 30 million tons of coal within the 5 year permit area. If Meridian only gets 1 million tons of coal sales a year, this 5 year permit should last for 30 years. Under this scenario, would the coal be hauled to Huntley for 30 years? 78-61

27. On the matter of trucking coal to Huntley, I understar. that federal regulations governing the length of time that an over-the-road truck driver may drive at one time, do not govern hauls of less than 100 miles from the load site. Those drivers may drive virtually unlimited hours. They may be paid by the hour or by the ton-mile. A frequent scheduling under these circumstances is to run 12 to 14 hour shifts. Truckers paid by the hour are usually less likely to take dangerous chances than those paid by the ton-mile. Considering the problems with Highway 3'2, it would be very relevant to know how Meridian plans to contract for the haulage. 78-62

27. The Huntley loadout site is signed with a WesTrans sign, a Dennis Washington company. That same company is rumored to be in the process of ordering a fleet of coal trailers. Is there a deal here? Will WesTrans build the load out site? 78-63

28. Ventilator shaft construction has been known to drain intercepted water aquifers, when the aquifers are not sealed properly. Does DSL plan to have Meridian seal any intercepted waters during ventilator shaft construction? 78-64

13

29. What is the chemical composition of the heavy media bath used to clean coal? Is it toxic? How does Meridian plan to dispose of the spent solution? Will the material deposited in the Waste Disposal area have been treated with the heavy media bath or is the heavy media bath for "clean coal" only? 78-65

30. Are water mitigation measures and reclamation techniques subject to revision in subsequent permits? 78-66

31. According to the DEIS, there are 100 elk in the Bull Mountains? The Fish and Game has issued 50 permits for elk hunting in the Bulls this fall. Isn't 50% an unreasonably high number of permits? Either there needs to be clarification on where the 100 elk are, or the figures need to be checked with Fish and Game. 78-67

32. It should be noted that displacing elk from the mine area onto other private owners impacts them because the elk compete directly with other livestock for the same forage. Perhaps Meridian should pay pasturage to the other owners or compensation them for forced reduction in cowherd. 78-68

33. Page A-41. Horizontal drains do not work in all cases with springs. I expect the costs would be similar to drilling vertical wells, but slightly cheaper. Getting a drilling rig into some of the spring sites could require extensive road building. Will the increased permeability that is expected to be taken advantage of with this method of water development also increase the amount of sedimentation that would infiltrate the two inch gathering pipe, tending to clog it? 78-69

34. Where has fracture repair been sucessful in restoring springs in longwalled areas? Fracture repair makes nice little diagrams in the permit, but I have doubts as to its feasibility. Between these repairs and the pond repairs, Meridian had better own a bentonite company, but they probably do. Getting runoff into a pond in the Bulls is a sometime thing any more. It strikes me that run off in the mined area will substantially decreaise due to the increased permeability of the rock structures due to subsidence. About all that lined ponds would be good for would some spring water if it happened to come back. The same permeability problems would exist in trying to use natural channels to conduct spring water flow toward lower elevations. 78-70

35. In a number of places in the DEIS mention is made of areas being fenced to exclude livestock grazing, whether for water development or reclamation. Has an attempt been made to determine the number and configuration of the acres from 78-71

15

which livestock will be excluded, and what affects it could have on the economic operation of a party trying to ranch in conjunction with the mine? 78-71
The DEIS does tend to forget that parties other than Meridian are deeply involved in the affects of this mine. In order to know how to live with it, it must be more clearly described.

36. The Bull Mountain Landowers contend that the minimum acceptable standard for water replacement in terms of quantity and quality is replacement, water source by water source, to existing premining quantity and quality of the source damaged, and the cost of operation of that wtaer source should be no more onerous than prior to mining. 78-72

37. What fuel will be used to dry the coal? Will the coal drying equipment need pollution control equipment? Will it be part of the same boiler system that will be used to heat the mine buildings? 78-73

38. Meridian has threatened individuals along the Broadview rail spur route with condemnation of the route by Burlington Northern. (Personal communication with George and Eleanor Carlson). What relationship does Meridian have with Burlington Northern Railroad? If condemnation is used for this rail spur will it become a publicly accessible line for shipments other than Meridian's? 78-74

38. The quality of the mine water in the old mines at Roundup is being used to justify predictions with the proposed mine. There are a couple of immediate differences that come to mind. Firstly, the old Roundup mines have not yet suffered the degree of subsidence that Bull Mtn. No. 1 will suffer. The water in the old mines is not totally filled with fragmented gob. Secondly, the overburden above the old mines has not suffered the degree of permeability increase that is endemic in most longwall mining. Finally, the water in the old mines has had a number of years to stabilize since mining ceased. Subsidence is not yet a major problem in the old Roundup mines. 78-75

39 Has Meridian conducted complete chemical testing on all springs in the water study area or only on those for which it has been doing monthly monitoring? 78-76

40. Does DSL plan to move the bonding requirements for the Huntley load out site from the Test Pit Permit to the Permanent Permit, and if so, will the amount of the bond be increased? 78-77

16

41. Table E-6 rates springs in relation to their value for ranch use. No person listed as a preparer of the DEIS has that kind of knowledge of ranching operations in the mine area. The people who would have that kind of expertise were not consulted. Certainly no Meridian personnel have that kind of expertise. I am attaching as exhibit "A" a list of questions asked me by Meridian personnel and answered verbally in about 5 minutes over the kitchen table. The answers were general at best. I find question 4 inquisitorial. The questionaire gives Meridian most of a rancher's financial information, but little information on how mining might impact a ranch operation. 78-78

The Meridian water monitoring personnel, were not even particularly accurate observers of the kind of water installations they were seeing. I find the following problems with their observations on springs with which I am personally familiar:

Spring 17145 (Bull Spring): This spring was excavated to blue shale water source with a scoria core, a culvert installed, truck load of washed river gravel place arounc the culvert and a permeable membrane placed over the gravel. A mechanical float in the bottom of the stock tank (metal, not wood) shuts off the flow into the tank and builds up the water storage in the gravel around the culvert until it reaches a certain level and over flows in the pipe 10 feet above the stock tank, where the flow exits from a water level discharge. On August 16, 1990, Meridian personnel noted no flow at this spring. It was not that the pring has ceased to flow; it was that Meridian personnel did not understand the construction of the spring and had never asked. 78-79

Spring 72125 developed with two tanks, one concrete bottomed with steel rim installed in 1966 and a second fiberglass tank installed in August 1983. 78-80

Spring 72115 has a bottomless old time steel tractor wheel set on the scoria, not a conventional steel tank.

I do not understand the monitoring plan. As it stands, the springs being monitored are those farthest away from the immediate impact of the mine such as Springs 17145 and 72155 in our pasture. If the water modeling is correct the affects of mining should show up first on those waters closest to the mine perimeters. 78-81

Will the monitoring model shift under the permit to monitor those springs closest to the mining and then move to those further out if impacts are detected?

42. The Permit Application has 4 electric wells listed in Appendix 312-2 for mitigation purposes. The DEIS lists 2 electric wells and 2 windmills for mitigation purposes. It seems the two documents are inconsistent. Please reconcile. 78-82

43. What will happen to mature pine trees on steep slopes under steep slope subsidence conditions? 78-83

44. Well No. 62720-03 is almost directly north a distance of two miles from our well in S. 5, T 5 N, R 27 E. See my verbal comments at the Billings hearing. 78-84

45. Have the increased levels of radon released due to subsidence in the area been calculated or considered? 78-85

46. Is there documented successful use of horizontal drains in longwall mined subsided ground replacing spring water in both quantity and quality? If so, where? Please cite studies. 78-86

47. For cost documentation, well service rigs for relatively shallow water wells cost $20.00 an hour plus materials. 78-87

48. If the State had to implement the proposed water mitigation plan, how much would it cost the State to do it? That should be the amount for the water bond, not the proposed bond in the permit application for $16,000. 78-88

49. Two alternatives that the State could have considered with respect to water would be to not mine the 4 sections where the Class I water springs are located or to backstow under those 4 sections to preserve the water. In Europe backstowing is used to preserve certain important features, certainly Class I water in arid Eastern Montana is such a feature. DSL should consider such conditions, but would DSL dare to impose them? 78-89

50. The degrading of Class I waters into Class II, and possibly Class III does change the hydrologic balance of the area. The degrading of Class II waters into Class III waters changes the hydrologic balance of the area. The more rapid infiltration of water into the mine pool area changes the hydrologic balance of the area. With the exception of the paragraph in which it is admitted that all waters might be lost, the overall tone of the DEIS is "Ever'thin's gonna be all right" from subsidence to water quality. The subsidence scenario in the DEIS is a mining company's dream. I think we need much better supporting documentation before it can be accepted. 78-90

51. Exhibit B attached hereto is a copy of the Coal and Exchange Agreement between the USA and Meridian Minerals. Condition 4 requires a permit for longwall mining from OSM and DSL in order to mine the NW NW Sec 18, T6N, R27E. Has Meridian applied for the appropriate permit and is their current mine plan in compliance? 78-91

Exhibit A

Ranching Operations Information

1.) Land Owner:
Address:
City: State: Zip:
Phone Number:

2.) Lands included within the ranching operations:

3.) Type of operations (cow/calf, young stock, etc.):

4.) Type and number of animals (agree with Inventory Tax Numbers or explain difference):

5.) Management Plans:
a. Pasture designations

b. Pasture rotation

c. Determination of forage

d. Water availability

e. Water utilization

f. Improved pasture techniques

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Exhibit A

Ranching Operations Information (Cont.)

6.) Artificial or Flood Irrigation Practices:
Water source

Irrigate lands acreage

Frequency and season

Irrigation method

Type of crops

7.) Productivity Yields:
Historic and anticipated livestock weight gains

Historic and anticipated forage production

Historic flood irrigation attempts

8.) Management techniques for wildlife:

9.) Management techniques for recreation:

10.) Commercial timber management and harvest information:

Exhibit B

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

COAL EXCHANGE AGREEMENT

THIS AGREEMENT ("Agreement"), made and entered into this 25th day of April, 1991, is in furtherance of an exchange as provided by Section 206 of the Federal Land Policy and Management Act of 1976 (43 U.S.C. §1716) and implemented under 43 C.F.R. 2201.6 (1989), by and between the UNITED STATES OF AMERICA, hereinafter called the "United States", acting through the Department of the Interior, Bureau of Land Management, and MERIDIAN MINERALS COMPANY, a Montana corporation, having its principal place of business at Englewood, Colorado, hereinafter called "Meridian".

WITNESSETH, that for and in consideration of the sum of One Dollar ($1.00) and other good and valuable consideration, the receipt, adequacy and sufficiency of which are hereby confessed and acknowledged, and of the covenants and agreements herein contained, the parties hereto do covenant and agree to an exchange of interests in certain lands as follows:

1. Meridian shall convey to the United States, by general warranty deed, all of its right, title and interest to the following described lands situated in the Counties of Madison, Beaverhead, Deerlodge, and Carbon, State of Montana, to-wit:

County	Township	Range	Section	Description	Acres (Approx.)
Madison	8S	1W	15	All West of East Bank of Madison River	572.00
Madison	8S	1W	25	Part N1/2NE1/4 lying East of West Bank of Madison River	48.00
Madison	9S	1W	1	Lots 6,7, SW1/4NE1/4	77.45
Beaverhead	1N	13W	9	SW1/4,NW1/4NW1/4	200.00

Exhibit B-1

County	Township	Range	Section	Description	Acres (Approx.)
Beaverhead	1N	13W	17	Part lying SE of C/L of Big Hole River	608.00
Deerlodge	1N	13W	17	Part W1/2NW1/4 lying West of C/L of Big Hole River	32.00
Beaverhead	1N	13W	19	Part lying SE of C/L of Big Hole River	483.92
Deerlodge	1N	13W	19	Part lying NW of C/L of Big Hole River	145.56
Carbon	9S	21E	1	Lots 1,2,3,4	197.06
Carbon	9S	21E	3	Lots 2,3,4 S1/2N1/2,S1/2	600.63
Carbon	9S	21E	5	Lots 1,2,3,4, S1/2N1/2,N1/2S1/2, S1/2SE1/4	560.44
Carbon	9S	21E	7	Lots 1,2,3,4, E1/2,E1/2W1/2	624.08
Carbon	9S	21E	9	NE1/4,N1/2NW1/4, S1/2SW1/4	320.00
Carbon	9S	21E	11	All	640.00
Carbon	9S	21E	13	Lots 3,4	80.83
Carbon	9S	21E	15	N1/2,N1/2SW1/4, E1/2SE1/4,SW1/4SE1/4	520.00
Carbon	9S	21E	17	All	640.00
Carbon	9S	21E	19	Lots 1,2,3,4, E1/2,E1/2W1/2	625.16
Carbon	9S	21E	21	All	640.00
Carbon	9S	21E	23	All	640.00
Carbon	9S	21E	31	Lots 1,2,3,4	106.36

Exhibit B-2

County	Township	Range	Section	Description	Acres (Approx.)
Carbon	9S	21E	25	Lots 1,2,3	111.89
Carbon	9S	21E	27	All	640.00
Carbon	9S	21E	29	All	640.00
Carbon	9S	21E	33	Lots 1,2,3,4	112.80

The above-described lands (hereinafter called "lands") contain 9,873.18 acres, more or less.

The warranty deed conveyance from Meridian to the United States shall be sufficient to convey to and vest in the United States good and merchantable title to the lands, free and clear of all liens or encumbrances except as set forth in the deed. With respect to those portions of the lands situated in Madison, Beaverhead and Deerlodge Counties, Montana, in which Meridian Oil Company, a Delaware corporation, is the owner of the oil and gas estate therein, Meridian will acquire from Meridian Oil Company and transfer to the United States a waiver and release by Meridian Oil Company of its surface occupancy rights pertaining to its oil and gas estate in such lands.

2. The United States agrees to accept conveyance of the lands upon the terms herein expressed. Upon approval of the deed by the proper officials of the United States, the United States shall forthwith deliver to Meridian, as full compensation for the lands conveyed, a Patent to the coal estate in the following described lands situated in the Counties of Musselshell and Yellowstone, State of Montana, to-wit:

County	Township	Range	Section	Description	Acres (Approx.)
Musselshell	6N	27E	18	All (Frac.)	635.72
Musselshell	6N	27E	20	All	640.00
Musselshell	6N	27E	30	All (Frac.)	638.00
Yellowstone	5N	27E	4	Lots 1,2,3,4	159.44
Yellowstone	6N	27E	28	All	640.00
Yellowstone	6N	27E	32	N1/2,SE1/4	480.00
Yellowstone	6N	27E	34	N1/2,SW1/4	480.00

Exhibit B-3

The above-described lands (hereinafter called the "coal lands") contain 3,673.16 acres, more or less. The conveyance of the coal estate in the coal lands shall be full compensation to Meridian in exchange for the lands conveyed to the United States.

The Patent from the United States to Meridian shall be sufficient to convey to and vest in Meridian good and merchantable title to the entirety of the coal estate in the coal lands, free and clear of all liens or encumbrances, expressly including any coal leases, licenses, prospecting permits or similar rights issued or created by, through, or under the United States pertaining to the coal estate in the coal lands, except those certain federal oil and gas leases numbered M 58748 and M 73819 heretofore issued by the United States covering a portion of the coal lands located in Musselshell County, Montana. Such Patent shall expressly provide that as between the coal estate and the remainder of the mineral estate in the coal lands, including, but not limited to, the oil and gas estate therein, the said coal estate shall be the dominant estate in and with respect to such lands, and, accordingly, that the development and operating rights of the United States, its lessees, licensees, permitees, agents, successors and assigns, concerning that portion of the mineral estate retained by the United States shall at all times be fully subordinate to the development and operating rights of Meridian concerning the coal estate in the coal lands. In this regard, neither the United States nor its lessees, licensees, permitees, agents, successors or assigns shall have the right to undertake any development of or operations pertaining to the said retained mineral estate in the coal lands which would in any way be hazardous to coal production, would result in the waste of coal deposits, or would interfere with or otherwise burden (economically or operationally) the development and production of the coal estate in the coal lands.

3. Meridian shall not conduct surface mining operations on the coal lands. All other rights and incidents of ownership of the United States to use or enjoy the coal estate conveyed to Meridian, including, but not limited to, the right to conduct underground mining operations (except as limited in Article 4 below), shall transfer with the Patent delivered to Meridian hereunder. As used herein, the term "surface mining operations" shall mean operations directly related to the extraction of coal from the earth by removing the top soil or other surface materials over a coal seam before recovering the coal from the seam or bed of coal so exposed, but such term shall not include coal recovered during operations incidental to underground mining operations. The term "underground mining operations" shall include, but not be limited to: (a) surface operations incident to or in support of underground extraction and marketing of coal or in situ processing, such as construction, use, maintenance, and reclamation of: (i) roads, (ii) powerlines, (iii) shops, (iv) storage areas, (v) coal processing, sizing, washing, and drying areas, (vi) shipping areas, (vii) hoist and ventilation facilities and portals, (viii) other

Exhibit B-4

support facility areas, (ix) areas utilized for the disposal and storage of waste, and (x) areas on which materials incident to underground operations are placed; and (b) underground operations such as (i) construction, operation and reclamation of shafts, portals, escapeways, underground support facilities, and in situ processing, (ii) underground mining of coal by any method whatsoever, (iii) underground haulage, storage, blasting, and power distribution, and (iv) any other activities related to underground mining or support of underground mining of coal.

4. Meridian shall not conduct longwall mining under that portion of the coal lands located in Township 6 North, Range 27 East, Section 18, NW1/4NW1/4, as shown on the map on page 253 of the Bureau of Land Management's Final Environmental Impact Statement on the Bull Mountains Exchange(BLM-MT-91-001-4120), without first obtaining authorization to mine in such a manner in the form of a mining permit issued by the U.S. Office of Surface Mining Reclamation and Enforcement and the Montana Department of State Lands, or their successor(s), as appropriate.

5. The values of the interests and estates described in Articles 1 and 2 above have been established by the Bureau of Land Management's Northwest Regional Evaluation Team in their Bull Mountains Federal Coal Appraisal resulting in the determination that the value of the Article 1 interests and estates exceeds the value of the Article 2 estate and associated rights. Meridian agrees to make a donation of such excess in value to the United States, and the United States agrees to accept said donation, pursuant to 43 U.S.C. § 1715(a) and § 1737(c). The restriction on surface mining operations and the limitation on longwall mining provided for above have been agreed to by Meridian for the purpose of enhancing the public interest in this exchange, and the United States has given, and agrees to give, appropriate consideration to these factors in making its public interest determination.

6. Meridian agrees to furnish to the United States evidence of title to said lands which is reasonably acceptable to the Department of Justice, and also agrees to eliminate any and all liens or encumbrances which, consistent with the provisions of Article 1 above, render title to the said lands unmerchantable.

7. This Agreement shall be binding upon and inure to the benefit of the parties hereto, subject, however, to the conveyance of good and merchantable title to the said lands to the United States, to the valid patenting of the entirety of the coal estate in the coal lands to Meridian, and provided that no material loss or damage shall occur to either property prior to title conveyance.

8. This Agreement may be modified or amended only in writing signed by both parties.

Exhibit B-5

9. No member of or delegate to the Congress or Resident Commissioner shall be admitted to any share or part of this Agreement, or to any benefit that may arise therefrom, but this restriction shall not be construed to extend to this Agreement if made with a corporation or company for its general benefit.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement the day and year first above written.

MERIDIAN MINERALS COMPANY

By: [signature]
Title

UNITED STATES OF AMERICA

By: [signature]
Title

(79)

RECEIVED
OCT 06 1992
RECLAMATION DIVISION

Don Golder
P.O. Box 1705
Billings, MT 59103
October 5, 1992

Mike DaSilva
Environmental Specialist
MT Department of State Lands
Capitol Station
Helena, MT 59620
Re: Comments on the Bull Mountain Mine No. 1 DEIS

Since I was unable to present my comments in Roundup at the scoping hearing of the D.E.I.S. on the Bull Mountain Mine, #1, I thought there might be some in the area who had not thought it out this way. I am asking you to pass my comments on in Letters to the Editor.

I think Meridian failed to address the "load out site" in Roundup, with respect to the fact that economically as a permanent site for the thirty year life of the mine, it is the best they have. 79-1

In the "Draft Bull Mountain Mine, Number One Alternative Site Summary" dated January 31, 1992, the discussion of Roundup, the ninth site of eleven, has several inaccuracies or failures.

"The site area is located to the west of the intersection of Highways 12 and 87." Why not locate the site to the east of the intersection and before the next crossing over the old railroad Right-of Way?

Advantages:

"The site is located 16.0 miles from the mine." In fact, it is 14.3 miles from the mine if Meridian had a haul road down Render Coulee 4.3 miles from the mine, intersecting with US 87 ten miles south of the load out site at the intersection of Hwy 87 and 12. Calculated out, this would be an annual savings of $1.5 million, over the southeast haul to Huntley for the first three years of mine operation, at one unit train per week. 79-2

Disadvantages:

"There are no main line track, siding or load-out facilities." The savings of $4.5 million for the three year temporary haul, to Roundup rather than Huntley, would make a good down payment on load out facilities in Roundup.

"Although track previously existed along the Right-of Way, track and other facility will create some environmental impact." Not near as much environmental impact as 33 miles of new railroad from the mine south to Broadview. Thirty one miles of track will need to be laid to reach the site area. Thirty one miles of track plus facilities, projected at $6.750 million is far cheaper than the Bull Mountain Rail Spur at an estimate of $1 million per mile. " The trucking would be permanent over the life of the mine."

If the mine proved successful in the first three years or so, there could be a conveyor belt or high volume air tube put in place from the mine south to the rail head in Roundup. At the end of the life of the mine, this equipment could be dismantled and removed, leaving very little evidence of it's existence. the Bull Mountain Spur grade will be a permanent scar on the country side.

"There are 72 track miles to Laurel." When in fact, there are approximately 53 miles of track from mine south to Laurel. The difference in rail freight would be approximately 19 miles further to Roundup.

If you calculated the cost of the new railroad from Broadview to the mine south, aproximately 33 miles against the cost of laying track on the existing Right-of-way, with load out facilities in Roundup, the Bull Mountain Mine Railroad Spur is by far more costly.

Capitol cost above Meridian's projected $6.750 million would be for a better storage and load out facility, consisting of a coal dust free silo capable of loading a unit train in three hours. Also, wouldn't it be reasonable to plan for an autoated conveyance system, either by belt or high volume air, at such time as their market increased, justifying it over to trucking? 79-2

Meridian's approach to the start up of the mine leaves them with virtually no capitol mining related costs. This points to two possibilities; they are unsure of their market, and possibly do not have the financial backing to construct permanent facilities in Roundup.

Since Roundup supports the Bull Mountain mining venture, and the fact that a permanent coal loading facility in Roundup would keep more jobs in the community, would Musselshell county be willing to float industrial revenue bonds to encourage construction of permanent facilities in Roundup?

Another possibility would be for Meridian to borrow money for this construction from their prospective customers on the Pacific Rim, and pay them back through reduced coal royalties on the coal delivered to them. This would conceivably insure them of a market in that area.

Sincerely,

Don Golder

(80)

October 4, 1992

Mike DaSilva
Environmental Specialist
Montana Department of State Lands
Capitol Station, Helena, MT 59620

RECEIVED
OCT 06 1992
STATE LANDS

Dear Mr. DaSilva:

Based on the public Huntley meeting held on September 22, 1992, I was informed that the Montana Department of State Lands (MDSL) took into account the social economic factors of various load out sites and came to the resolution that Huntley was the most beneficial in all aspects considered. I strongly disagree with this finding as in the draft environmental impact statement prepared by MDSL there are numerous contradictions and misnomers. The complete and utter disregard for the human well-being including the population of Huntley and all the citizens along the truck route was not taken into account at all. 80-1

I am addressing the factors which were completely disregarded by MDSL. I am triple licensed, CRC, LPC, CCDC, in Montana and am speaking on behalf of myself and the probable ramifications which will be accrued by all citizens due to the Meridian Minerals Co., MDSL, and the proposed load site in Huntley.

According to the Montana Environmental Policy Act under definitions (26.2.642) Sub Part II, pt B, #7 "'Cumulative impact' means the corrective impacts on the human environment of the proposed action when considered in conjunction with other past and present actions related to the proposed action by location or generic type. Related future actions must also be considered when these actions are under concurrent consideration by any state agency through pre-impact statement studies, separate impact statement evaluation, or permit processing procedures." None of the human well-being was taken into account which includes the mental health, physical hazards of people's health, or the possible causal agent of chemical dependency. 80-2

First, the mental health aspect of the population of rural route 3 is 700 families; Huntley 260 rural routes and post office boxes 172. Pryor Creek Golf Course membership 700; Shepherd 600 rural route and 200 post office boxes; Worden 500 boxes and rural route; Ballantine 200 boxes and rural route; and Pompeys Pillar 100 = 3432 X 4 (parents and average 2 children per household) = 13,728 people X 70 years (average life expectancy) = 960. 960 X $70.00 per hour for counseling X 52 weeks per year 960, 960 X $3640.00 = $3,497,894,400 which Montana Department of State Lands (MDSL) and Meridian Minerals Company will be liable for.

The mental health aspects which will be hindered will include, but are not limited to, include the diagnosis of Post Traumatic Stress Disorder, Dysthymia, Major and Minor Depression, Panic Disorders, Dream Anxiety Disorder, Sleep Termor Disorder, Sleeping Disorder, Insomnia Disorder, Anxiety Disorders, Organic Anxiety Syndrome, Delusional Disorder, Conduct Disorders, Avoidant Personality Disorder, Passive Aggressive Personality Disorder, Adjustment Disorder, Adjustment Disorder with Anxious and Depressed Mood, and Attention Span Disorders. All of these mental health aspects will be incurred due to worrying and stress created by the undue Huntley water usage and ground water pollution (Draft EIS page 18), the wild life hindrance (Draft EIS pages 20-24) not taken into account in the Huntley area of eagles nesting on the Yellowstone river; fox, deer, birds, fish, mountain lions, and pets. Also, the transportation (Draft EIS, pages 24-29) flow on Highway 312 states currently it has 10% heavy vehicle traffic and the incorporation of an additional 192 trips per 24 hours of heavy coal trucks with the severity of 1.78 accident which is over the average 1.53 severity - Needless to say, the accident rate will be extremely high and the accidents themselves will be severe. The traffic noise (Draft EIS, page 31) will be increased decibel and the constant traffic for 30 months will be damaging to ones mental health+physical health. No fire protection in Huntley (Draft EIS Page 37). The social well-being (Draft EIS, page 43), which includes the coal dust, noise, safety of children, highway doterioration, the intrusion of the Huntley community, recreation (Draft EIS, page 44) of the 6 acre park, which is 750 feet from the beet site, aesthetics (Draft EIS, page 48), the regional weather (Draft EIS, page 2), which was compared to Billings and weather differentiation between Billings and Huntley is like comparing apples and oranges. The stress of pollution and ecological damage to the population, Yellowstone River, irrigation, ranches, farms, and the real estate values will all be factors which hinder ones mental health. 80-3

The child abuse rate will increase due to the parents' stress level; fighting of families; divorce rate; employment loss due to no sleep because of noise level and retraining costs; alcohol and drug consumption due to stress and depression, nightmares; educational barriers; children's terror of being run over by coal trucks and/or their pets death; farmers mental state of having to drive to Billings to the beet site because of coal truck traffic, will be a major hindrance with the current site in Huntley.

Further, according to the Montana Environmental Policy Act under definitions (26.2.642) Sub Part II, Pt B, #12, "'Human environment' includes, but is not limited to, biological, physical, social, economic, cultural and aesthetic factors that inter-relate to form the environment. As the term applies to the agency's determination of whether an EIS is necessary, economic and social impacts do not, by themselves, require an EIS. However, whenever an EIS is prepared, economic and social impacts and their relationship to biological, physical, cultural and aesthetic impacts must be discussed."

In MDSL EIS the human factor of physical health and mental health was not taken into account at all. The medical costs is immeasurable. The three leading causes of death in the United States is: 1) heart, 2) cancer, 3) stroke. Certain cancer-causing agents, carcinogens, have been identified as causing lung cancer which is coal dust or better known as black lung disease. Occupational disease is caused by a specific organic substance to which the person has become sensitive, hypersensitivity pneumonitis.

The pulmonary disorders which will be incurred due to the coal site will include but are not limited to bronchial asthma which a causal agent is air pollution. Treatment and prognosis includes one's life time of oxygen, allergy medications and shots. Also, emphysema is a destruction of the walls of the lungs. There are two main types of emphysema disorders: Type A "pink puffers" and Type B "blue boaters." The functional disabilities include the earliest manifestations of COPD, cough and expectoration, and bed rest. The psycho-social disabilities is that "fear must be frequently allayed." 'Depression is also frequent and focuses on the loss of valued activities, the loss of a previously cherished image of vigor and health, and the conviction that there is an inexorable downhill course.'" Stolov and Clowers Handbook of Severe Disability page 312. The increase rate of depression is inevitable. 80-3

Treatment and prognosis is limited as damage to the lungs is irreversible. Often times, bed rest is prescribed which is detrimental to one's overall health. Bed rest affects humans' joints and connective tissues: muscles, due to limited use, which is referred to as atrophy; bones which, within 3 days, the rate of calcium removal begins to exceed the rate of deposition. The bones soften and become weak (osteoporosis). Urinary tract destruction: heart, which is a muscle, and "it undergoes disuse

atrophy like other muscles when a patient remains inactive.' 'Being weaker, it can pump less blood per minute.'" Stolov and Clowers, Handbook of Severe Disability page 59. Circulation Lungs, Gastrointestinal Tract, Skin, and the mental state are all affected by bed rest.

Hearing Impairment and loss due to noise levels of machinery, trains, coal truck traffic, which will cause psychological damage, interfere with sleep, work and recreation, and create hypertension, strokes, increased admissions to mental hospitals, and increase in aggressive behavior. Noise affects health/welfare/quality of life.

The Psycho-social adjustment to chronic disease and disability are always extreme. "Disabled persons in our society assume a special kind of minority status and occupy a socially devalued role." Stolov and Clowers, Handbook of Severe Disability, page 14. The rate of increased traffic on Highway 312 will result in an increase in auto accidents which will, in turn, increase disabilities of the citizens of humans that travel on Highway 312. The medical costs will be extreme, the disability retraining costs will be extreme, and the mental state of these "unfortunate statistics" will be extreme!! 80-3

Referring to the Montana Environmental Policy Act under Definitions (26.2.642) Sub Part II, pt B, 14-18:-

(14) 'Mitigation' means:

(a) avoiding an impact by not taking a certain action or parts of an action;
(b) minimizing impacts by limiting the degree or magnitude of an action and its implementation;
(c) rectifying an impact by repairment, rehabilitating, or restoring the affected environment; or
(d) reducing or eliminating an impact over time by preservation and maintenance operations during the life of an action or the time period thereafter than an impact continues.

(15) 'Programmatic Review' means an analysis (EIS or EA) of the impacts on the quality of the human environment of related actions, programs, or policies.

(16) 'Residual impact' means an impact that is not eliminated by mitigation.

(17) 'Scope' means the range of reasonable alternatives, mitigation, issues, and potential impacts to be considered in an environmental assessment or an environmental impact statement.

(18) 'Secondary impact' means a further impact to the human environment that may be stimulated or induced by or otherwise result from a direct impact of the action.

Beside the mental health and physical ramifications, there is also the increased rate of chemical dependency that must be taken into account, as when one is depressed due to stress or mental health anxiety or a physical disability, the likelihood of trying to divert one's sorrow by use of a mood altering drug is increased ten fold. Chemical Dependency (C.D.) requires treatment which can be residential or on an outpatient basis, dependent upon the degree of dependency and based on the C.D. evaluation. On the average, residential treatment for the 30 days is $1500.00, which must be followed by outpatient counseling which, on the average, takes 2 years at $70.00 per hour, per session. 80-3

According to the Montana Environmental Policy Act under the General Requirements of the Environmental Review (26.2.643) Section III. #1 a & b:

Section 75-1-201 requires state agencies to integrate use of the natural and social sciences and the environmental design arts in planning and in decision-making, and to prepare a detailed statement (an EIS) on each proposal for projects, programs, legislation, and other major actions of state government significantly affecting the quality of the human environment.

(1) The agency shall prepare an EIS as follows:

(a) whenever an EA indicates that an EIS is necessary or;

(b) whenever, based ont he criteria in Rule IV, the proposed affecting the quality of the human environment.

As everyone knows, child abuse is a reciprocal process, meaning

when one is abused the likelihood of them, in turn, abusing the next generation is increased. Also, the occurrence of chemical dependency, when raised in an alcoholic home, is increased and treatment and prognosis of either being chemically dependent in the next generation or being Adult Children of Alcoholic (ACOA) is likely. Statistics prove this is a factor. Will MDSL and Meridian be liable for the next generation too?

According to the Montana Environmental Policy Act, under Determining the Significance of Impacts (26.2.644) Sub Part IV. part 1 and 1 (a) and 1 (f):

(a) the severity, duration, geographic extent, and frequency of occurrence of the impact;

(f) any precedent that would be set as a result of an impact of the proposed action that would commit the department to future actions with significant impacts or a decision in principle about such future actions. 80-3

We believe that these should be legislative proposals.

All future actions should have been taken into account which was not done. All these factors have a Long Term Impact, persist beyond final bond release, on the population and, also, according to the Montana Environmental Policy Act under the Preparation and Contents of Draft Environmental Impact Statements (26.2.649) Sub Part IX, part 4b, 4c, 4d, 4e, 4f, these should have been taken into account.

(4) a description of the impacts on the quality of the human environment of the proposed action including:

(a) the factors listed in (3)(d) and (e) of Rule V, whenever appropriate:

(b) primary, secondary, and cumulative impacts;

(c) potential growth-inducing or growth-inhibiting impacts;

(d) irreversible and irretrievable commitments of environmental resources, including land, air, water and energy;

(e) economic and environmental benefits and costs of the proposed action; and

(f) the relationship between local short-term uses of man's environment and the effect on maintenance and enhancement of the long-term productivity of the environment. Where a cost-benefit analysis is prepared by the agency prior to the preparation of the draft EIS, it shall be incorporated by reference in or appended to the EIS.

Did MDSL and Meridian take into account the overall ramifications of the proposed coal dump in Huntley and the billions of which will be inevitable to the human life - I think not, or they would have placed the proposed loading site at a less populated town such as Cushman. According to the Montana Environmental Policy Act under Preparation and Contents of Draft Environmental Impact Statements (26.2.649) Sub part IX, #5, #8, an analysis of reasonable alternatives to the proposed action, and an explanation of the trade offs among the reasonable alternatives. Logistically, a coal site in Cushman would be better as all of the Meridian Mine would stay in Musselshell County. Also, being less populated is financially more sound for Meridian as cost for health ramifications would be extremely less. Traffic accidents would be fewer as the road is not used as much by commuters. Not taken into account was the traffic and tourism on Highway 312 to the National Landmark of Pompey's Pillar Rock of Lewis and Clark Expedition, which is posted at the beginning of Highway 312 east bound to Huntley. This would not be a factor if the coal site was placed in Cushman. Also, the tourism and traffic to Homesteader's Days and the Huntley Park was not taken into account. All of these people would also be affected by a coal site being in Huntley and MDSL and Meridian would be liable for their well-being and lives. These people would not be an economical consideration to you either if the coal site was in Cushman. The created jobs would still be alive in Cushman. 80-3

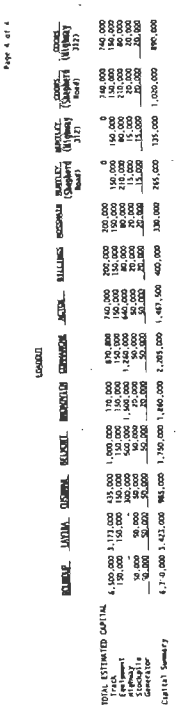
According to the Meridian's, Robert B. Morehead, Jr., Project Manager, April 8, 1991, letter to Mr. Clint Erb, Environmental Program Manager, observations were weighed and the most cost effective load out was Huntley, least expensive for Meridian (see enclosed). All Meridian took into account was the initial starting fee, not the long term effect to human life. I do not have any idea what a human life is worth - do you?

How could MDSL come to the conclusion that Huntley was the most beneficial and cost effective option? MDSL took into account social-economic factors to come to that resolution. I believe, without a doubt, that MDSL did not consider all of the factors and draft EIS is completely unacceptable! 80-3

Sincerely,

Ella Dugan-Laemmle

Ella Dugan-Laemmle, MS, CRC, CCDC, LPC
P.O. Box 67
Huntley, MT 59037
(406) 348-3802



(82)

CENTRAL MONTANA
RESOURCE CONSERVATION & DEVELOPMENT AREA

RECEIVED
OCT 07 1992
STATE LANDS

Mr. Mike DaSilva
Environmental Specialist
MT. Dept. of State Lands
Capitol Station
Helena, Montana 59620

September 30, 1992

Dear Mr. DaSilva

The Central Montana Resource Conservation and Development Area (RC&D) was happy to receive our copy of the DEIS for the Bull Mountains Mine No. 1, from the MT. Dept. of State Lands. It appears to have gone to great lengths to summarize all the issues related to the mining proposal. From the beginning of the EIS process, we have recognized the necessity to review all scoping, application and related documentation for this proposal. We have participated in all the public meetings and reviewed all information and publicity we could acquire, relating to this project.

It is our belief that the DEIS is a comprehensive outline of the proposal, a review of the issues and concerns raised throughout the EIS process and a projection of the anticipated impacts that may result if the project is permitted to proceed. It also articulates the conclusions about the levels of impacts and changes possible, derived through study and analysis of all the related documentation of baseline data and public processes associated with the project proposal.

Based upon the conclusions of the DEIS and all other related information about the proposed project, we see no reason why the decision to approve the applicant's proposal should be anything more than a formality.

Thank you for the opportunity to offer these comments about the Bull Mountains Mine No. 1 DEIS.

Respectfully Submitted,

Monty L. Sealey, Exec. Dir.

34 THIRD AVENUE WEST P.O. BOX 664 ROUNDUP, MONTANA 59072 PH 406-323-2715

(81)

October 3, 1992

RECEIVED
OCT 07 1992
STATE LANDS

Mike DaSilva
Environmental Specialist
Mt. Dept. of State Lands
Capitol Station
Helena, MT 59620

Re: DEIS - Bull Mountains Mine No. 1

Dear Sir:

I oppose Meridian Minerals request for a permit to mine coal as outlined in the draft environmental impact statement, August 1992 for the following reasons:

I live northwest of the proposed mine in the West Parrot Creek drainage. I consider this property to be " around the life-of-the mine area". Therefore, I have major concerns regarding Meridian's hydrologic mitigation measures (Chapter 4 page 17-20, Appendix A page 38-48). Namely, will they work? Should Meridian's mitigation fail, there will be irreversible and irretrievable loss of some springs and intermittent stream reaches (Chapter 4, page 85). There should be a realistic bond and a permanent trust fund to monitor and restore water resources likely to be disrupted by mine subsidence both on-site and within 10 miles of the mine. I would like Meridian to pay for initial baseline groundwater data for my house/livestock well. 81-1

I work in Billings and know Highway #7 between Roundup and Billings well. Adding 192 additional trucks, 24 hours a day, for hauling coal to Huntley for the next 3 years is insane! The DEIS points out many deficiencies in this proposal. I hope that the public's best interest is considered ahead of Meridian's with a disapproval of interim coal hauling to Huntley. 81-2

The soils in the proposed mine area are highly erodible. There should be a realistic bond and a permanent trust fund to stabilize slopes and control subsidence-caused erosion.

Formal notice should be given to interested parties on development and revisions of permit requirements.

Sincerely,

Elizabeth Woodson

Elizabeth Woodson
Box 424
Roundup, MT 59072

(83)

RECEIVED
OCT 08 1992
STATE LANDS

October 5, 1992

Mike DaSilva
Environmental Specialist
MT Dept. of State Lands
Capitol Station
Helena, MT 59620

Dear Mike:

Enclosed please find (1) my written comments concerning the Draft EIS for Meridian Minerals Company Bull Mountains Mine No. 1, and (2) written script from my oral testimony at the Public Hearing in Huntley on September 22, 1992.

Please feel free to contact me anytime at work or home if you have any questions or comments concerning these.

Thank you for your time and efforts spent with us.

Sincerely,

Jackie Stearns

Jackie Stearns
P.O. Box 84
Huntley, MT 59037

cc: Dennis Casey, Commissioner
Department of State Lands

October 5, 1992

Mike DaSilva
Environmental Specialist
MT Dept. of State Lands
Capitol Station
Helena, MT 59620

RE: Draft Environmental Impact Statement
for Meridian Minerals Company
Bull Mountains Mine No. 1

Dear Mr. DaSilva:

I am writing in response to the DEIS mentioned above which was issued by the DSL on August 31, 1992. This document is lacking on many accounts and in its present form does not provide a solid tool for officials to use in basing decisions regarding this project.

Much of the DEIS document dealt with irrelevant analysis of impacts under Alternative Two, which denies approval of the project. Tables comparing the two alternatives show almost consistently "Negligible Impacts" on all points under Alternative Two. The Agency, by exercising the option of "no action" as an alternative, was able to avoid having to provide alternate approaches which could accomplish the same results and objectives as the proposed action but with less adverse environmental impacts. 83-1

Numerous issues were not specifically addressed, inadequate and generalized data was used, and MEPA Rules were not adhered to by the Agency.

The following is a brief list of those issues and impacts not addressed in the DEIS:

1. Alternative load-out sites were minimized and considered unimportant by the Agency. Only a brief discussion was given, lacking a level of detail needed because of their significance; 83-2
2. For impacts determined by the Agency as moderate with potential to be significant, and major to significant, the Agency failed to provide discussion for mitigation, stipulations, or other controls with which to give compensation for said impacts; 83-3
3. Secondary and residual mental health effects to the human environment in the Huntley area due to the impacts of the proposed load-out operations were not considered; 83-4
4. Residual medical health effects to the human environment in the Huntley area due to the impacts of the proposed load-out operations were not considered; 83-5

5. The cumulative impacts of traffic patterns involving peak travel hours, business accesses, number of approaches, and intersections along the truck haul route were not addressed or analyzed; 83-6
6. Commuter traffic along Northern Avenue in Huntley to I-90 past the proposed Huntley load-out site was not addressed as a factor in considering impacts at the load-out site; 83-7
7. Fire protection for the operations at the proposed Huntley load-out site is inadequate; 83-8
8. The results of a telephone survey conducted in our area in 1991 were not included; 83-9
9. Residual impacts to property values for the property owners in and around the Huntley area and along the truck haul route were ignored; 83-10
10. Records of data, sources used, and well locations used for monitoring were not provided in the DEIS in regard to the proposed Huntley load-out site; 83-11
11. Location and data records used for air quality monitoring for baseline data was not given; and 83-12
12. The Huntley community was not included in the original scoping activities of the DSL. 83-13

The following will discuss the above points in detail:

1. Alternative Load-out Sites.

The details of the Agency's evaluation and sources of data should have been included in the DEIS for public review and comment.

Under the MEPA Rule 26.2.643, "General Requirements of the Environmental Review Process," Section III, Part (2), Subpart (b), it states that, for each proposal for projects, the Agency shall apply the following criteria: "...to assist in the evaluation of reasonable alternatives and the development of conditions, stipulations, or modifications of a proposed action..." and MEPA Rule 26.2.648, "Environmental Impact Statements - General Requirements," Section VII, Part (2), states that "The agency shall discuss the impacts of a proposed action in a level of detail that is proportionate to their significance." 83-14

The DSL fails to follow these rules by giving only a brief description of alternative load-out sites in Chapter II, Page 4 of the DEIS.

Also, the Agency failed to follow the MEPA Rule 26.2.629, "Preparation and Contents of Draft Environmental Impact Statements," Section IX, Part (8), which states that the Agency shall prepare a DEIS containing the following: "...an explanation of the tradeoffs among the reasonable alternatives..." 83-14

2. Compensation for Moderate to Major and Significant Impacts.

In the DEIS Chapter IV, Page 36, stating "The Agency concludes that the impact to traffic flow and public safety along public highways from mining-related traffic would be moderate with the potential to become significant during the 2 to 3 years the Huntley loadout is in operation."

DEIS Chapter IV, Page 38 states that "...impacts to the integrity/stability of County and State roads from trucking coal from the mine to the Huntley loadout would be major and significant over the short term..."

And in the DEIS, Chapter IV, Pages 41-42, it states, "Noise generated during the operation of the loadout... occasionally would be above acceptable levels recommended by the EPA."

Also, in the DEIS, Chapter IV, Page 50, it states "...impacts to social well-being in the Huntley area would be moderate with the potential to become significant over the short term..."

Last in the DEIS, Chapter IV, Page 60, which states, "...impacts to visual resources/aesthetics in Huntley from Huntley loadout would be major and significant..." 83-15

The only compensation suggested by the Agency for any of the above impacts was found in the DEIS Chapter IV, Page 50, which states "Closure of the Huntley loadout facility would be a positive impact on the social well-being of Huntley residents who opposed the project."

MEPA Rule 26.2.649, "Preparation and Contents of Draft Environmental Impact Statements," Section IX, Part (6) states that the agency shall prepare a draft environmental impact statement containing the following "a discussion of mitigation, stipulations, or other controls committed to and enforceable by the agency or other government agency..." and Part (7) "a discussion of any compensation related to impacts stemming from the proposed action..."

Under MEPA Rule 26.2.642, "Definitions," Section II, Part (6), "Compensation' means the replacement or provision of substitute resources or environments to offset an impact on the quality of the human environment." 83-15

3. Secondary and Residual Mental Health Effects.
and
4. Residual Medical Health Effects on the Human Environment.

Neither of the above impacts were considered in the DEIS.

MEPA Rule 26.2.642, "Definitions," Section II, Part (12) states "Human environment' includes, but is not limited to biological, physical, social, economic, cultural, and aesthetic factors that interrelate to form the environment...whenever an EIS is prepared, economic and social impacts and their relationship to biological, physical, cultural and aesthetic impacts must be discussed." 83-16

Also under the MEPA Rule 26.2.642, "Definitions," Section II, Part (16) "Residual impact' means an impact that is not eliminated by mitigation..." and Part (18) "Secondary impact' means a further impact to the human environment that may be stimulated or induced by or otherwise result from a direct impact of the action."

And, as per MEPA Rule 26.2.649, "Preparation and Contents of Draft Environmental Impact Statements," Section IX, the Agency shall prepare a DEIS that contains the following: Part (4), Subpart (b) "primary, secondary, and cumulative impacts; (c) potential growth-inducing or growth-inhibiting impacts...(e) economic and environmental benefits and costs of the proposed action; and (f) the relationship between local short-term use of man's environment and the effect on maintenance and enhancement of the long-term productivity of the environment..."

5. Cumulative Impacts of Traffic Patterns.

The Agency did not address this issue as defined under MEPA Rule 26.2.642, "Definitions," Section II, Part (7), which states "Cumulative impact' means the collective impacts on the human environment of the proposed action when considered in conjunction with other past and present actions related to the proposed action by location or generic type. Related future actions must also be 83-17

considered when these actions are under concurrent consideration by any state agency through pre-impact statement studies, separate impact statement evaluation, or permit processing procedures." 83-17

6. Commuter Traffic Along Northern Avenue in Huntley.

The DEIS document did not include any discussion and analysis of this secondary impact. 83-18

7. Inadequate Fire Protection at the Proposed Huntley Loadout Site.

The only reference to this is found in the DEIS Chapter III, Page 38 which states that "The Huntley Fire Department has 4 to 5 volunteers - not enough to provide sufficient fire protection to the community...In addition, the fire department is not properly equipped to provide year-round fire protection..." 83-19

Again, no compensation or control measures are discussed or suggested by the Agency in the DEIS.

8. Results of Telephone Survey.

The Agency failed to include the results and statistics from the survey conducted in the Huntley area in 1991. This would be vital information needed by our decision-makers in forming their decisions on this project. 83-20

9. Residual Impacts to Property Values in the Huntley Area.

The anxiety caused by having a coal loadout facility in Huntley and having a person's property value lessen to the point where equity could not be realized would have a major mental health effect on the property owners in the Huntley area. 83-21 Not only would values fall when the loadout facility is operating, but population growth and re-sale value of property would diminish for several years after the loadout closed, due to the perception by the general public that the loadout was located in Huntley at one time. 83-22

10. Well Monitoring at the Proposed Huntley Loadout.

Even though the Agency states in the DEIS Chapter IV, Page 24 that "...impacts to alluvial ground water 83-23

supplies in the Huntley area from the water supply well at the loadout would be negligible..." the information used to support this statement was generalized and did not identify the source of well data collection and the locations of the monitors. The DEIS document Chapter IV, Page 24 also states "...the proposed pumping rate of about 20 gpm would create minimal drawdown as close as 1,000 feet from the well..." and in the DEIS Table A, Page 11 "An existing, 20-foot well...would be used to furnish up to 30,000 gal/d of raw water..."

Under MEPA Rule 26.2.644, "Determining the Significance of Impacts," Section IV, Part (1), Subpart (b), it instructs the Agency to consider the following criteria: "...reasonable assurance in keeping with the potential severity of an impact that the impact will not occur..." 83-23

Was monitoring of wells done within 1,000 feet? Which wells were used? Was monitoring done by the Agency or by Meridian Minerals Company?

The information requested above is needed in order to determine if, in fact, the impacts will be negligible.

11. Air Quality Monitoring.

The Agency provides models for the predicted ambient concentrations of air pollutants, but what did the Agency use as baseline data for existing air quality? No information was provided in the DEIS which shows where or when the baseline monitoring was done or what the actual data was. This is an important factor in determining the predicted concentrations of air pollutants and must be addressed and analyzed by the Agency. 83-24

12. Exclusion of Huntley During Original Scoping Activities.

The DEIS states in Chapter V, Page 2 that "The Agency held two public meetings to obtain public input to the scoping process. Twenty people attended the first public meeting in Billings, Montana on June 11, 1990. Seventy-seven attended the second meeting, in Roundup, Montana on June 12, 1990." 83-25

The Agency failed to hold a public meeting in Huntley at that time, the community which stands to lose the most in quality of life. The Agency did not follow MEPA

Rule 26.2.647, "Determining the Scope of an EIS," Section VII, Part (2), Subpart (a) which instructs the Agency to "invite the participation of affected...and interested persons or groups..." and MEPA Rule 26.2.643 "General Requirements of the Environmental Review Process," Section III, Part (2), Subpart (d) "to ensure the fullest appropriate opportunity for public review and comment on proposed actions..." 83-25

In closing, I am urging the Department of State Lands and all the decision-makers involved with the Meridian Mine Project to choose an alternate site for the temporary coal loadout facility, or, at the very least, to instate proper mitigations, stipulations, and other controls to ensure the public's safety and quality of life for all the citizens affected by the Project.

Sincerely,

Jackie Stearns

Jackie Stearns
P.O. Box 84
Huntley, MT 59037

cc: Dennis Casey, Commissioner
Department of State Lands

E4

DISAPPROVAL FOR

MONTANA 5-YEAR PERMIT TO MINE COAL FOR MERIDIAN MINES AND ASSOCIATED FACILITIES.

THE MONTANA LAND USE AGREEMENT FOR THE OPERATION OF THE BULL MOUNTAIN MINE NO 1 AND ASSOCIATED SUPPORT FACILITIES.

A DISAPPROVAL OF SUCCESSIVE AMENDMENTS OF THE MONTANA PERMIT TO MINE COAL.

A MONTANA COAL LEASE

A FEDERAL PERMIT TO MINE COAL

AND A FEDERAL SURFACE USE PERMIT FOR FUTURE LIFE-OF-MINE DEVELOPMENT.

SIGNATURES	ADDRESS
[illegible]	1576 Nissen Ave Huntley, MT 59037

ORAL TESTIMONY
Huntley, Montana
9/22/92

Gary Amestoy, Administrator Reclamation Division of Department of State Lands, opened the meeting at 7:30 p.m. He explained the purpose of and procedure for the meeting, and the regulatory authority for preparing the EIS.

John Scott: I'm John Scott, Rep. from House District 97 which represents this area. I have a request of the Department of State Lands. Verbatim testimony is presented in Letter 4.

Monica Lundeen: I'm a member of the Huntley Community Club and also a resident here in Huntley. Verbatim testimony is presented in Letter 13.

Jackie Stearns: I'm honored to be here today on behalf of the people of Huntley and on behalf of my family and myself. My name is Jackie Stearns and I would like to share our concerns with you today. During the summer of 1990, when Meridian was at the height of their test pit run, the quiet, unhurried, unpolluted way of life in our community was shattered. A thick, black, filthy dust caked our houses and our lungs. Several neighbors, young and old, with respiratory problems suffered from the dust. The noise from the constant truck traffic, the loaders moving the coal on the stockpile, the train cars clanging back and forth, caused many sleepless nights. The air was stifling and we dared not open windows because, wind or no wind, the coal dust drifted in and settled on everything. This went on for nearly six months. When these things happened, I did have a personal interest in it. My motivation was my family's health and my health which was severely threatened. But the more I spoke to the people in the community, neighbors and friends, and even those who didn't live close by, I found that there were many of us with the same concerns. Since then my scope of understanding broadened to include much more than just myself and my family. It includes hundreds, maybe thousands, of people in my community and the surrounding areas. We discovered that not only was there dust and noise problems, but also these concerns. H- 1

What was the danger of contamination of our water supplies because the pad that was used for the stockpile was not lined to prevent seepage of particulates into the ground water supply? H- 2

What about safety on the haul route? What would the added traffic do in regard to bus routes for school children and for drivers on the narrow, pot-holed road? H- 3

What about the farmers who drive their machinery along the road? H- 4

What would be the increase of accidents? With the added stress to this old highway, what would be the deterioration rate and who is responsible for maintaining and repairing it? H- 5 H- 6

These questions and many others came from people in our community. We have taken our direction from them and feel that we accurately represent them. We were chosen to be

spokespersons and therefore be assured what you are hearing today voices the concerns of many, many people.

If we have been perceived as unresponsive to Meridian's invitations to talk one-on-one, it is due to the repeated advice of several persons who deal with these kinds of conflicts all the time. They say that a direct contact between citizens and big business is not always the best way to approach a problem. Thus far, we have been encouraged to use our State, County, and local people as mediators and to follow the correct procedure for the EIS studies.

One of the jobs of DSL is to judge objectively and as a third party, act as mediator between groups of concerned citizens and big business. If we have perceived Meridian as calloused, and unresponsive to us and blatantly ignoring the State Agency's request, maybe it is because of some of our past experiences. For example, the Montana Department of Highways, letter dated May 8, 1991, to Department of State Lands, instructs Meridian to identify how they are prepared to reduce conflicts with school buses. Meridian replied: "all trucks would be equipped with a school bus schedule and all of the bus routes would be posted for the drivers." They say nothing of what their drivers will do about it, or if any procedures will be enforced. In this same letter, Montana Department of Highways instructs Meridian to tarp or cover the loads and their reply was: "the washed coal will be partially blocked with air foil wind screens to prevent blowing of the small coal." Their Statements reek of total disregard for the agencies' instructions.

We have been guaranteed many times that Meridian's plans for a loadout facility will be State-of-the-art equipment and handling and they have taken care of the dust problem. Their studies showed that 90 percent of the dust generated during the test pit run was caused from truck traffic, but the major portion of the dust was generated by the stockpile itself and the way it was handled. Meridian's solution to this dust problems consists of using water spray. Since they anticipate operating 340 days of the year, how can water sprays control any dust when the temperature falls well below zero here during many months? H- 7

Not only that, but if there are four times the amount of coal loaded out over the amount we experienced before, there will be a dust problem, no mater what kind of equipment is used and how careful the machine operators are, unless that stockpile is completely enclosed. H- 8

Keep in mind also, that if a loadout is constructed and if air quality standards are ever violated during the course of operations, it would still take a minimum of 48 hours to shut the operation down. In the meantime, Huntley residents would eat dust and suffer for two days. H- 9

The number of months that Meridian claims it needs to run a loadout in order to complete a rail spur has steadily grown from 18 to 20 to 22 months. Thirty months was the time frame instantly adopted when they heard a statement made at a public meeting in July of last year, and now throughout the EIS, it lists 2-3 years. Three years to me is 36 months. H-10

It is our understanding that most mining operations have a rail spur in place before turning over any rock. Is Meridian so unsure of their market or their lack of signed contracts that they are unwilling to forego a truck-hauled loadout? It is possible that they are anticipating using the loadout for much longer than 36 months. H-11

We don't claim to know all the facts in this situation but we do feel we have valid concerns and they need to be heard.

Consider for a moment the impact this may have on our Heights merchants. If Highway 312 is so congested and unsafe to use, wouldn't many people drive on the Interstate instead and bypass the Heights altogether. This may create more business for the west end but the Heights could experience ruin to many businesses. H-12

We are not here to shut down the operations of the mine or a loadout facility. But we

do want to be assured that Meridian will do what they are required to do. And if Meridian is a company oriented toward the safety and welfare of people, as well as toward being a profitable business, they could go the extra mile in this project. If nothing else, couldn't they change their preferred site from Huntley to Acton or Broadview, a host of any other sites which they themselves have said are a feasible established site? If the people of Huntley have a choice, our town would not be the preferred site of a loadout. H-13

We are not here to take anyone's job away from them. We're not against the mine operation and we're not against the loadout, as long as it is done right. The same number of jobs will still be there, no matter where the loadout facility is located. It will still be in Yellowstone County, and this County will still receive all the benefits of the number of jobs, income, tax dollars, etc., which has been projected for our County.

In the summer of 1990 we experienced a horrible situation. This was on a minute scale compared to what is being proposed for the mine operation. For example, Meridian loaded 125,000 tons of coal through Huntley. According to statements made by Bob Morehead the Project Manager, that was moving 800 tons per hour and loading 110 train cars every 16 hours. During the mining operation, they anticipate being able to haul up to 4,400 tons of coal per day, and have stockpiling ability of up to 30,000 tons. That means a pile of fuel the size of four football fields less than 1,000 feet from many houses in Huntley. Hauling up to 4,400 tons per day, 340 days per year, 24 hours per day, means one coal truck every 8 minutes running down Highway 312 and past hundreds of residents. It means round-the-clock noise from trucks, loaders, dozers, and trains. It means dust and more pollution from the diesel fumes. It means three more trains per week running through a major road in Huntley. It means more traffic accidents and possible deaths of people. H-14

We have been asked if we would be willing to compromise if a loadout comes to Huntley. If it did, what choice would we have but to compromise? At this point, we can not compromise any more than we already have. We compromised when the temporary loadout was here, we compromised our health, our families' health, our safety and well- being and ever since we've compromised of our time spent with our families because much time is spent writing letters, talking with people, trying to do what is right. I know that none of us on this committee would be willing to sacrifice this much of time and hard work on something like this if we were not committed to standing by our principles. These are basic principles folks, the right to choose where we live, and provide a quality environment to raise our families in, the right to live our lives as we see fit as long as it does not interfere with another's rights. When a person experiences his or her rights being violated in such a manner, it is time to speak up, to step in, to stand your ground until that situation is corrected. Thank you.

Steven Erb: My name is Steve Erb. I'm representing myself, my family, my wife and my children and my community. I'm currently serving as President of the Huntley Community Club and as Chairman of the Standing Committee which was formed to address the concerns of the Huntley community and the surrounding area regarding the proposed Huntley loadout. Verbatim testimony is presented in Letter 18.

Nicol Price: I'm Nicole Price and a member of the Huntley Community and a member of the Huntley Community Club and also coordinator for Medicine Wheel Alliance. Verbatim testimony is presented in Letter 6.

Roger McGraw: I only have a couple of things I wanted to bring up. I live in Shepherd. I

know the concern on the traffic in Huntley and the problems there have been in the past, but Meridian, I know, is going to take care of the dust control and the traffic control. Like Monica said, there can be some speed limit signs put up.

The other thing is that I don't know if everybody is looking at the wages and money that this is going to generate and the unemployment that this will take care of. This is going to take care of about 300 unemployed people at a rate of about $33,000 per year, per person. That is a lot of dollars, and that is needed. True, it probably involves mostly Roundup, nearly 50 percent, but there are other people getting involved with this. The work is there. I think we ought to really think about this before we turn anything down. We need to take a good hard look at it. It's only going to be two-year program, from my understanding, in Huntley. Like it says, it is a good program.

Shirley Culbertson: I'm from Shepherd also. I did not read the document. I am speaking for some of the people of Shepherd that are very concerned about the traffic. It is really bad now. I work in Billings and going back and forth is bad enough now. My mother lives here in Huntley, and when they were doing the test run, I came down to see her and it was real dusty with coal. She told me, "I don't think I can take this much longer." She is 89 years old. Thank you.

Ellen Pfister: I'm Ellen Pfister, I ranch on the southern edge of the mine plan. I also get my mail in Billings so of necessity I use either U.S. 87 or Highway 312 to go to town for business and pleasure. Tonight I would like to talk about the public subsidy of this mine for public transportation during the first three years of mine life, and once again raise the questions of public safety on some of these roads.

On the Fattig Creek Road on the north end, which is the first mile and a half where Meridian will hit the public roads, currently PM Mine has its own mine that uses Fattig Creek Road for just a very short distance. It was unclear to me from reading the DEIS, exactly why Meridian felt it should use the public road for a mile and half as opposed to the current private road out of PM Mine when both are gravel roads. The gravel that is used on those roads over there will quickly break up under coal truck pressure. H-15

Then the next road that will subsidize the mine is the Old Divide Road from the intersection of Fattig Creek Road down to U.S. 87 for a distance of approximately five miles. Under the test pit hauling, it broke up within the first week. There is nothing in the DEIS that indicates - I guess Musselshell County will have to pay to repave that one to support the coal trucks. H-16

U.S. 87 has a new subdivision going in, Cedar Ridge North, beginning at mile marker 25 and extending south along U.S. 87 for about three miles, in some cases on both sides of the road. The lots are currently being peddled at $450/acre, they are some of the 20+ acre lots. There will be about six sections subdivided in that subdivision. It would be a great place for miners to live who work at the mine. That subdivision is also in the Shepherd school district which, if there are children who move into it, could increase the number of school buses up U.S. 87 or at least certainly the distance. H-17 H-18

There is also another subdivision being planned. In Section 35, township 5 north, range 27 east, which would exist from the east on County Line Road to U.S. 87 at mile marker 25.

Something I have wondered about is what would it cost to build a raised cross-walk over

U.S. 87 where the school cross walk crosses to Independent School. That strikes me as a very hazardous area. The condition on 312 have been amply addressed here tonight. I discovered last year that 312 is what is called an "orphan highway", that no agency will claim it. To rebuild it will cost somewhere in the vicinity of several million dollars. And I can tell you that, after having driven over 3000 round trips from our ranch to town and back in the last 20 years, 312 is a very dangerous highway when you are broken down, especially at rush hour. There are no shoulders on the road, there is no place to get your car out of the traffic. It is really pretty terrifying, as a matter of fact. H-19

The people at the State Highway Department may have counted the vehicles on 312, but I don't think they observed the traffic patterns. The traffic in the last 3 years seems to have increased substantially and I have had a number of near misses on that road, particularly with people turning left into businesses. H-20

I have attached to my testimony a list of various businesses and particularly dangerous intersections between the Yellowstone River Bridge and the intersection of U.S. 87. I total about 40 of them, which is an average of four per mile. Most of these are commercial businesses with turns on them. The drivership on 312 has a lot of very young people and a lot of older people and to throw the coal trucks in this is a very dangerous proposition.

On all of these roads, with the exception of 87 as it is being rebuilt, the public is going to subsidize at some point. If the users of 312 can get help from no one else, I would suggest going to the Legislature to seek authorization for a toll road or some form of redistribution of the Diesel Fuel Tax to at least help pay for repairs. Otherwise the public, somewhere, somehow, is going to subsidize Meridian's use of 312. I hope no one pays with his life, for then it will become a very expensive subsidy indeed. H-21

One final question--if Meridian fails to sell sufficient coal to support building the railroad, will Meridian be permitted to continue on this haul route for an indefinite period of time? The DEIS takes Meridian's plans a "fait accompli," but DSL should remember that "the best laid plans of mice and men often gow awry." When DSL deals with public funds and public safety, they should consider that a failure to make sales as planned is a real possibility. I also have some other comments from the Bull Mountain Land Owners Association. Thank you. H-22

Don Golder: My name is Don Golder. I'm a cattle rancher in Bull Mountains, also I have a ranch in the Coalstrip area. My question tonight, with a few facts and figures leading up to it, I would like to project what Meridian Minerals representative stated on the previous haul into Shepherd at 125 tons, that's 3,333 trips into Huntley.

Their cost on that was $94.12/trip. Now I'm not going to reiterate on that too much because basically what I wanted to talk about was that in the DEIS it projects 45 truck drivers on this new haul. Now I took that at 40 hours per truck, per driver, per week. That would be 1,800 man hours per week. At 1,800 man hours, if you consider that there is a two-hour round trip hauling 40 tons, with a set of doubles, that is 900 trips per week to load 3 unit trains totalling 36,000 tons. Now what this is, is their projection of the drivers equated into man hours, does equate out to 3 train loads per week. Now we realize that isn't what they want, or maybe it is - I don't know.

Nine hundred trips per week is 150 trips per day on a six day week, or 6.25 per hour. Maximum capacity at this figure would be 1,872,000 tons shipped annually. Now this triggers the railroad. I appreciate the fact that they probably don't intend to haul that much coal weekly into Huntley, but nonetheless, their projection is 45 truck drivers on a 40 hours man week, is 1,800 man hours if it is a two-hour round trip figure, that is 900 trips at 40 tons per trip. H-23

Now contracting trucks with a local firm at $72.00/hr at 1,800 hours is $129,600 weekly, or $6,739,200 annually. Now, this was a reputable contractor in this city that I got these figures from, particularly to find out the profit margin, not necessarily what you could scab this in for. H-23

Thirty-three percent of freight costs would be $2,223,936.00 annually if they went for one train load per week instead of three.

Now the issue that I would like to point forward more than anything, is the fact that you are looking at 41 miles from the mine mouth to Huntley. Now if you look at the alternate solution of 14.4 miles from the mine mouth down Rehder Coulee 10 miles on 87 into Roundup. Now what I'm trying to say is that it is 35 percent of the haul road into Huntley, which is a considerable amount difference. The freight bill per unit train would be $778,377.00 as opposed to $2,223,936.00. The question I would like to ask is the differential in cost of hauling that into Roundup per unit train as to hauling it into Huntley of $1,445,449.00 annually. How much track should that lay on the existing railroad bed from Roundup to Cushman that Meridian already owns? H-24

The exposure to public roads for coal hauling would be reduced by 75 percent if they use that 14.5 miles because only 10 miles of that is on public roads, U.S. 87. Cost of repair to the public likewise would be reduced 75 percent. Now traffic hazard exposure would decrease, I'll estimate at 90 percent, mainly because the majority of traffic hazard is on 312 between Billings and Huntley. H-25

Now if Meridian is in earnest about developing the Bull Mountain Mine, their capital expense, their permanent installations, would be the construction of a coal silo and train-loading facility at Roundup and the laying of the track west to Cushman. The way it now stands, Meridian has virtually no major capital expense to put into this. Now I can appreciate that fact that they are trying to get their feet off the ground, but nonetheless, there is that to consider. H-26

This would also eliminate the construction of 33 miles of new railroad for the mine mouth to Broadview at their projected cost of $1 million per mile which is $33 million. That seems to me to be a much larger capital outlay.

Now if Meridian Mine does prove successful for them, then they could invest in a conveyor belt of air tubing conveyor into Roundup to move their coal therefore getting the haul trucks completely off of public roads. I think that it is something that they should eventually look into. I do feel that the objective is to move that coal to Roundup, put it on the existing right-of-way, and move it on back to Cushman and get it on the road and be gone with it. Why spend all this extra money putting in a tipple here in Huntley or building 33 miles of railroad that when they are done with it in a 30-year period, there is still going to be the scar of that railroad? If they did use a conveyor, air conveyor or conveyor belt for 14 miles into Roundup, at the end of that point, it could be taken up and hardly have any scars left on the area. H-27

Esther Bengston: Esther Bengston, Senate District 49, Shepherd. I'm no stranger to this issue, as you all know. I first of all would like to thank the Huntley Community Club for being so thorough and professional in addressing this issue, but one particular issue that I would like to address is the "orphan highway". In 1988 and 1989, this was the top ity for upgrade and maintenance in Region 9 and the people of this area signed petitions, at least 500 petition signers, and sent them to the Department of Highways. Region 9's priority was rejected. We got absolutely no money. The money went somewhere else in the State. An "orphan highway" has no first nibs on any money at all. Montana state law does not allow the earmarking of gasoline tax to pay for any particular road in this State. That is determined on the basis on need. It's all put into a major, general fund and allocated out. H-28

What I'm concerned about is the commitment to accepting public input. There was public support and public input sent to the Highway Department in 1989 - nothing happened. I'm hoping that somehow this process works and that you will be listening to the people in this area. Their concerns address a lot more than is in the DEIS. There are so many vagaries in this particular mine permitting that I think we have to be serious about considering public safety and health issues. H-29

Greg Pope: My name is Greg Pope, I'm a resident of Huntley and a member of the Huntley Community Club. First of all, I would like to address a couple of issues that I feel were not addressed in the DIES: (1) What will happen to the property values in Huntley after the coal loadout is installed here? Nobody's has guaranteed us exactly how long the coal loadout will be here. If they can't maintain three billion tons per year, then the railroad will not be built until they can achieve that goal. Who is to say that they will ever reach that goal and once the coal loadout starts coming to Huntley, how long will it be? It could be 30 years or longer than that. (2) The wildlife was not addressed in the Huntley area. Evidently people don't realize that there is wildlife that uses that area. Even when the Sugar Beet loadout it going on, there is white tail deer, ring neck pheasant, morning doves as well as other wildlife. The people in town enjoy having wildlife in close proximity. H-30 H-31 H-32

I myself, the front door of my property is 724 feet from the loadout facility boundary. I feel it is safe to say that the people that are involved in the decision making process for permitting this mine, if they were in my shoes and the shoes of every other resident of this community, they would shed a different light on their decision making process.

Another thing I would like to talk about is what Roger brought up--all of these wonderful jobs. Everybody would like to have a job, great, let's put everybody to work. But it is my understanding that the vast majority of the people that are applying for these jobs come from out of State--come from West Virginia. If we are worried about unemployment in Montana, let's put Montana people to work! H-33

Gary Amestoy: I would like to say that it as part of our jurisdiction under the Montana Strip and Underground Mine and Reclamation Act and MEPA, jobs and economic development is not one of the criteria that we are able to use. While we all can appreciate the impact that jobs have on individuals, and tax dollars, that is not one of the criteria we use. With respect to your concerns about how long a loadout site would potentially be used here in Huntley, that is an issue we have discussed very seriously in-house and I know that Commissioner Casey is giving that a lot of thought. We are hearing what your concerns are with respect to the loadout.

Al Evans: I'm Al Evans, Director for Fergus Electric Co-op and a resident of the Roundup area. I'm here representing Fergus Electric Co-op's Board of Directors and wish to speak in support of the Meridian Bull Mountain Mine #1. Verbatim testimony is presented in Letter 5.

Marshall Anguiano: (hard to hear the comments - too far away from the microphone) I'm the one who lives 500 feet from the site. I definitely am not for it! It would like to see any one of you put your house where mine is and live with the dust and mess. I have a little girl now, none of this money is worth anything compared to my little girl. If she runs out in the street and something happens none of your money is worth that. That is all I have to say.

Dick Walker: My name is Dick Walker and I'm a rancher in northeast Yellowstone County

and southeast Musselshell County. Our ranch lies approximately 12 miles due east from the eastern end of the proposed mine site. I would also like to say that I have served on local school boards and served as a County Commissioner of Musselshell County and it is from these experiences that I direct my remarks.

I believe that when it comes to the environment we have all grown up and come a long ways. When I think back into the last century when the Anaconda Copper Co. raped the land and left, I think it left a bad taste in our minds and we can no longer accept that kind of activity. I think industry and the environment have to come closer and closer together. No longer can a huge conglomerate rape the land and not be responsible. However, we are living in a modern industrialized world with a standard of living next to no other country. School districts need more money, cities and counties need more money to provide services that you and I demand and where does that money come from? It comes from industry, taxpayers that own property, it comes from honest every day workers that hold down jobs. It is from this need that we have a conflict between industrialization and the environment and somewhere we have to reach a middle ground. We have to agree that no longer can we pillage the land but on the other hand we have to agree that something has to be added if we are going to achieve these services that we demand. I think the process is working. I think the EIS process here in this room is a good example of how it works. It allows you to give valuable input on impacts to your area. I think it is incumbent upon these agencies and upon the industry involved to look at these comments and to assess their impact and to make the appropriate changes. I think, when you read through the DEIS, you will see that many of the impacts have been identified and remedies put forth. Though not all these remedies are acceptable to everyone, there are some losers and some winners. That is the way it is in every day life. That is the facts of life.

One of the concerns in our area is the effect of the mine on hydrology - water. I'm 12 miles away from this mine and I too have concerns even though I'm somewhat out of range of it. I certainly can't tell those people who have land adjoining that their worries are unfounded, but they have in place monitoring and studies, on-going, that assess the previous water levels and that will conduct the cost of monitoring of the impact of the mine as it proceeds. They also have put forth some remedies, water lines, alternate water sources, to mitigate these problems. Not ideal maybe, not as good as it was, but they are mitigating factors. Nobody suggests that the solutions are perfect, but I think in most cases the solutions presented are valid.

Traffic - I know this is a vital concern for the people in this area. There have been numbers thrown out and what not. If I was living in this area, I certainly would be concerned too. If I had kids I was putting on a bus on this route, I would be concerned. But let's put this in perspective, and these are numbers that come from the Department of Transportation out of Helena. At the intersection of 312 and 87, the traffic count is 7,100 vehicles per day. Coal truck traffic would be 192 per day - 2.7 percent increase. At 312 adjacent to Huntley across the river, the vehicle count is 2,300 vehicles per day. The impact of this increase would be 8.3 percent. So I think we have to put this in perspective when we consider the many hundreds of farm trucks hauling beets during beet periods, or grain to the barley bins, or hauling silage, I think it's all relative. They are all very important vital industries that keep the wheels of this country turning, and so is the coal industry--so is the coal industry. We like to wake up in the morning and turn the light bulb on. We are in a work market also, and I think we have to keep that in mind.

As far as the direct impact to the counties - Musselshell County, the taxable valuation would be almost exactly double. This county, the oil revenues as they have been taken out and the new calculation process, the taxable valuation would be approximately double. Now this H-34

would be a considerable impact to those local governments providing those services. Revenues in Yellowstone County, I do not have figures for those, but they would be substantial. They would not be nearly as great on a percentage basis as Yellowstone County because it is a much larger county.

In summary I would say that I favor this permit providing that the regulatory agencies, the permitting agencies such as yours, be responsible and that they keep Meridian's feet to the fire until they have addressed every one of these issues and lived up to the conditions of that final EIS. Thank you.

Bill LaFebre: My name is Bill LaFebre and for the those people who don't know where I live, it is right on the corner over here. So we are talking about traffic and noise pollution and all this. I live on the corner of Nommis and Northern. Today, because of this thing, my wife counted the bull haulers - 22; I've counted them and they start at 2 o'clock in the morning when they start jacking their jake brakes and waking you up. You've got noise pollution.

You talk about your accidents, we have people in this town that drive vehicles, pickups, that tear up the streets way over the 25 MPH limit. Marshall said something about his little girl, my wife and I just adopted our two little boys, one will be three and the other will be four in the next two or three months. We live on this corner - it is Northern where they turn to go to 312. We have traffic - when the east bridge was closed, all your oversized loads went up there, and everything - there is trailer houses. There is still people that cut across 90 that are going north that don't want to go through Billings who come down Pryor Creek and head up to 87. So when you're talking about all this traffic, and I guess I'm biased because I drive truck for a living. You have professional drivers. How many times have any of you pulled out, driving your four wheeler and somebody pulls out in front of you, a farmer pulls out with his tractor or machinery and pulls out in front of you. Is that the truck driver's fault? I don't think so.

Talking about dust pollution - my mother lived about 1000 feet from the experiment mine up there. There wasn't that much dust problem. She was there - there wasn't that much dust problem, very seldom, and with the environmental thing that is going on now, they have it rectified. I think that they have the dust controlled. The environmentalists will be on this as far as the pollution problem is concerned. I just don't understand why people are so against this in this community when you have all these
other problems going on with the people right here.

Jim Pope: My name is Jim Pope. I've been a resident of the Huntley area all of my life, nearly 64 years day after tomorrow. There are several things - I just got back into the country, I've been gone all summer and I've only had this draft copy for just a few days, so I haven't been able digest all that is in this thing.

My name is mentioned in this twice and I want clarification in the final EIS on this. It is stated that I was the President of the Huntley Community Club when in fact I was the Vice President. This was in Chapter 3, Page III-44 under Recreation. Under Chapter 4, Page 4-51, also in Recreation, it is stated that "due to the existing traffic load on Heath Street, most of the Huntley residents do not use it as a recreation route." This was from a personal communication with me by a telephone call by somebody from Tetra Tech, I believe it was, from Helena. The street that I was referring to in that conversation was the Highway (old Highway 10 - Northern Street) leading out of town, northeast to 312. This is a narrow section of road and that is where your traffic is. He threw in Heath Street on this! I thought this was kind of peculiar that

H-35

H-36

somebody would make a phone call from Helena and want to make a judgment on that phone call. Why didn't he come down here to the area and address the issue here rather than make a phone call to somebody that didn't have a map in front of them for one thing, and want pertinent information that you could put in an EIS, for gosh sakes!

There are a few other things that I did find in this statement. It's stated in there that some of the figures that were used for the air pollution, dust problem, and so forth, that went on here in town, would lead you to believe that there were monitors here. There may have been monitors up at the mine, but I fought tooth and nail to get monitors down here while this was going on - there is a gentleman that can attest to that sitting in the front row there - they didn't have it available. They didn't need to make it available because it was strictly a temporary thing. Now here we're talking about another temporary loadout until such time as they can get a permanent installation made. Is it going to be the same thing then? You state that you have three meters situated around this proposed facility. Now, it doesn't address who is going to do the reading of these meters, who is going to record the readings - we need to know that here. If it is going be left up to Meridian, we just as well forget the darn thing as far as I'm concerned!

H-37

H-38

Comment (no name given): I think that this is a good point that he made - that we have a third party involved in some of these situations. A good example in Musselshell County, the Lower Musselshell County Conservation District applied to the Coal Board and received a grant to do some independent studying and monitoring so that they could mitigate this issue between the landowner and Meridian, so we weren't looking at biased points of view totally. So I think it is a very good point.

H-39

Ella Dugan-Laemmle: I've been a resident of Huntley since I was 5. One of the reasons I chose to stay here, my husband and I, is because it is a quiet little community, I know everybody here, and I'm also a new member of the Huntley Community Crisis with all this going on. To start out my statement - I'm completely opposed to the coal dumping here in Huntley. I'm triple licensed: I have three licenses in the State of Montana, two licenses are national. I'm a licensed Professional Counselor, a Certified Rehab Counselor and a Certified Chemical Dependency Counselor. I will address what this will do to the mental health of the Huntley Project community.

First license: LPC - the mental health. I'm going to read some diagnosis of what this could do adults and children. Post Traumatic Stress Disorder, Dysphonia, Major Depression, Recurrent Minor Depression. Children - conduct disorders, attention span disorder, educational barriers, avoidant personality disorders, passive/aggressive personality disorder, adjustment disorder with anxious and depressed mood, anxiety disorders, organic anxiety syndrome, organic personality syndrome, delusional disorder, dream anxiety disorder, sleep terror disorder, somatization disorder, sleeping disorder, insomnia disorder. Those diagnosis in layman's terms will costs Meridian billions of dollars! Meridian will be liable for the mental health of every adult child from 312 to Huntley Project, all of Huntley Project, Pompeys Pillar, Huntley, Ballantine, Warden, all of it. I'm not counting in Pryor Creek Golf Course and all the people that go to that which are not locals. I'm not counting in Homesteader Days with all the people that come to Homesteader Days. I'm not counting in Lewis & Clark - there is a land mark right where Roundup road comes into 312. It is a national monument landmark for tourism to go down 312 to come see the monument. I'm not counting any of those people that this will affect.

Children will have nightmares, cannot go out in the streets and play because they might get ran over by how many coal truck per day? Parents are going to have nightmares about the

H-40

children getting ranned over. It is going to play on each other continually. Or their pets getting ran over.

Farmers - they say that there is going to be room for your beets in the beet dump -good luck! With a pile of coal that big, how are you going to get your beets to the dump? With the traffic that is going to be in and out of there, with the coal and with your beets, out of the four months of the year, the congestion of trying to get in and out of there is going to be unbearable.

H-41

The pollution from the coal onto your beets - what kind of stress is that going to create for you? Will you have to drive your beets to Billings? How long with the coal be there? They say for 30 months. As some of the testimony has said tonight, the months keep going up.

H-42

There is going to be mental health stress due to the traffic. There is going to be increased depression to people. The noise level is mental health. It is not safe to go to the park. From the corner of the coal dump to the corner of the park is 750 feet, that is our recreational spot where the children play, where people come from Billings to picnic in that park. What is that going to do to our mental health when there is noise level and traffic?

H-43

What happens when people get depressed? They start to drink, they abuse their children. The cases of child abuse will double. There is going to be loss of jobs because people can't sleep and you're going to have to pay for retraining. There is going to be continuous fighting of family, of friends. The increased alcohol and drug rate - consumption due to the stress and depression.

The church - how far is the church from the coal dump? Maybe a 1,000 feet? Our little community church where we go and pray to our God. That is going to be wonderful in the midst of the coal trucks running back and forth.

H-44

I want to give you some numbers. I took the privilege of contacting our lady postal service here in Huntley and I'll give you some numbers of how many people this will affect. This is the only mental health, I haven't even got to the medical or the CD portion yet.

On RR 3, which is 312 there are 700 families.	700
Huntley there is 260 on the rural route.	260
172 in box numbers	172
Shepherd there is 600 on the rural route and	600
200 on boxes.	200
Warden there is 500 rural and box together	500
Pompeys Pillar there is 100	100
Ballantine there is 200	200
That gives me a Total -	2,732

If every family averaged three children per family (2,732 x 3 = 8,196) That give me a total of 8,196.

You take the mental health of a child from the time they are born, because of the child abuse, because of the depression of the parents, because of the drug and alcohol, because of the stress of the pollution. You take a child from pre-verbal to adulthood. We are averaging 70 years. You times that by 70 years which comes to 573,720. Now times that by what I charge per hour (70/hour) times 52 weeks in the year is 3640. That comes to a grand total of $2,888,344,800.00. And we are only talking about mental health. We haven't even addressed the CD or the medical.

(8,196 x 70 = 573,720 X 70 X 52 = $2,888,344.00)

There is going to be depression due to the ranchers having to travel back and forth. The water usage in Huntley - on Page 18 of your book it says that Huntley needs another water tank. Who

H-45

is going to pay for that? The taxpayers?

On Page 9 - you said that Huntley is ideal because of flat land. Why isn't Broadview or Acton ideal? It is right in town in Huntley, and in Broadview, the proposal would have been out of town.

H-46

Page 20-24 is Wildlife - you never addressed it for Huntley. That effects our mental health. We like the fish, Yellowstone River, the eagles nesting, foxes, mountain lions, deer and birds. Never addressed for Huntley. What is that going to do to our mental health?

H-47

Roadways - The stress that that is going to do. The old road being ripped apart - who is going to pay for that? Taxpayers!

Page 28 you said that currently there is 10 percent of heavy vehicle traffic. My question is what is going to be the increase in the percentage of traffic after the coal trucks go 24 hours per day on Highway 312 with 192 trips per 214 hours estimated?

H-48

Page 29 it says that the accident history on Highway 312 is 1.78 severity which is over 1/53 normal severity. So in other words the wrecks on the old road are more severe. With more traffic at 192 trips per coal, what is the severity and the number of accidents going to be? What is that going to do to the mental health of the community?

H-49

With the increased traffic and increased noise levels constantly going, it is going to affect the mental health of everybody - Rural Route 3, Huntley, Shepherd, Warden, Pompeys Pillar and Ballantine. It is going to deteriorate the mental health. There is going to be medical claims due to hearing problems.

H-50

There is no fire protection in Huntley. With that big of a coal dump, what is that going to do to your mental health? Living here in Huntley, thinking that that baby could go on fire at any moment and there is no way to put it out.

H-51

What is going to be the social well-being of people's mental health with coal dust noise, safety of children, highway deterioration, and intrusion of the coal dumping?

H-52

On Page 43 it says that there is currently sugar beet trucks that use the dump and they are not nearly the capacity or the number that the coal trucks are going to be. And they are not physically damaging roadways.

On Page 44 - The park is 750 feet from the dumping site. That is a 6-acre park. What is that going to do to the mental health of children and adults that use that park.

Page 47 - The definition of an industrial area. I don't know where you got the elevator and the beet dump as an industrial area.

Page 48 - Visual Resources. What is that going to do to the mental health of people having to see the coal dump for four years or more?

Page 2 - Regional weather and local winds. You can not use Billings to estimate Huntley winds. The weather differentiates between here and Billings 10 degrees or more and so does the wind.

H-53

Pollution and ecological views of the Yellowstone, Pryor Creek and irrigation. What is that going to do to our mental health having to worry about that and everything else I have just said?

At $2,888,344,800.00 is that worth the mental health of those people?

My next issue is my other license, CRC - Certified Rehab Counselor. A lot of people have made their concerns about the medical issue of the coal dumping. I have not heard any specifics on what coal dumping can do to your medical health. I work with people that are disabled due to all sorts of things - accidents and medical well being. OK? There are three causes of death in the U.S. (1) heart, (2) cancer, and (3) stroke.

Cargingens(sp) of cancer is coal dust. How many people are going to have cancer due to the dumping site? How much money is that going to cost everybody? Cancer is described as an unusual and rapid and uncontrollable growth of abnormal cells. One in four persons in their lifetime gets cancer. With the use of cargingens(sp) such as coal dust, that increases. Cigarette smokers and people work around asbestos and coal dust are at risk of developing lung cancer. (Page 206) H-54 H-55

Page 208 - Hypertension - High blood pressure also known as hypertension occurs commonly in middle age and elderly men and women. It is the leading cause of stroke. It can cause damage to the heart, brain, kidney and arteries. It increases the risk of heart attack, congestive heart failure and kidney failure. Hypertension is caused due to stress.

Page 212 - Pulmonary disorders. Bronchial asthma. Bronchial asthma is characterized by slow rapid breathing, cough and shortness of breath. Ideology and diagnosis - causal agents can be infection or allergic reaction to some environmental agent such as air pollution. Treatment and prognosis - Oxygen and antibiotics may be given or allergy shots. How much is that going to cost the citizen?

Emphysema - Emphysema is the destruction of the walls of the lungs. At first small black holes appears. As the disease progresses, the holes become larger and tear the membranes. This interferes with the normal exchange of carbon dioxide and oxygen. Breathing becomes labored and impaired. The lungs try to compensate to the decrease in viable lung tissue by enlarging. This forces the chest cavity to increase in size giving persons who have advanced emphysema a barrel chest appearance. What they do for emphysema is bed rest.

Let me tell you what bed rest does to a person. Disability consequence of bed rest. Page 55. It destroys the joints and connective tissues. The moving parts of the body, joints, ligaments, tendons and the related muscles and skin all have a normal range of motion which is necessary for proper performance of physical tasks. Any decrease in the normal range of motion is called "contracture." Contracture of muscles, tendons, joints and skin are among the commonest complications of bed rest. Atrophy which allows disuse of muscles. Bones - the rate of calcium removal begins to recede the rate of deposition and within three days there are miserable increases in the urinary losses of calcium. The bones soften and weaken - osteoporosis - and even ordinary forces such as those encountered during wheelchair transfers, physical therapy or minor falls may cause fractures. Urinary Tract - inactivity increases the urinary calcium load which may be three or four times normal within three weeks after the onset of complete bed rest. Heart - The heart is a muscle and it undergoes disuse atrophy like any other muscle when a patient remains inactive. Being weaker, it can pump less blood per contraction, so it must pump more rapidly to move the same amount of blood per minute. Circulation - a common and potentially lethal complication of bed rest is the clotting of blood in the deep veins of the lower limbs and lower abdomen. It affects every organ in your body - bed rest does.

You get bed rest due to emphysema. Emphysema is caused by coal dust.

It affects your pulmonary system. Gives you chronic bronchitis. Physical disabilities - they will liable to have every person that comes down with this to repair them. The medical costs, the retraining to have them into other jobs. A person can become completely disabled due to that coal dust. So we just increased $2 billion to whatever you can put a life on. I don't know what that answer is. I sure wouldn't want to pay for it. People are so concerned with gaining profit of big business. Is a big business worth that many lives? No, I don't think so.

The physical ailments that would cause - we still have car wrecks with school buses being wrecked and all those people being disabled and Meridian being liable for every one of them. H-56

My next license is Certified Chemical Dependency Counselor - When people get depressed, they increase their alcohol consumption or drug use. If you want a reference you can look at my DSM IIIR, Page 83 - 111. Residential treatment for 30 days is $1500. When a person is chemical dependent, you can not just go to residential treatment, come out and be cured. You are going to be going for out-patient therapy treatment for at least two years. At $70/hour every week. When a person is CD, they are depressed. When a person is depressed, they're chemical dependent. When a person is disabled, they're depressed and the chances of them becoming CD, have just went through the roof. Meridian is going to be liable. We've just outcassted that $2 billion and we are up into $50 billion. If you can put a price tag on people's lives, which I can't. H-57

All of these in your book here say there will be no long term impact, Huh! Everything I just discussed is long term impact, it is a lifetime for everyone of these people. I haven't addressed the Pryor Creek Golf Course, I haven't addressed the people that come to Homesteader Days, I haven't addressed the tourism to go to Pompeys Pillar rock.

I am opposed to having the coal dump here in Huntley without a question because I don't think it is worth that many lives and nobody's profit share is going to surpass that number that I gave you in black and white. You can put it somewhere else where it is not going to affect so many lives. Broadview wants it, put it there. $33 million to put a railroad line. We've already gotten to $2 billion just on the mental health issue. That's not counting the physical or the CD. And I will have it all in writing, believe me!

Nicol Price: With the Huntley Community Club. Listening to some of the things that were being said here tonight. I do have two more comments. In talking about the park. The park land is owned by Burlington Northern. The park has been maintained by the Community of Huntley for a number of years. One of the things that will be taking place on the site the rail cars will be loaded on will come half way into that park when they are being loaded. So you will have children from within here to the rail road track in a Park where they play. The impacts to a child when one of those cars moves, or thinking that it is not moving and they do, we could see a child really seriously injured. H-58

The other comment I would like to make is on the transportation issues. I think that a truck that holds 40 tons of coal is a whole lot different than a car. I think that the problems of stopping on icy roads, blowing snow into cars when the snow is on the roads, or a whole lot different than when you pass a car. I have been on the interstate when trucks pass you and many times you are totally blinded. Our 312 does handle an immense amount of elderly people going into Billings and they have always used old number 10 and they still do. I think that is one of the issues that really needs to be addressed here. The fact that when the trucks come into the beet dump they come off the interstate, they come down Northern Avenue, and they whip in, get their beets, and they're back on the interstate. They don't go on to 312. We do get a lot of trucks coming off the highway in through Pryor Creek that come up here and use 87 for the simple reason that they have not been able to use the bridge at the Lockwood Interchange. That may change in the future, they have two good lanes on the bridge now and so whether they are allowing trucks on I don't know. We have been dealing with the big wide trucks coming through this community, they take 312, which then puts more big truck traffic on the little road over here to go by. You also have an immense amount of people who drive the road who are not cautious. They are in a hurry to go someplace. They all act like they should have been 10 minutes ago. So the chances of a truck taking off - the gentleman from Roundup that was here talking - the intersection at Roundup when the transportation people were here - that is a bad corner. For H-59 H-60 H-61

one thing it slants wrong. The trucks are going to have to come this way and curve and then totally make a u-turn bend to come back onto 312. They can't just come into that intersection straight. So they are going to be destroying the buffer zone that is part of that. So when you get children on a school bus coming off, or walking on that road, because there isn't any place. You have parents who deliver their children to the Independent School in the morning and the evening, you will have a lot of traffic building up on that corner. You have trucks coming down there when it is icy, sliding into that intersection with a lot of cars that do travel it. The thing is that there are no stop signs - there is a stop sign but there is no - when people are coming this way, they have to stop and wait for these guys to pull out. So you could back up traffic coming off of 87 a whole big way. Waiting for the traffic coming out of Billings to come on to 312 to come through. I think that is an issue that has not been addressed in this draft because it is going to make a difference. There are no lights there. And so when you start having to have a truck with it pulling out onto a road that has a lot of heavy traffic, there isn't places for them to pull out. So whether it's only an 8 percent - something different in the total numbers of what's taking place here - you are putting huge trucks on a road, not cars - and there is a difference there. H-62 H-63

Jim Cunningham: I was curious, I have a lot of friends that live in Shepherd and they drive right past my house and then hit the Interstate in Billings where the construction is. I don't understand - that road from Shepherd to Billings through K Mart is already so jam packed it is unbelievable, it is already dangerous, it is already overrun, and these people are driving miles out of their way to go back to Huntley to hit the interstate to drive the other way. How can anybody even think of adding on to this thing semis or any kind of access to that road? It is unbelievable to me because these people live and drive it day in and day out, and they will not drive through the Heights and drive through Shepherd road because it is too dangerous. There are too many cars and too much traffic, and they drive through Roundup. They drive by my house to go to the interstate and then go into town. H-64

Kim Mueller: My husband and I have lived here for over 14 years. I think the best thing that we can do is the people that are sitting here listening to what your friends and neighbors have said - go home and call your friends and neighbors! Tell them what happened here tonight! Let them know that one morning that they could wake up and there would be coal trucks coming and coming and coming! And a mountain of coal in our back yard! Is there an address that people can address their comments to? Or an address they can write to? H-65

Darla Day: I would like to address the transportation issue on Highway 312. That road is not suitable for heavy industrial traffic. There are no pull-offs. We have a rural route on that road and she serves mail boxes and I don't know how many people have had close encounters with this lady, but it is very critical that we have pull offs on that road, not only for her but for anybody who does have car trouble. H-66

Also, it is my understanding that there will be no road maintenance? There will be no road improvement of that highway? H-67

Also, fire protection in Huntley. It is my understanding that we are now defunct so we depend on Warden for fire protection. H-68

Employment. Fifty jobs and that is just hauling back and forth from here to Roundup and maybe 12 jobs at the loadout? Out of State? I don't think - to me this does not really address the benefits for Huntley residents. I think we need to look at that. H-69

Dave Swyhart: I live south of Huntley, so the dust doesn't bother me, but I do go up to the Roundup area to get wood sometimes. My address is not to the farm trucks and the elderly people that drive up that road, because they will drive 40 MPH. I happen to hear the comments of that gentlemen that said he was professional truck driver and they are professionals. Well I want to address the three pretty close calls that I've seen with professional drivers of those heavy trucks. They were all trying to pass, one on a double solid line with oncoming traffic on it. I had to almost come to a complete stop one time. So you can't say a professional driver is always going to be courteous, so you kind of have to watch that sometimes to. Especially when a truck encounters a pickup with 30-40 bales of hay on it traveling 25-30 miles an hour up there. He's getting paid by the hour, he's not going to sit behind that pickup for ten miles waiting for a way to get around him. He's going to make his time and get along. I think that ought to be a very serious consideration on that because there are a lot of elderly people in this area which I happen to be one of them. I'm a senior citizen, I do not drive 30-40 mph, but I have seen a lot of them that will be driving up that road 30-40 mph because they are elderly. They do not have exceptionally good eyesight and so forth, they are going to be driving fast and that ought to be a consideration. It should be really looked into. It is something - there are farmers and elderly people that should be considered. H-70

Question: (Gentleman did not identify himself.) Have you ever driven from Billings to K Mart to the Huntley/Shepherd area? Have you every driven that road during rush hour morning or evening? There is a lot of traffic up there! H-71

Ella Dugan-Laemmle - Question: I was wondering why mental health care, medical and CD was never taken into consideration in that document? H-72

Bonnie Lovelace: Under MEPA we are required to address socioeconomic issues and those have been historically and typically been defined in the issues we cover. Mental health issues, medical issues other than medical services, have typically not been addressed under MEPA. We quite simply followed the standard. Done by professionals who typically do address those kinds of things. Again, it is not typically done in an environmental document.

Ella Dugan-Laemmle - Question: Why?

Bonnie Lovelace: I can't address that. I don't know why. The list of items to be covered under MEPA simply states socioeconomics. I will simply say that for many years maybe we should have been addressing those things, we typically have not. It is something that I will have to go to our attorneys and say "should we be", we never have. That doesn't mean that's right. You are more than welcome to discuss it with your legislator and have it added to the Montana Environmental Policy Act. H-73

Gary Amestoy: Thanked every one for coming and adjourned the meeting at 9:45 p.m.

Billings, Montana
9/23/92

Gary Amestoy, Administrator Reclamation Division of Department of State Lands, opened the meeting at 7:30 p.m. (See Huntley meeting opening.)

Monica Lindeen: Last night I spoke as a representative for the Huntley Community Club and other concerned residents of the community. I'm not going to repeat the same statement that I did last night. Tonight I'm speaking in two separate capacities: (1) as an elected official for the Huntley Water District and (2) as a concerned citizen of Huntley who will be extremely affected by the proposed loadout. Verbatim testimony is presented in Letter 14.

M.D. Brewer: I'm M.D. Brewer from Roundup, County Commissioner. I would like to read my statement here. Verbatim testimony is presented in Letter 12.

David Shuler: I'm Dave Shuler, General Manager of Fergus Electric Co-op and a resident of the Roundup area. Ladies and gentlemen, Al Evans spoke to this last night. For the people that weren't there, I would like to have our position known. Verbatim testimony is presented in Letter 5.

Don Picchioni: My name is Don Picchioni, I'm President of the Musselshell County Development Corporation. I have a letter from the District Superintendent of Roundup Public Schools that I would like to read into the record. It is addressed to Mike DaSilva. (Verbatim letter is presented in Letter 11.)

I wanted to read this letter because I felt it was a written in a very clear, concise, factual manner. His statement, his letter, and a lot of the comments made last night dramatize the difference between rational vs. emotional thinking. The DEIS and the DSL were characterized last night as being vague and shallow by an emotional opposition. Well, I too am biased. I've got very strong opinions on this process and I feel the mine should be permitted. But when I read the draft EIS, I felt that it was overly critical and over emphasized in insignificant matters. So this means the DSL catches hell on both sides. Maybe this means that since they are playing a middle, rational approach to this problem, maybe they're more in the right.

Some of the concerns brought up last night were very valid concerns, but I feel they emphasize the need for flexibility on both sides. The need for all of us to work together to solve these problems. If we do put our heads together we can come up with decent solutions. An example of that is Highway 312. I didn't realize until last night that it was considered an orphan highway. It was stated that there were no funds for the rebuilding of this highway. I guess I find that hard to believe. It seems like maybe there is a need for a creative approach here. In fact, possibly, an impact grant from the coal board might even be obtained to fix this road. But that is only going to happen if coal is hauled over that road. So it might even be a benefit to that area - the coal hauling. Solutions are always available if we are willing to sit down and discuss them rationally.

The Musselshell County Development Corporation has been and continues to be very

strong supporters of the Bull Mountains Coal Project and feel that this Draft EIS emphasis and Alternative #1 is the only fair consideration.

Nicol Price: My name is Nicol Price. I'm a resident of Huntley and part of the Huntley Community Club. I spoke last night and my statements will be different tonight. Verbatim testimony is presented in Letter 10.

One thing that was not addressed last night in the air quality - when we had our previous meetings, we had been told that the air quality people would only give the Huntley loadout a permit for 18 months. What do you plan to do with the rest? B- 1

John Scott: I'm John Scott from Ballantine. I've been involved at several public meetings concerning this loadout site back in the days of the scoping for the EIS. And I really have to question the credibility of some of the providers of data. The reason I say that--in one case, referring to the time span that the proposed loadout site at Huntley would be used, we have been told everything from 18 months to 30 months. It seems like whenever we nail down a time period, it is always changed. It was made 30 months after the Yellowstone County Air Quality said that there would be a permit given for 30 months and then they jumped on the 30-month period. B- 2

Another incident that I'm thinking of here is that I had a meeting approximately January 25, with Bob Oschner to discuss some of the problems that the people of Huntley might have with this proposed loadout site. The people were worried about the continuous hauling through their community until the time that the mine reached a 3-million ton contract per year and at that time they would be justified to build a railroad. I was guaranteed by Bob that no coal would be hauled until the three million tons were contracted because it was not feasible to truck it. According to the DEIS this is not the case now. B- 3

Another thing through the scoping that we were told, and during the test loadout, we were told that they could not use water to control their dust on their coal pile. They did on one weekend because it was so bad they couldn't even avoid it. They told us that they could not use water and the reasons was that it created moisture in the coal and that it cost them several thousand dollars to put the sprinklers on it for week end. This is dry coal and to take the coal and dry it in Roundup and bring it to Huntley and put sprinklers on it doesn't make very good sense, but within the DEIS that is how they are going to control their dust is with water again. So I question whether they will even worry about controlling the dust. B- 4

Now I'm going to skip to the question of jobs. I know everyone in the State of Montana wants jobs, and according to the DEIS, 222 jobs will come from Billings, 21 from rural Yellowstone County, 38.95 from Roundup, 18 from Musselshell County. Within the figures in the DEIS they are saying - I have no idea where they got those figures - but using the Montana 1990 census and data from the HRVC, the number of people qualifying for public assistance from these jobs will be 99.9 from Billings, 9.45 from Yellowstone County, 17.5 from Roundup, 8.1 from Musselshell County. These are people who will qualify for welfare going on the figures that are in the DEIS. Montana Employment Service, at this time, says that there is approximately 1,500 people that have put in applications to work at the Meridian Minerals Bull Mountain Mine, of that approximately 400 are in-State people, and near 1,000 are out-of-State people. The biggest percentage of people applying are from West Virginia. Thank you.

Ellen Pfister: My name is Ellen Pfister and I ranch on the south side of the Bulls, adjacent to

the south side of the proposed Bull Mountain Mine No. 1. In reference to Mr. Scott's remarks about out-of-State people applying for these jobs, I talked to a fellow in West Virginia today and he assured me that they could fill the needs for certified miners in that mine 10 times over with fellows from West Virginia.

Anyway, to get to other portions of the EIS - reading this EIS I feel sort of like Casandra. The subsidence predictions in it are, I think, supported fairly thinly. I don't think the prediction with respect to the water correspond with actual encounters with regard to springs particularly at higher elevations. I have studied the mitigation plan quite thoroughly. If subsidence occurs as they predict it to occur under their scenario, the mitigation plan may work. If subsidence occurs with spring loss at higher elevations and springs resurfacing at lower elevations down the hills, their mitigation plan is out of luck. I think that perhaps there should be two mitigation plans on this scenario. I checked the references, the bibliographies cited in the back of the EIS, and I believe there were a total of six - two of them were in-house publications that are apparently the primary reference and predictors, the others were a couple of studies that I recall do not deal particularly with water but more with predicting subsidence, and the others were methods of prediction. One of them is an english handbook that I understand is the basis for predicting subsidence, but it's 17 years old now. There have been on-going studies on subsidence prediction, particularly in hilly terrain and I think that this is an area where this EIS is particularly weak. By my calculations within the life of the mine, there is approximately 30 linear miles of very steeply dissected terrain that will behave differently than subsidence in level areas. The subsidence will be steeper, there will be more of it collected at the bottom of the hill. There doesn't seem to be any discussion in the EIS of how one would reclaim these hills if they are denuded of vegetation due to subsidence and erosion. B- 5 B- 6

There is a well mentioned in the EIS, Well No. 6270-03. I was unable to find an exact location for it. The spring that they propose to use to mitigate is approximately 2 miles north of a well that we drilled on the north side of Section 5, Township 5 North, Range 27 East. It is almost on a direct north/south line. The prediction concerning that well are that if they pump it at 14-gallons per minute steadily, that it will lower water 5-12 feet within a two-mile radius of that well. I'm concerned for our well. It is a fairly new well, it is a solar well, it's 285 feet and is capable of pumping 11 gallons per minute, however we are not stressing it to that point. The elevations are pretty close with the base of our well and the floor of the coal seam on the other side of the hill. B- 7

I think it would be useful to put the locations of these kinds of wells in the EIS document. B- 8

Another thing that struck me in reading it was the classification of all waters in that mine area as Class Two. Just checking the TDS levels there were 14 springs in your document that classified as Class One waters, the other elements that they listed for drinking water classification were not given in the EIS and I haven't seen those, so I don't know, but I think that it would also be useful information to provide would be the chemical composition. B- 9

As far as the visual effects, there is an old saying that "what the eye don't see, the heart don't grieve," and that is sort of the impact of the mine plan on the terrain and the people who live around it.

One of the things that I noticed was a ranking of the springs on importance to the ranchers. At least 50 percent of the ranchers in that area were not interviewed. I would be curious to know how you ranked them, because looking at the people who assembled that EIS I didn't see anybody that I would classify as having the expertise to do that for the given operations. B-10

There is another thing with this water. Classification on the springs - ranking a high volume spring as a higher value spring as say a consistent producer of a gallon per minute. From my personal point of view, I would rather have a spring that would produce a gallon spring fairly consistently, particularly through the months of July, August and September, than a spring that produced 30 gallons in April and nothing in August. Springs that are the consistent producers in hot weather conditions are the one that are drawing their water from the weathered and fractured bedrock, the base production rather than the flash production due to localized precipitation. That is the mostly valuable water production that we have, both for us and for the livestock. B-11

There are many other things that I could comment on tonight, but I won't take your time, but I will submit extensive written comments. Thank you.

Don Golder: I'm Don Golder, I also ranch in the Bull Hills and in the Coalstrip area. So basically coal mining is no stranger to me. Last night I addressed an alternate solution to hauling the coal from the mine to Huntley. Tonight I would like to approach an alternate solution for the subsidence of the long wall mine in the Bull Hills. (See Letter 32.)

I have mined, which I know is completely out of the question - the term they use is backstowing or backfilling, and though it is economically not feasible. If you consider what could take place if they could eliminate the subsidence by backfilling, which eliminated up to a minimum of 10-15 percent, which in turn might alleviate the problem of the surface water and particularly the perched water aquifers above this mine. Now if you consider the fact that if Meridian is willing to put forth and replace these waters - I have an instance that is in your EIS and it is what they call a "water guzzler" - and in particular what they are talking about here is an area to entrap water into a pond, into a storage tank, and through floatball system send it into a pond - and then particularly what they are talking about here is for wildlife. It has no consideration for livestock. The design of it would negate the use of it for livestock because it is designed completely improperly. B-12 B-13

In the EIS they have blueprint of this particular system and if everything is drawn to scale, what they have for a storage tank is a tank that would hold 216 gallons of water. A 5,000 gallon apron is equipped to collect an inch of rain - 4,364 gallons of water. Now, where in the world are they going to put that in a 216 gallon tank storage? Why do they even bother?

The cost of the 1,000 gallon fiberglass tank, if they would choose to do it, would cost them $2,500 minimum. Now, you're looking at an astronomical cost to produce a little bit of water, and what they are producing is basically for the game. I wonder what they want to do for the livestock? B-14

We produced a spring that produced a gallon per minute, and what they are saying in the EIS is that one of these "guzzlers" is equivalent to our gallon-a-minute spring. A gallon-per-minute spring will produce 525,000 gallons of water annually. A "guzzler" will produce, figuring that you have a 14" annual rainfall, this "guzzler" will produce 43,000 gallons of water. I know these figures are kind of hard to reach out around, but the fact remains that a spring is there, the spring is always there, and if it is produced right it will continue to be there. In this particular spring we have produced this spring for $1,000, if you sent that water down through cracked aquifers and subsidence, is Meridian going to be able to replace that water? I don't think so! I don't think there is a way they can! B-15

Now if Meridian is serious about the water, possibly backstowing would be an alternate solution - really I think it would. Maybe they ought to consider the cost factor of both of them. If not, I don't think 1/2 million bond would cover the cost of livestock water in the Bull B-16

Mountains. I think it is something that really should be considered.

Cal Cumin: My name is Cal Cumin speaking on behalf of the Montana Tradeport Authority here in Billings. We support the proposed Bull Mountain Mine, we are in general consensus with the socioeconomic impact findings in the EIS. We do feel, however, that the employment of upwards of 300 people in a basic industry in a rural area of Montana, merits more than what you call "minor impact" in Table 4-5. The same can be said for your summary statement on Page IV, that under Alternative 2, there would be only "negligible to moderate impacts." The non-creation of approximately ___ primary industry jobs in rural Musselshell and Yellowstone counties, when the opportunity therefore exists within the environmental constraints, needs to be considered a "major negative impact." Thank you. B-17

Doug Richardson: 2116 Virginia Lane, Billings, Montana. Verbatim testimony is presented in Letter 37.

Kim Mueller: My name is Kim Mueller and my husband is over there. We have lived in Huntley for 14 years. I don't know how many - you guys were at the hearing last night and you know the Park that is situated across the street adjacent to the stockpile. Did you know that a quiet park with playground equipment, picnic tables, a basketball court, horseshoe pits and mature trees, is located within 1,000 feet of the proposed coal loadout in Huntley? This park is enjoyed by townspeople and folk from Billings. Many times while spending time at the park with our three-year old son, I have visited with travelers from another State which stopped to each lunch, relax, watch their children play and run.

As stated in the DEIS, Chapter 4, Page 52, the Agency concludes that impacts to outdoor recreational opportunities in the Huntley area from operation of the Huntley loadout would be "minor over the short term and negligible over the long term." I believe the Agency came to this conclusion under the assumption that the sugar beet stockpile, near the proposed loadout site, operates on a year around basis. It does not! Dust and noise generated by this agricultural-based activity occurs for a maximum of four months. I feel the conclusion of the impact to the outdoor recreational opportunities should be changed to read "major to significant over the short and long term," depending upon how soon they can get that rail spur built. B-18 B-19

The other thing I wanted to talk about was - as stated in Chapter 4, Page 36, of the DEIS, the agency concludes that the "impact to traffic flow and public safety along the public highways from mining related traffic would be moderate with the potential to become significant during the two to three years that the Huntley loadout is in operation." I feel this conclusion should weigh heavily on the decision-making process. Do no allow the loadout in Huntley. Thank you.

Meeting adjourned at 8:30 p.m.

Sally Armstrong: I'm Sally Armstrong, Mayor of the City of Roundup. I have this letter that I will read and then turn over to you. Verbatim testimony is presented in Letter 28.

Ken Sanner: I'm Ken Sanner. I'm from Roundup and I'm also a businessman. I have some things I would like to point out for myself. First off as a resident of Roundup of Montana, it's going to affect me greatly not having the coal here in Roundup; (1) I heat my home which is one of the best heats and cheap heat there is around, and without it my personal income would greatly sacrifice itself by going to a different fuel; and (2) I also have a business which is a coal delivery business in Roundup, Montana, which greatly supplies the whole town of Roundup and business people. Without the coal here I wouldn't have a job; and (3) I also work at the coal mine, myself, as an underground coal miner. That greatly affects me because I think the job we do out there is well maintained, its safety first, and you also look out for the ecology, you are looking out for things. I tell you, nothing is going to slip by - nothing. The people who work out there are interested because we live here. We do not go some place else and work, we work here and we are worried about what things are going to happen out there at the coal mine. We aren't going to let things slip away like everybody thinks they are. We're greatly influenced by EPA and we are watching out ourselves. We are watch dogs just like everybody else. And I don't think any other community can say that. We are deeply interested in what is going on out at the mine. So - it's locally run and locally employed. I think we are going to watch out for ourselves. We are not going to get carried away with hurting the environment. I greatly support our coal mine here and I wish everybody else would too. I hope the State of Montana will back us up because we need all the help we can get here in Roundup, Montana.

Paul Smith: I'm Sheriff of Musselshell County. I would like to address the impacts to Law Enforcement agencies that will occur because of the Bull Mountain Coal Mine Project. Verbatim testimony is presented in Letter 27.

Kelly Gebhardt: Musselshell County Commissioner. I have a letter here I would like to read and then give to you. Verbatim testimony is presented in Letter 26.

Pete Tully: My name is Pete Tully. I am here representing myself as a rancher in the Bull Mountains and Northern Plains Resource Council and its local affiliate the Bull Mountains Landowners Association. Verbatim testimony is presented in Letter 25.

Sue Olson: Commissioner Casey, Hearings Officer Amestoy, Miss Lovelace and Mr. DaSilva, I'm Sue Olson, County Commissioner of Musselshell County and a rancher in the Fattig Creek drainage near the Meridian Mineral Bull Mountain Mine No. 1. I would like to make my comments in the capacity of a rancher in the area of the mine project.

The hydrology of the mine area has been of great concern to me. My livestock water springs are within 1/2 mile of the mine project perimeter. There are no wells in this area for livestock watering so maintenance of the stream flow is vital. R- 2

I feel another vital link in mitigation process has been added with a grant from the Montana Coal Board to the lower Musselshell Soil Conservation Service. This grant provides a neutral third party to monitor water and wells outside the mine permit area. With this monitoring in place, the trust fund and bonding by Meridian, the plans for replacement of the water you've lost, examples of horizontal drilling, mitigation of any water problems will be successful.

Roundup, Montana
9/24/92

Gary Amestoy, Administrator Reclamation Division of Department of State Lands, opened the meeting at 7:30 p.m. (See Huntley meeting opening.)

Jay Erdie: I'll address this letter to Mr. Mike DaSilva. My name is Jay Erdie. I'm the District Superintendent of Roundup Schools. Verbatim testimony is presented in Letter 29.

Mark Clark: I'm a resident of 299 Old Divide Road and my bedroom sits about 100 feet off the roadway. So I will be pretty well affected by this being as there are 300 employees going by and 192 trucks every day. I'm just concerned mostly about safety on the highway especially on the Old Divide Road. Mostly, I'm concerned as to whether or not the road is going to be repaired or in any way changed. The reason I ask this is because I intend to make other improvements on my property and if the road is to be moved, I would like to know. Is there any way I can get an answer to this? R- 1

Gary Amestoy: As I said earlier, this is not a question and answer type session, but I would suggest that you - there are representatives from Meridian, Mr. Ted Hanks and Mr. Bob Oschner, and they could answer those types of questions.

Mark Clark: I support this project. The whole country needs more economic growth but I feel it should be done properly.

Robert Clark: Good evening. I'm Robert Clark and a Representative from House District 31 for this area here and it is already a matter of record that I am strongly in favor of this project for various reasons. I understand that there are some people that will be inconvenienced, the people from Huntley that are concerned about this and will see some inconvenience for a couple of years. I guess I have to sympathize with them and I hope they will bear with it and help us get this thing going because we do need it in this area. This economic situation here is poor and has been poor for many, many years and this is something that will definitely give us a boost here.

The road situation, I think I can help answer that. The Old Divide Road with the amount of extra traffic that will be on there, I'm sure that there is no question that there will have to be a lot of work done on that, it appears that over the next couple of years with that heavy truck traffic. As far as the safety goes, that is the only area where there will be a real traffic safety problem with the new road between Billings and Roundup. The tax situation here, I think that the $20 million plus for the schools over that period of time is only one thing that we can consider here. When it comes to the total impact that this mine is going to have on the situation for improving the surrounding area, I think that we are going to see a lot of benefit from this mine, pure and simple.

I would like to compliment the people from the Department of State Lands for putting together a good EIS. I think they did a super job. Thank you.

On Page 4-58 of the Visual Resources/Aesthetics it is stated that visual contrast of the waste disposal area constitutes an irretrievable commitment of the visual resources and aesthetics. There is a very short area of travel along Fattig Creek Road where the waste disposal area is visible to the public. If a few well placed pine trees were planted to replace the burned ones along the County road, this area would not be visible to the public. This would mitigate the visual contrast and not be an irretrievable commitment of the visual resources. R- 3

The 35-day comment period is sufficient. This process has been on-going for the last four years and anyone interested in the project has been aware that the Draft EIS was to be presented to the public in August. To extend the comment period for 25 more days could be construed as a delay tactic and would serve no worthwhile purpose.

A comment on a comment on the Huntley Project Hearing - I grew up on the north side of the tracks at No. 3 when the mine was running, there was a huge slack pile, a train siding, a large dump and later trucks dumping slack into coal cars. I can name seven people still living in this area who are over 80 years old and have lived near the slack pile for over 50 years. They are as healthy as people in their 80's can be and most still live by themselves in their homes and have not suffered from lung cancer caused by the blowing coal dust or been mentally disturbed by the noise and problems caused by the mine when is was working. I feel the statements made regarding mental and physical health were greatly exaggerated.

I would suggest that, if the permit were granted to Meridian, in future years, if changes are requested, adjacent landowners and interested parties be notified. I urge approval of Alternative #1. R- 4

Sanford Haugsdal: I'm Sanford Haugsdal, Road Superintendent for Musselshell County. I'm offering the following comments concerning the draft EIS for the Meridian Minerals Co. Bull Mountain Mine No. 1, dated August 1992.

In general, I agree with the Agency's conclusion about impacts to the County roads in the life of the mine in related areas. Two minor typos are obvious in the first paragraph on Page III-25, "Goulding" Creek, and "Bailey" Road. The final paragraph on Page III-35 should be modified in the interest of accuracy. It should read "for fiscal year 1992 Musselshell County levied 18.158 mills to raise $93,340.00 for the operation and maintenance of County roads. That amount combined with $114,800 of local government severance tax from oil and gas, at $131,330 of non-tax revenue, provide a total for Fiscal Year 1992 Road Fund Budget of $339,470.00." R- 5 R- 6

On Page IV-36 it is stated that the Agency concludes that impact to traffic flow and public safety along public highway from mining-related traffic would be "moderate with potential to become a significant impact should be negotiable." Perhaps the last sentence of the above conclusions could be changed to put things more in perspective. Example: "Impacts should be negligible over the other 40 plus or minus years concluded in our definition of short-term and over the long term." R- 7

It is interesting to speculate what the actual difference exists in traffic flow impacts. Road maintenance requirements and public safety considerations, etc., between two to three years of legally loaded coal truck hauling at a rate of 192 trips per day and other extraordinary heavy truck hauling that continues to occur in our region such as 100 plus logging trucks trips per day on County roads and highways for three to five months per year or until all the Bull Mountain timber resources are exhausted. Forty-plus grain truck trips per day through harvest periods, 50-plus livestock trips per day during fall and spring, 100 truck trips associated with every highway construction project over the past five years. R- 8

Thank you for the opportunity to provide comments about this DEIS. I encourage

adoption of Alternative #1 without any excessive stipulations. A significant amount of tax revenue that this project can provide to the road fund would be greatly helped.

Larry Lekse: My name is Larry Lekse. I'm President of the Musselshell Valley Chamber of Commerce. I have a letter here for Mr. Mike DaSilva that I'll read. Verbatim testimony is presented in Letter 24

Hershel Robbins: I here representing myself, I'm Hershel Robbins. I'm a past County Commissioner and State Representative from Roundup. Verbatim testimony is presented in Letter 23.

Jeanne Charter: I'm Jeanne Charter. I'm testifying on behalf of myself and my husband. We flipped for it and I won. Verbatim testimony is presented in Letter 22.

Larry Deschemaeker: I'm Larry Deschemaeker, Board President for Fergus Electric Co-op. I'm here representing Fergus Electric Co-op's Board of Directors and wish to speak in support of the Meridian Bull Mountain Mine No. 1. Verbatim testimony is presented in Letter 5

Corky McKown: As a resident who lives at the corner of PM Mine and Old Divide Road which is up Fattig Creek. We feel that the impact statement was very inadequate on the dust control problems for the immediate residents there. We feel it should be addressed on how the trucks are going to be running every 15 minutes - is that correct? It can be stated then also on how often that road will be watered to control the dust or paved. If the test pit was any indication on how it was going to be controlled, it wasn't done very well. Once they would water it down, the grader would come by and grade it and then you couldn't go outside. R-9

Water is also a concern for the residents, not just me but other residents around there on the truck traffic route. So I would like it if the final impact statement take a little more concern with the immediate direct dust impacts for health problems because you can not stay outside with double 10 trucks running. So that is a very main concern of mine.

Don Golder: I'm Don Golder. Livestock rancher in the Bull Hills. The last two nights - in Huntley the issue of coal hauling into Roundup. So I would like to reiterate that tonight for the benefit of the Roundup people. First of all I would like to read to you from a document analyzing a temporary loadout facility, dated January 31, 1992 with review team of the Robert Oschner, Mike Duval and Ann Fossy, entitled "Draft Bull Mountain Mine No. 1." - I'll have to turn this in. Thank you. (Refer to Letter 31.)

John Simic: My name is John Simic and it looks like I'm going to be the closest neighbor to the mine once it is open. My house is located right between Fattig Creek Road and PM Road. Basically I'm in favor of the mine and everything that comes with it, but I have a very deep concern about myself too because I'm sandwiched between those dirt roads and if it is any indication of what it is going to be like when the mine opens, I'm telling you, when the test was operating it was completely unlivable for me there because of dust. All I would like to say is let's be good neighbors so I can live there too. We would appreciate the control, or pavement, or water. This is basically what I have to say. R-10

Bruce Hoiland: My name is Bruce Hoiland. I'm a businessman, a taxpayer and a past little

league coach in Roundup. Verbatim testimony is presented in Letter 21.

Gary Thomas: My name is Gary Thomas. I'm Commissioner of Public Works for the City of Roundup. On the section on public water supplies the draft EIS states the water supply and pumping capability and storage capacity of Roundup Municipal Water System are adequate for the present population. According to a water system engineering report for the City of Roundup dated March 1980, the supply pumping distribution and reservoir capacities are sufficient for a population of 3,400 people. The 1990 census puts our population at 1806. Therefore our water system is not only adequate for the present population but also adequate for any increases of population projected by the EIS. R-11

In the Draft EIS it states that if the mine becomes a reality, the benefits of increased tax revenues are "minor and beneficial." The draft also states that, if there is no mine, the impacts of lost benefits are "moderate to major." Another section states that direct tax revenues from the proposed mine and related facilities should average $9 million per year in 1989 alone. That's $270 million over the life-of-mine. So if we get the $9 million per year throughout the State, it is a "minor" benefit, but if we don't get the revenue, it's a "moderate to major" loss. To me these two sections appear to contradict themselves. I believe the conclusion to the section on impacts to Public Sector Fiscal Conditions in Chapter 4 should be changed to "major and beneficial." R-12

I read the entire DEIS and, with the mitigation measures that are planned, I think Meridian's proposal should be approved without unreasonable conditions and let's get on with the project.

Monty Sealey: My name is Monty Sealey and I'm a citizen of Roundup. I promised my wife I would not get up here an make any comments tonight because everybody wants to go home. But I got a call this afternoon from a representative of the Yellowstone County Commissioners and they send their apologies up the staff of DSL that they could not be here in attendance tonight. They have mailed comments to you but for the benefits of the public here tonight, I'll read the comments.

> We have reviewed the DEIS for Meridian Minerals Company Bull Mountains Mine No. 1 and we are in general consensus with the socioeconomic impact.
>
> However, we feel that the employment of people in a rural primary industry such as the Meridian Mine needs to be more appreciated. Your EIS merely refers to it as a "minor impact" in Table 4-5, having only negligible to moderate impact. The employment of upwards of 300 people in a basic industry of Montana merits more consideration. Please consider this in your final EIS. Thank you. R-13

One other point from my standpoint, believe me you have written comments coming.

T.J. Mueller: I'm from Huntley. I have a question on the permit for Meridian. That will be issued for five years? R-14

Gary Amestoy: By law any permit that we issue is a five-year renewable permit but it is not automatically renewable.

T.J. Mueller: Will the temporary loadout in Huntley is supposedly for two years, is that right?

Gary Amestoy: The document ranges somewhere between 24-36 months.

T.J. Mueller: If Huntley is selected for the loadout, is it possible that it could be used for the full five years or beyond that?

Gary Amestoy: We have had a considerable number of comments regarding just that question, and right now that is not the plan - the plan is for no more than 24-36 months and that includes construction, reclamation, and everything.

T.J. Muller: But could it be used for that amount of time?

Gary Amestoy: I can't answer that right now, because we don't have an answer. Maybe Mr. Casey could shed more light on that. But that isn't what we are evaluating, any more than that.

T.J. Mueller: Then I would like to see the railroad put back into Roundup and have the loadout closer to the mine. I think that would be more beneficial for everybody. R-15

There is a difference between choosing to live next to a pile coal and being forced to live next to it.

Steve Erb: My name is Steve Erb and I'm also from Huntley. I represent the Huntley Community Club. I'm not going to speak on behalf of the Yellowstone Valley Co-op but I am employed there and am a member of the Co-op. I do appreciate your listening to our concerns in Huntley. On the way up here tonight I found three more things in the document that I would like to relay to you.

Chapter IV-45. The estimates of increased maintenance and operations, the cost of the two highways was made available by the Montana Department of Transportation and the document forwarded to the Montana Department of State Lands, dated 12/23/91. R-16

Chapter III-25. We would like to see highway 12 mentioned as a hauling route because no Federal aid is any longer available. Also in July of 1993 Reconstruction Trust Fund monies will also terminate unless State Legislature reinstates the Reconstruction Trust Fund. R-17

Chapter III, Section 5, which is also in the letter that the Department of Transportation sent to DSL, there are 10 different listings for school bus interaction with coal trucks. I believe there are some major contradictions in the information from the DEIS and what was in that letter. R-18

If you would allow me to, I won't take a lot of time, but I would like to express my personal interest as a resident of Huntley to the residents of Roundup. We are not opposed to the development of this mine. We are very, very concerned about what the loadout is going to do to our community. What the increased truck traffic to do Highway 312 and Heath Street. Like I say, I'm a journey lineman and I make a good wage and I know what it means to have a good job, especially a good job with benefits. We have voiced many, many concerns. Some may have been minor concerns and some were major. We felt they were all valid. The Huntley Community Club consists of mostly younger people, 35 years old or less. We aren't professional speakers. We aren't Legislators. We aren't attorneys. We're just young people concerned about our community. I've got a real good suggestion for you. If you want jobs in Roundup Montana, I suggest you take the 24 jobs that they are asking for the loadout in Huntley and move them

right up here. You've heard a comment made on putting a conveyor belt system and the loadout right here in Roundup. That's 24 more jobs waiting for you in Huntley. I would encourage you to do that. I'm really surprised - the problem with this system and the way it is set right now is that all that has been submitted to State Lands for consideration is the development of this mine and the 4-year mine plan and the Huntley site is the loadout. Boy, if we were in a situation where we needed some more jobs, I think I would have gone to Meridian and asked them to proposed the loadout for Roundup.

I know this is off what you wanted us to say, but I know there have been some bones of contention about it. We have not tried to hold up the project or anything else. We've just asked what we feel are legitimate concerns, and we've had a chance to voice them, and we want to thank State Lands for providing us that opportunity. It is a complicated process and, believe me, we've spent 2-1/2 years trying to follow it and who we needed to talk to and what we needed to address. Thank you very much.

Lavonne Rook: I'm Lavonne Rook and I work for Musselshell County Human Services. I keep hearing everybody saying about how they feel that this report says quite enough about the impact as far as financial. I've worked for the Human Services in Roundup since January 1988, five years. My caseload has probably doubled - you don't think we need jobs here. We really do! It is going to be a big impact if the mine goes through. I have people coming in every day that I ask why are you coming to Roundup, Montana, and they say: "We heard a mine is going in and we want jobs." Whether they go to work or not, I don't know, but it's going to be a very big impact if this coal mine goes through. Thank you. R-19

Darrel Brewer: I'm Darrel Brewer, Chairman of the Musselshell County Commissioners. I gave my statement in Billings last night so you don't have to listen to it tonight. I would just like to thank all the people from our community and surrounding area for showing up at when we need you and also thank the State Lands Department for a job well done. Thank you.

Meeting adjourned at 9:00 p.m.

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4. RESPONSES TO COMMENTS

2-1 It was beyond the scope of the EIS to determine how many new employees would be moving to the area to work in the health services field or how many spouses of these workers would be willing to work in an underground coal mine. The number of workers projected to move to the Roundup area was based on the expected number of workers to be hired locally, the proximity of the community to the mine, and the amount of services available in each area.

3-1 See Chapter V, Section B. Public Participation, for discussion of public meetings that were held in Huntley. The Huntley Community Club sponsored 3 public meetings in Huntley, attended by 82, 53, and 58 people, respectively. Montana DSL personnel were also in attendance at these meetings. In addition, Montana DSL sent brochures to all addresses in the Huntley area describing the proposed Project and inviting public participation. Concerns expressed during these meetings, and as a result of the mailing, were included in the scope of the EIS analysis, where appropriate.

4-1 The comment period for the draft EIS was 35 days, 5 days longer than the rules require. An extension of the comment period would have caused undue delay in production of the final EIS.

4-2 The specifics of the land use agreement would be unknown until the agreement was negotiated. Meridian has applied for easements to use State parcels. The decision to grant a land use agreement cannot be made until after publication of the final EIS.

4-3 See Chapter III, Section K., Capacity and Accident History. Traffic accident increases were based on information provided by the Montana Department of Transportation. Use of the conditional tense, (e.g. could), is made throughout the EIS because there isn't certainty that the mine would be permitted. There is also no certainty that additional accidents would occur. The coal hauling trucks will only increase overall truck traffic about 10 percent. See Chapter IV, Section 9., impact topic a. There is no evidence that trucks hauling coal are more dangerous to school buses than other commercial trucks.

4-4 See revised text, Chapter III, Section J., Ambulance Services, for discussion of Worden Ambulance Service and Shepherd Quick Response Unit.

4-5 See response to comment 4-1.

4-6 See response to comment 4-1.

5-1 Economic conditions due to secondary employment and income were addressed in the socioeconomic section of the EIS.

6-1 The only tax benefits available to Huntley would be from taxes received by Yellowstone County and expended in Huntley. See Chapter IV, Section 11., impact topic g., for discussion of impacts from the operation of the proposed loadout in Huntley. The Agency concludes that

impacts to social well-being in the area would be moderate over the short term. Impacts from the Huntley loadout would last no longer than 3 years; from construction, 24 consecutive months of operation, and reclamation.

6-2 The draft EIS acknowledges that the community of Huntley would experience temporary noise impacts during the 3 years that the loadout is constructed, used, and reclaimed. See new permit conditions in Chapter II, Section 1. Alternative 1.: Alternative of the Applicant's Proposal, With Conditions.

6-3 Comment noted and acknowledged. Thank you.

6-4 These figures are an estimate of how sound from a typical operation could attenuate at the stated distance from the source. Operations using different equipment emit differing mean noise levels with varying effects. Acoustical attenuation factors affecting noise levels include, but are not limited to: topography, physical, barriers, absorptive or reflective properties of intervening surfaces, and other ambient environmental factors. Any interruption of sound would create an "acoustic shadow zone" resulting in reduction of noise levels. Since there would be different equipment and machinery used at the mine site and the physical environment at the mine site is different, it would be difficult to accurately compare the level of noise attenuation over distance at the two locations.

6-5 Chapter III, Section 2. Existing Noise Environment, does not attempt to predict rail traffic noise by extrapolating from highway traffic noise. Noise studies cannot be conducted without the proposed activity being present. Noise levels must therefore be approximated.

6-6 See response to comment 6-4.

6-7 Chapter IV, Section A. Assumptions for Alternative 1, defines short- and long-term impacts. See new permit conditions in Chapter II, Section 1. Alternative 1.: Alternative of the Applicant's Proposal, With Conditions.

6-8 Montana DSL looked at a number of alternative sites. The Huntley site is a commercial/industrial site. Many of the other sites would require disturbance of undisturbed land. None of the other alternative sites is environmentally superior to the Huntley site. See revised text, Chapter II, Section B. Other Alternatives Considered.

6-9 See response to comment 6-8.

6-10 See response to comment 6-8.

6-11 Wind data from the nearest National Weather Service station are often used for air quality analyses such as dispersion modeling. Multiple years of data are available and are provided in a format compatible with the computer analyses which are done. As a condition of the Yellowstone County air quality permit, on-site wind monitoring would be required during the operational life of the Huntley facility.

6-12 The town well and Strand well are both in excess of 1,000 feet from the loadout well and closer to the Yellowstone River by the same distance. Both wells are significantly deeper than the loadout well. Since the town and Strand wells are neither in locations nor installed in a manner conducive to monitoring drawdowns, potential impacts have been based on aquifer material characteristics instead.

6-13 These noise impacts are addressed in Chapter IV, Section 10., impact topic d. The Huntley loadout would be constructed, operated for 2 years, and subsequently reclaimed.

6-14 The general impacts to roads in the Huntley area are discussed in Chapter IV, Section 9. Northern Avenue would be included in those more general discussions. See Chapter II, Section 1., new Condition 7.

6-15 Quality-of-life telephone surveys were conducted by Economic Consultants Northwest (1991) with 160 Huntley residents concerning their perceptions of social conditions in their respective area. Systematic sampling techniques were used to select a sample. The interviewer did not ask the respondent's name; therefore, no list of contacts is available. On-site, unstructured interviews also were conducted in 1991 with Huntley residents.

See Chapter III, Section J., Social Well-being, for discussion on results of the survey. Ninety percent of the Huntley residents were not surveyed; rather, 92 percent of the respondents (i.e., 160 interviewed persons) indicated that they were aware that coal was hauled to the loadout facility.

6-16 This comment is beyond the scope of the EIS. Ownership considerations are not issues for analysis in the EIS.

7-1 Musselshell County would have the responsibility of maintaining this road in a usable condition. See Letter 12.

7-2 See response to comment 7-1.

7-3 See response to comment 7-1.

7-4 The PM mine would cease to exist if the Project were built. The PM mine road would be closed to accommodate the rail car loading facility at the mine.

7-5 See response to comment 7-1. The physical and revenue impacts associated with Old Divide Road are recognized in the text in Chapter IV in sections on transportation and fiscal impacts. See Letter 12.

7-6 Road maintenance is the responsibility of Musselshell County.

7-7 Noted and acknowledged. Thank you.

7-8 Noted and acknowledged. It is acknowledged that residential development could occur along Highway 87, however the density and timeframe of this development is unknown.

7-9 The cost of a 10-foot wide crosswalk built to current standards is roughly estimated at $175,000. Remainder of comment is noted and acknowledged.

7-10 Noted and acknowledged. Thank you.

7-11 The estimated cost of replacing Highway 312, the expected revenues generated by the Project and accruing to Musselshell County for increased County costs including road maintenance, and the increased safety hazard on Highway 312 are all discussed in the text. See Chapter VI, Section 11., impact topic b.; Section 9., impact topic a.; and Letter 57.

7-12 Noted and acknowledged. Thank you.

7-13 This comment is beyond the scope of the EIS and outside the scope of analysis under MEPA. Business decisions about contractor arrangements would be made by Meridian.

7-14 Under Montana law, liability for injury or death attaches to a party whose negligence or intentional conduct caused the injury. The State has waived sovereign immunity for its negligent acts up to certain monetary limits.

7-15 Montana DSL would allow Meridian to operate the Huntley loadout for 24 consecutive months. However, in the future, Meridian could request an extension of this timeframe. In responding to such a request, Montana DSL would have to provide another opportunity for public review and input as part of an impact assessment for the continuation of hauling coal to, and loading it out at, Huntley.

8-1 Comment, assumptions, and calculations noted. See response to comment 6-8.

9-1 Expected impacts on total employment and income in the total study area would be less than 1 percent. Impacts on fiscal conditions for the total study area are also expected to be minor and beneficial; however, impacts to fiscal conditions of the individual local governments of Musselshell County and associated school districts would, of course, be moderate to major and beneficial. Similarly, the loss of potential jobs refers to impacts on the entire study area, not necessarily Roundup or Musselshell County. The text of the EIS has been revised to reflect impacts on local areas rather than the total study area.

10-1 Analysis of alternate mine plans included a number of factors including specific consideration of geotechnical characteristics of the overburden and existing fracture patterns, longwall mining methods versus room-and-pillar mining, different orientations of longwall panels and different locations of mains for access, construction, and ventilation. Consideration of location of specific features such as overlying springs and stream channels, and the need for controlled subsidence, was combined with the best coal recovery scenario to arrive at the planned mine. Support facilities and mine face-up facilities require certain terrain and stability, not found in alternate

locations. The existing PM underground mine provides face-up and support facilities which can be incorporated without new disturbance in a different location. Some mine development requirements are inflexible, such as location of mains to provide adequate ventilation, equipment haulage, and material handling systems.

10-2 This EIS has been prepared in accordance with MEPA.

10-3 See response to comment 10-1. The preferred alternative is not required to be identified in a draft EIS. Please see revised text Chapter II, Section 1.

10-4 Appropriate mitigation measures are included in Appendix A and in Chapter II, Section 1., new conditions.

10-5 See response to comment 6-8.

10-6 Quality-of-life telephone surveys were conducted by Economic Consultants Northwest (1991) with 160 Huntley residents concerning their perceptions of social conditions in their respective area. Seventy-two percent of the respondents described the local economy as either growing or stable, while 28 percent described the economy as depressed.

Those interviewed in the social survey did not identify specific segments of the population, such as the elderly, as being disproportionately stressed or otherwise affected differently from the population as a whole. The Project, such as the loadout facility, could cause stress and anxiety in some segments of the population opposed to the Project or who would be affected by increased noise, dust, and traffic.

10-7 "Cultural modifications" refer to any alteration in the viewshed due to human activity, including structures, roads, and signs. The remainder of the comment is noted.

10-8 Impacts to public sector fiscal conditions include all government expenditures and revenues. The impact of increased highway maintenance expenditures would be mitigated by a doubling of the present County maintenance budget.

10-9 This EIS analyzes the mine plan and its mitigation plan. As a result of the draft EIS review process, additional conditions have been added to the approval of Alternative 1. All major revisions to an existing permit require public notice, complete technical analysis, and MEPA compliance. Changes to the mine plan and its incorporated mitigation plan are beyond the scope of analysis for the EIS. See responses to comments 6-8 and 10-1.

11-1 Noted and acknowledged. Thank you.

12-1 Noted and acknowledged. Thank you.

13-1 See response to 6-8.

13-2 See Chapter II, Section 1., new condition 7. See Letter 57. Any licensed vehicle in compliance with traffic and road limit laws has the right to travel on State roadways. Remainder of comment noted. See Appendix A, Section E., Coal Transportation, for discussion of trailer protection. Trucks would be required to have tarps over the coal. See Chapter 11, Section 1., New Conditions.

13-3 Concurrence with Department of Highways recommendation noted.

14-1 See response to comment 6-12.

14-2 The effect of the loadout well on the District's proposed well could not be assessed until the site selection and depth of the new well were formalized. However, if the new well were located in the vicinity and at the depth of the existing water supply well, no adverse effects would be predicted as a result of pumping the loadout well.

14-3 See response to comment 6-8.

14-4 See revised text, Chapter II, Section 1., new Condition 7.

14-5 See responses to comments 10-1 and 61-1.

14-6 See response to comment 10-1.

14-7 See responses to comments 6-8 and 10-1.

14-8 See response to comment 7-14.

18-1 See response to comment 14-3.

18-2 See responses to comments 6-8 and 10-1.

18-3 See response to comment 6-11.

18-4 The results of the social survey were used to describe existing conditions and project potential impacts. The results of the survey are available from Montana DSL.

18-5 See Letter 57 from the Montana Department of Transportation.

21-1 See response to comment 9-1.

22-1 See revised text, Chapter III, Section E., Ground Water Resources, for discussion of spring ranking and importance to ranchers. Noted and acknowledged. Thank you.

22-2 See response to comment 22-1.

22-3 These resources have not been documented and the locations may be outside of the life-of-mine area.

22-4 Impacts to water resources cannot be accurately predicted either as to severity or location at this time. Meridian has committed to mitigate impacts that do occur. Detailed mitigation plans are included in the permit application package and include quick response actions to impacts. Significant sources are identified in Table E-8.

22-5 See text, Chapter IV, Section 3., impact topic a., for discussion of impacts to steep slopes and natural processes.

22-6 Montana DSL protects the public interest by establishing bonds in the amount sufficient to accomplish mitigation and reclamation. Pursuant to ARM 26.4.404(3), Montana DSL must give public notice of a determination that an application is acceptable. The final permit terms and terms of the bond and trust fund would be available at that time. This rule gives the public the right to file written objections or request an informal conference, or both.

24-1 The assumption was based on the number of workers available in Musselshell County and Yellowstone County. The figures used were not quotas and Meridian certainly could hire more workers from the Roundup area than was forecasted in the EIS. See response to comment 9-1.

24-2 Local hire ratios were presented in the assumptions at the beginning of Chapter IV. In addition, methodology and the basis for assumptions will be on file at, and available from, the Montana DSL.

24-3 The informal survey by non-EIS preparers referred to in the comment is not an acceptable basis for projecting economic impacts in the EIS.

24-4 Comment noted. See response to comment 9-1.

24-5 Noted and acknowledged. Thank you.

25-1 See response to comment 22-6.

25-2 See response to 22-4. See revised Table III-3, Chapter III.

25-3 See responses to comments 22-5 and 22-6.

25-4 See response to comment 10-1.

25-5 See response to comment 10-1.

25-6 The rules require public notice and opportunity to comment for major revisions to plans within existing permits. All application materials are available for public review at the Montana DSL offices listed in Chapter 1. For public notice and comment procedures, see response to comment

22-6.

27-1 Noted and acknowledged. Thank you.

28-1 See response to comment 9-1.

29-1 General fund revenues used in the EIS include funds from all sources.

31-1 See response to comment 6-8.

32-1 See Chapter IV, Section 6., impact topic a., for discussion of potential subsidence impacts.

32-2 Mining-induced fracturing would occur before backfilling could be completed. Changes in the surrounding rock mass would exist with or without backfilling and therefore, backfilling would not be expected to reduce potential hydrologic impacts.

32-3 Referenced drawings are not to scale. Guzzler systems are designed primarily to serve wildlife. See Appendix A, Section F., Hydrologic Mitigation, for discussion of guzzlers.

32-4 See response to comment 32-3. Calculations noted.

33-1 Comment noted. See Appendix A, Section A., Main Facilities Buildings, for discussion of emergency facilities.

34-1 Within the original rail corridor, a Tetra Tech, Inc. survey identified 12 prehistoric and 22 historic sites. One locality had both a prehistoric and historic component so the total number of sites was reported by Tetra Tech, Inc. as 33. All 12 prehistoric sites and 15 of the 22 historic sites (27 sites in all), were recommended as potentially eligible for the National Register of Historic Places (NRHP).

Just under 20 miles of rail corridor realignment were later surveyed by Metcalf Associates (Pool 1991). These realignments left 25 of the 33 total sites identified by Tetra Tech, Inc. within the revised corridor (direct impact area), 20 of them potentially eligible. This left 8 sites, 7 of which were deemed potentially eligible, outside of the new corridor.

In addition, the Pool survey identified 7 new sites (2 historic and 5 prehistoric) within the revised corridor, 5 of which were recommended as NRHP eligible. This brought the total number of sites within the corridor to 32, with 25 of these sites recommended as potentially eligible for the NRHP.

34-2 The survey corridor for the railway was about 150 meters wide, not 150 feet. Local variances in right-of-way width were due to construction considerations (e.g., a wider corridor in rough terrain to accommodate cut-and-fill work).

With regards to adequacy of the survey width for the rail corridor, the standard employed for

conventional prehistoric and historic resources was based on potential for direct impacts due to construction or operation. The same standard has been applied to coal-mining projects in Montana, in consultation with the State Historic Preservation Office (SHPO). The SHPO now suggests that a permit applicant consult with their office prior to undertaking a cultural resource project to determine the adequacy of an audio-visual impact survey corridor.

With respect to traditional Native American resources, the archeological surveys carried out by both Tetra Tech, Inc. and Metcalf Associates were not intended to define traditional or sacred sites, except as incidental to the primary purpose. Evaluation of traditional Native American resources is being done as part of the Native American consultation process, currently being carried out by Ethnoscience of Billings, Montana. This consultation is not restricted to the physical limits of the proposed rail corridor.

34-3 Consultation with Native American groups with concerns about the Project area, per the provisions of both the National Historic Preservation Act and the American Indian Religious Freedom Act, was initiated by Tetra Tech, Inc. and is currently underway by Ethnoscience of Billings, Montana. Members of some Native American groups have visited the Project area and have expressed some concern over particular sites believed to be of a sacred or spiritual nature.

The final report on traditional Native American consultation is now being prepared by Ethnoscience. The nature of, expected impacts to, and potential mitigation treatments of traditional sites and values would be addressed after completion of the final report (see Chapter II, Section 1., conditions 1, 2, and 3).

34-4 The proposed mine area has been the subject of extensive correspondence between Montana DSL and the SHPO. Montana DSL requested site eligibility review by the SHPO in the spring of 1992, and has subsequently forwarded its formal recommendations regarding site eligibility and potential mitigation to the SHPO. No response has been received as of this writing.

The 2 cultural resource surveys carried out on the mine area identified a total of 5 sites which were deemed potentially eligible for the NRHP, 4 of which lie within an area of known direct impact. These were recommended for further testing to resolve eligibility. After testing in 1992, the 4 sites have been recommended as ineligible. This would, assuming SHPO concurrence, complete the Section 106 requirements for the area of active disturbance.

As noted in the text, there is a potential for indirect impacts to undiscovered sites due to subsidence-induced slope failures in steep-slope areas. These failures are extremely difficult to predict with accuracy. Meridian would be required to upgrade all areas with greater than 25 percent slope to the Class III inventory level as mining progressed. Sites thus identified would be evaluated and mitigated in advance of mining, both in consultation with the SHPO. The inventory requirement may be modified by Montana DSL, based on actual observed ground behavior.

The 230+ site figure was extrapolated from site density recorded for the 690-acre Class III inventory. Since slope failure impacts would be limited to the steeper hillsides, Montana DSL

believes that the potential impact to archeological sites would be significantly less, and limited primarily to pictograph panels and rock shelter sites. The procedures outlined in the preceding paragraph are designed to survey, identify, and evaluate such impacts in advance, per the provisions of 36CFR800.

36-1 See response to comment 9-1.

38-1 See Appendix A, Section 3., Coal Transportation, and response to comment R-9.

38-2 See Chapter IV, Section 6., impact topic c., for discussion of ground water impacts.

38-3 Noted and acknowledged. Thank you.

38-4 In Chapter IV, Section 10. impact topic a., it is noted that during construction, noise levels would range from about 60 to 51 dBA at 1,000 and 4,500 feet, respectively. During operation, noise levels are estimated at 40 dBA at 4,500 feet from the mine site. These noise levels are not commensurate with living next to a highway. Please refer to Table III-5.

38-5 Noted and acknowledged. Thank you.

38-6 Noted and acknowledged. Thank you.

38-7 Impacts to property values are not the type of socioeconomic impacts that have been required to be evaluated in EISs. In Northern Cheyenne Tribe v. Hodel, the court listed the socioeconomic factors that must be considered as:

". . . social disruption caused by increased numbers of miners, their families, and others who will provide services, the increased demand for schools, housing, water and sewer services, and the increased strain on local governments."

38-8 Impacts to property values are not the type of socioeconomic impacts that have been required to be evaluated in EISs. Montana DSL has no authority to determine the amount of decrease in property values and require the applicant to make payments to property owners. In Northern Cheyenne Tribe v. Hodel, the court listed the socioeconomic factors that must be considered as:

". . . social disruption caused by increased numbers of miners, their families, and others who will provide services, the increased demand for schools, housing, water and sewer services, and the increased strain on local governments."

39-1 See response to comment 4-1.

39-2 See Chapter V, Section B., Public Participation, for discussion on public meetings in Huntley.

39-3 Noted and acknowledged. Thank you.

39-4 See response to comment 4-1.

39-5 This EIS has been prepared in accordance with the Montana Environmental Policy Act (MEPA). See responses to comments 6-8 and 10-1.

40-1 Inspection reports maintained by the Montana Department of Health and Environmental Sciences (DHES), Water Quality Bureau, were reviewed, and condition and capacity of the Huntley water supply system were discussed with appropriate DHES staff. This was cited in Chapter III, Section J., Public Water Supply, Wastewater Treatment, and Solid Waste.

40-2 See responses to comments 6-12 and 14-2.

40-3 If the same streets are involved in the construction project and the coal-hauling route, impacts discussed in Chapter IV, Section 9., impact topic a., would be amplified.

40-4 Noted and acknowledged. Thank you.

40-5 Comment noted. See response to comment 4-1.

41-1 See revised text in Chapters II and IV appropriate to comment 41-3. Remainder of comment acknowledged.

41-2 See response to comment 41-1.

41-3 See response to comment 41-1.

42-1 The data reported are from a baseline air monitoring program done by Chrome Corporation of America at a site located about 4 miles east-northeast of Huntley in 1989-90. These were considered the most representative data available for Huntley. It is correct that no air monitoring was done at the loadout site or in the immediate Huntley community.

42-2 The 12-ton per year emission estimate is calculated using factors developed by EPA to estimate the potential emissions of an air pollution source. It is not related to baseline air quality monitoring. In order for Prevention of Significant Deterioration (PSD) regulations to apply, estimated emissions would have to be 250 tons per year.

42-3 There is some difference of opinion as to the severity of air quality conditions related to the 1990 operations at the loadout site. In any event, the air quality permit process is designed to prevent the type of situation described and to protect public health.

42-4 The water spray system would require different technology for operation during sub-freezing temperature than would be required for operation during temperatures above freezing.

42-5 Noted and acknowledged. Thank you. See new permit conditions in Chapter II, Section 1. Alternative 1.: Alternative of the Applicant's Proposal, With Conditions.

42-6 Noise impacts in Huntley due to construction and operation of the loadout are portrayed as minor to moderate over the short term and negligible over the long term. The Agency does not predict that air quality impacts would exceed any applicable air quality standard.

42-7 The Agency's determination that the impact to recreation opportunities would be minor with respect to air quality is based on the fact that the increase in particulate matter in the air resulting from Meridian's proposed operation would be minimal in comparison with existing background levels and current air pollution sources such as vehicle traffic, home heating, and agricultural activities.

42-8 Noted and amended. Thank you.

42-9 Noted and acknowledged. See new permit conditions in Chapter II, Section 1. Alternative 1.: Alternative of the Applicant's Proposal, With Conditions.

42-10 See response to comment 10-1.

43-1 Noted and acknowledged. Thank you.

43-2 Noted and acknowledged. Thank you.

44-1 See responses to comments 6-8 and 38-8.

44-2 Comment noted. See Appendix A, Section D., The Bull Mountains Rail Spur, for discussion of the rail spur, and Section F., Reclamation Plan, for reclamation discussion.

47-1 See response to comment 9-1.

49-1 An interdisciplinary team applied the criteria using the available technical characteristics of each spring. The subsequent scores and relative ranking are presented in a revised table in Chapter III, Table III-3, and Appendix E, Table E-8. Comment noted.

49-2 More recent data are acknowledged, although the wintering area mentioned (confluence of Fattig Creek and the Musselshell River) is a considerable distance from the proposed mine.

49-3 References to the "western portion of the area" apply to the west half of the life-of-mine area and the rail spur right-of-way.

49-4 Noted and amended. Thank you.

49-5 There is little factual information available on the value of recreation to either Musselshell County or Yellowstone County. No doubt there is income spent and jobs created, but there are not reportable data for either of these economic variables as they relate to recreation.

49-6 Some displacement would occur. The distances involved would vary depending upon habitat influences. However, no data are available as to whether these animals would be more or less available to the hunting public (i.e., whether they would end up on public or private land).

49-7 As stated, the comparisons obtained from monitoring would direct corrective measures during the mine life.

49-8 This comment is beyond the scope of the EIS.

49-9 See response to comment 22-4. Remainder of comment noted. Thank you.

49-10 There is a remnant population of sage grouse in the area, most of which are probably maintained in a few islands of sagebrush habitat to the north of the right-of-way. The proposed corridor does follow along the east and south boundary of S13 T4N R24E. The NE 1/4 of this section is cultivated, the remainder is sagebrush-grassland. Thus sage grouse habitat along one-half mile of the east boundary and 1 mile along the south boundary would be disrupted for the width of the right-of-way.

49-11 The degree of attraction for the newly-seeded railway corridor by deer and elk would depend largely on adjacent habitat (i.e., if good cover with little food is adjacent, the corridor, ungrazed by domestic livestock, would probably be a benefit to wild ungulates.) Train speed along the corridor is not likely to be a detrimental factor.

49-12 See text, Appendix A, Section F., Wildlife Mitigation.

49-13 Noted and acknowledged. See response to comment 49-16.

49-14 Noted and acknowledged. Thank you.

49-15 Noted and acknowledged. Thank you.

49-16 Concerns for mitigative measures or lack of same expressed in 49-13 through -16 are very real but beyond the scope of the EIS. The suggestion to place conservation easements on existing "undisturbed" parcels of land is recognized as a positive effort but is one which is usually left to the initiative of the private landowner.

51-1 The rail spur right-of-way is not a part of Meridian's permit application package and does not require a permit from Montana DSL. However, under 7-22-2152(2) and (3), MCA, Meridian must submit and receive approval of a weed control plan for the rail spur. On the permit area, Montana DSL rules require the use of certified weed-free seed mixes, ARM 26.4.716(3) and (4), and certified weed-free mulches, if available, under the requirement to use the best technology currently available, ARM 26.4.716 (4). The steam cleaning of machinery has been included as a condition (see revised text, Chapter II, Section 1.). The permit reclamation bond approved by Montana DSL may only be released after verification of noxious weed-free status (10 years post

reclamation) on all permitted acreage. Before bond release, Montana DSL must give public notice of proposed bond release to each county in which the permit area is located.

53-1 See text, Chapter IV, Section 6. for discussion of replacement water supplies for landowners losing water as a result of mining operations.

53-2 Comment noted. See Appendix A, Section F., Reclamation Plan, for discussion of reclamation.

53-3 Noted and acknowledged. Thank you.

53-4 See response to comment to 10-1.

53-5 Noted and acknowledged. Thank you.

55-1 It is anticipated that all water from mine dewatering would be used and none would be discharged. The activity would be monitored and, if discharge occurred, Meridian would have to comply with applicable regulations.

55-2 The potential for 5-foot of drawdown in the upper underburden, as a result of mining related recharge reduction, is estimated at less than 2 miles over the 5-year permit period. Estimates of potential for 1 foot or less of drawdown after 30 years extend less than 4 miles to the north and east and less than 2 miles in other directions. Monitoring during the first 5 years would provide the basis for more reliable, future drawdown estimates.

55-3 PM Draw discharges into Rehder Creek.

55-4 The statement is specific to the suitability of the water for use and is thereby supported by the cited reference. Average total dissolved solids information presented in Chapter III is for the purpose of describing the affected environment. Comparing this information to Thompson (1982) predictions is interesting and useful but comparing estimates of average values barely lends itself to order-of-magnitude precision.

55-5 See response to comment 55-1. The quality of the water from dewatering would not be known prior to the activity.

55-6 See responses to comments 55-1 and 55-5.

55-7 The quality of the water to be discharged is unknown. See response to comment 55-1 and 55-5. There are no known receiving waters.

55-8 Comment noted. The precise quality of the water pumped from the Madison Formation would not be known until the wells were installed. Literature researched showed that water in which TDS ranges from 1,000 mg/l to 100,000 mg/l can be expected from the Madison Formation.

55-9 Water could impact and be impacted by the coal preparation process. See response to comment 55-8.

55-10 Analyzing the rate of release of process water is beyond the scope of the EIS. The rate will not be constant and will rely on business and production decisions made by Meridian.

55-11 There are no receiving surface waters. See text, Chapter IV, Section 6., impact topic a., for discussion of potential impacts.

55-12 See text, Chapter IV, Section 6., impact topics b., and d. for discussion of potential percolation impacts.

55-13 Discharge would be directed by the drains to diversion channels and sedimentation ponds.

55-14 Precise impacts are unknown. Potential impacts are to downgradient water quality. See text, Chapter IV, Section 6., impact topic a. See text, Chapter IV, Section 6., impact topic a., for discussion of Agency conclusion with regard to impact and term of impact.

55-15 Discharge through "weep holes" in sedimentation ponds was not identified as an issue and was not analyzed. Seepage from sedimentation ponds is extremely variable. Monitoring ponds for seepage losses would identify problems that could be solved by corrective measures at a later date.

55-16 Long term projections of drawdown impacts associated with mining indicate that there would be no impacts on the Roundup municipal water source. See response to comment 55-2.

55-17 Noted and acknowledged. Thank you.

55-18 Noted and acknowledged. Thank you.

55-19 Noted and acknowledged. Thank you.

56-1 Noted and amended. Thank you.

56-2 Noted and amended. Thank you.

56-3 Text has been amended to include corrected figures. Thank you.

56-4 Noted and acknowledged. Thank you.

56-5 Noted and acknowledged. Thank you.

56-6 See text, Chapter III, Section E., Ground Water Resources, for discussion of alluvial valley floors. Investigations by Montana DSL indicate that the 24.5-acre area specifically discussed in

60-1 The Agency acknowledges that large-scale disturbance of the landscape or the earth may be in conflict with the belief systems of some Native Americans. The Agency is committed to working with concerned Native Americans to address these potential conflicts, to the extent possible.

60-2 Montana DSL recognizes the importance of pictograph sites in Native American beliefs. Meridian is committed to surveying in detail all areas where slope failure or toppling would be likely to occur, and to identify such sites prior to mining. Mitigation or protection plans for vulnerable sites would be developed in consultation with concerned Native Americans.

60-3 As noted in comments 34-1 through 4, Native American consultation is underway. Some Native Americans have visited the proposed Project site. As sensitive sites were identified, the Agency and Meridian would take both Native American and scientific concerns into account in developing possible mitigation plans.

60-4 See response to comment 60-3.

61-1 See responses to comments 38-8, and 42-3.

61-2 See responses to comments 6-8 and 10-1.

63-1 See responses to comments 6-8 and 10-1.

66-1 See responses to comments 38-8 and 42-3.

66-2 See response to comment 38-8.

68-1 See response to comment 22-5.

68-2 Noted and acknowledged. Thank you.

68-3 See text, Appendix C, Section 4., for discussion of mechanisms of subsidence and sandstones in the overburden.

68-4 Noted and acknowledged. Thank you.

68-5 Noted and acknowledged. Thank you.

68-6 Noted and acknowledged. Thank you.

68-7 See response to comment 22-1.

68-8 The quantity of alluvial ground water flow in the life-of-mine area is unknown and can be expected to be highly variable. See Chapter III, Section E., Ground Water Resources, for discussion of alluvial flow.

68-9 Horizontal drains are one of the alternative mitigations proposed for application at selected sites. See response to comment 22-6.

68-10 See text, Chapter III, Figure III-2 and Chapter IV, Section 6., impact topic a., for discussion of clinker and spring impacts. Further discussion of clinker is beyond the scope of the EIS since it was not identified as an issue for analysis.

68-11 Noted and acknowledged. Thank you.

68-12 Noted and acknowledged. Thank you.

68-13 Noted and acknowledged. Thank you.

68-14 See responses to comments 22-1 and 49-1.

68-15 See response to comment 49-1.

68-16 See text, Chapter III, Section E., Ground Water Resources, and Appendix E, Table E-2 for discussion and listing of ground water quality in the life-of-mine area.

68-17 See responses to comments 22-1 and 49-1.

68-18 The average flow of 0.4 gpm was estimated from measured flows ranging from ponded (little or no flow) to 1.0 gpm.

68-19 See responses to comments 22-1 and 49-1.

68-20 See responses to comments 22-1 and 49-1.

68-21 These resources have not been documented and the location may be outside of the life-of-mine area.

68-22 Comment noted. See responses to comments 22-1 and 49-1.

68-23 See responses to comments 22-1 and 49-1.

68-24 Noted and acknowledged. Thank you.

68-25 Comment noted. See responses to comments 22-1 and 49-1.

68-26 See responses to comments 22-1 and 49-1.

68-27 See responses to comments 22-1 and 49-1.

68-28 Noted and acknowledged. Thank you.

70-19 The comment is correct. Effective control of spotted knapweed and leafy spurge would require an integrated approach including several kinds of treatments. See response to comment 56-13.

70-20 See Appendix A, Section F., Hydrologic Mitigation, for discussion of proposed hydrologic mitigation for potential mining-related subsidence impacts. See response to comment 22-6.

70-21 Noted and acknowledged. Thank you.

70-22 See responses to comments 53-1 and 22-6.

70-23 Noted and acknowledged. Thank you

72-1 The draft EIS was prepared by a multidisciplinary team using an interdisciplinary approach to many issues. The comments of DHES, Water Quality Bureau are answered in responses 55-1 through 55-21.

72-2 While permitting and exemption processes are beyond the scope of the EIS, Meridian must comply with all applicable Federal and State regulations through the appropriate regulatory authorities. Ground water quality data are collected on a quarterly basis within the plan of an overall monitoring program. It is not within the scope of the EIS to anticipate or reject the need for a nondegradation exemption.

72-3 For the purposes of the EIS, springs and seeps result from ground water sources and are therefore defined as ground water resources.

72-4 Permitting and exemption processes are beyond the scope of the EIS. Meridian must comply with all applicable Federal and State regulations through appropriate regulatory authorities.

72-5 See response to comment 72-2.

72-6 The 3,100 TDS (3,100 mg\l, TDS) is a mean value for underground mine spoils water presented in the Thompson (1982) reference. The reference also presents that results are "worst case predictions" and that average values imply no confidence level. See responses to comments 55-1 and 72-4.

72-7 Comment noted. Table E-2 neither presents water quality data as TDS nor references a 3,100 TDS value. The table presents no wells. Springs in the Project area are not used by humans for drinking purposes.

72-8 The 3,100 TDS (3,100 mg/l, TDS) is a mean value for underground mine spoils water presented in the Thompson (1982) reference. The reference also presents that results are "worst case predictions", that average values imply no confidence level, and that postmining ground water would continue to be suitable for livestock uses.

72-9 The mine pool is not planned as a water replacement source. The mine pool would be available as a water source after mining was completed.

72-10 See response to comment 72-4.

72-11 See text, Appendix A, various sections for discussion of water pollution control practices.

72-12 See responses to comments 72-4 and 25-6.

72-13 It is noted in the text that a Prevention of Significant Deterioration (PSD) permit is not required for the Project. That refers to only that specific air quality permit. General air quality permits are required from the Montana Air Quality Bureau for the proposed mine and from the Yellowstone County Air Pollution Control for the proposed loadout. Following analysis and public review, both agencies have issued preliminary determinations to approve the permits.

72-14 The text recognizes that specified discharge permits and exemptions are needed. See response to comment 70-3.

73-1 Considering ground water as a renewable resource or estimating the use value of water in perpetuity is beyond the scope of the EIS. See response to comment 22-6. See text, Appendix D, for discussion of the responsibilities of Montana DSL.

73-2 Noted and acknowledged. Thank you.

73-3 Noted and acknowledged. Thank you.

73-4 See response to comment 10-1.

73-5 See text, Appendix D for discussion of responsibility of ICC and other agencies. See text throughout Section F., Appendix A, for discussion of land reclamation.

73-6 Comment noted. Mining schedules would be based on a business decisions made by Meridian and are beyond the scope of the EIS. By law, any permit issued is a 5-year permit that is not automatically renewable.

75-1 It is acknowledged that there would be traffic impacts to Old Divide Road in the text. See Letter 12.

75-2 Impacts to the integrity and stability of Old Divide Road are recognized in the text. As mentioned, Musselshell County is responsible for maintenance of Old Divide Road. The County would realize an estimated 80 percent increase in tax revenues, some of which could be used to address road maintenance problems. See Chapter IV, Section 11., impact topic b., and Letter 12.

75-3 See response to comment 10-1.

76-1 See Letter 57 from Montana Department of Transportation.

76-2 See response to comment 7-14.

76-3 The Huntley loadout is proposed to be used for 24 consecutive months. See Appendix A, sections A., C., and E., for discussions of the Huntley loadout.

78-1 See responses to comments 6-8, 22-6, and 25-6.

78-2 Noted and acknowledged. Thank you.

78-3 See response to comment R-14.

78-4 Ownerships have been reconfirmed and are correct as shown.

78-5 See revised text, Chapter I, Section B. The Applicant's Proposal.

78-6 The word "could" is not used in discussing the possibility of surface subsidence. The acreage of potential surface disturbance by subsidence and other mining and mitigation activities is the context for the use of the word.

78-7 There are 7,562 surface acres under which coal mining activities would be conducted. It is estimated that 6,170 acres would experience surface disturbance. This estimate includes mains, pillars, and other mine areas over which limited disturbance is predicted.

78-8 See response to comment 78-7.

78-9 See response to comment 78-7.

78-10 These are proposed enhancement areas. Landowner consent has been demonstrated in the permit application.

78-11 Figure A-9, in Appendix A, shows the last longwall panel that would be mined in year 32. Add to that the 3 years for Phase 1 limited mining and the total is 35 years of mining.

78-12 The area is not a coal buffer zone. It is an area of study around the mine plan area.

78-13 Conditions 1, 2, and 3 pertain only to cultural resources. Remainder of comment noted.

78-14 See response to comment 22-5.

78-15 Noted and acknowledged. Thank you.

78-16 Yes. The status of coal leases is beyond the scope of the EIS.

78-17 Meridian has not applied for any State or Federal coal leases outside of the 5-year permit area.

78-18 See responses to comments 6-8 and 10-1.

78-19 See response to comment 7-14.

78-20 See responses to comments 6-8 and 10-1.

78-21 Noted and acknowledged. Thank you.

78-22 Noted and acknowledged. Thank you.

78-23 Noted and acknowledged. Thank you.

78-24 Noted and acknowledged. Thank you.

78-25 Noted and acknowledged. Thank you. As described in the comment, there can be a large amount of variability in wind patterns seasonally and annually as well as based on topographical influences. (See also the response to comment 6-11.) Long-term wind data from the Billings Airport (National Weather Service station) were used for the dispersion modeling for the Project. The Bull Mountains monitoring site was located on a low ridge at the Old Divide Mine. The adequacy of wind data with respect to windmill efficiency has not been evaluated as part of this process. If windmills were used for mitigation, design and storage requirements would have to be identified.

78-26 Only the coal of interest to the proposed Bull Mountains Mine No. 1 is within the scope of the EIS.

78-27 Comment noted. See text, Chapter III, Section E., Ground Water Resources, for discussion of shallow aquifers in the Bull Mountains and the regional ground water gradient relevant to the scope of the EIS.

78-28 This comment is beyond the scope of the EIS. Only ground water resources considered to be at issue with regard to mining and mining-related impacts are within the scope of the EIS.

78-29 See response to comment 78-28.

78-30 See response to comment 78-28.

78-31 Comment noted. Postmining water quality is predicted to be suitable for current uses. Mitigation water would be suitable for current uses.

78-32 Postmining water quality is predicted to be suitable for current uses.

78-33 Noted and acknowledged. Thank you.

78-34 Comment noted. See text, Chapter III, Section E., Ground Water Resources, for discussion of spring and ground water quality. The classification of ground water by Montana Administrative Rule 16.20.1002 is based on specific electrical conductance, not TDS.

78-35 The hydrology discussions do not present conclusions about degradation between classifications. See response to comment 70-3.

78-36 The water quality sampling and analysis program began in 1989, continues at this time, and is planned to continue through proposed mining and reclamation. Some sources are on different sampling schedules than others, but all are monitored on at least a quarterly basis.

78-37 See response to comment 72-8. Mine spoils water quality would not have an immediate and 1:1 qualitative impact on springs or well water quality.

78-38 See text, Chapter IV, Section 6., impact topic b., for discussion of permeability changes in the overburden. See responses to comments 55-1 and 55-5.

78-39 See responses to comments 55-4, 72-8, and 78-37.

78-40 No other chemical tests are known to have been conducted for major ionic constituents in cores from wells drilled in the Bull Mountains.

78-41 Comment noted. The quality of the water discharged from the mine pool prior to stabilization would not be known prior to monitoring. After stabilization, any discharge from the portal would be monitored.

78-42 See text, Appendix E, Table E-2, for definition of Class III ground water. Postmining ground water is expected to remain suitable for wildlife, agricultural, and livestock uses.

78-43 Noted and acknowledged. Thank you.

78-44 Mitigation systems have the potential to provide water for longer durations at sites having seasonal or intermittent discharge.

78-45 See response to comment 22-6. See text, Appendix C, for discussion of subsidence.

78-46 The citation supports the discussion on modification of subsidence prediction calculation methods as presented in Appendix C.

78-47 Noted and acknowledged. Thank you.

78-48 Noted and acknowledged. Thank you.

78-49 Noted and acknowledged. Thank you.

78-50 Noted and acknowledged. Thank you.

78-51 Noted and acknowledged. Thank you.

78-52 Noted and acknowledged. Thank you.

78-53 Comment noted. Guzzlers are proposed to mitigate impacts at 2 springs with average flows in the 0.2 to 0.4 gpm range. Guzzlers are not discussed as being equivalent to any natural source.

78-54 Noted and acknowledged. Thank you.

78-55 Noted and acknowledged. Thank you.

78-56 See text, Appendix A, Figure A-1 and Section D., Roads and Railroads, for discussion of planned roads. Permitting is not required.

78-57 Additional exploratory drilling would be based on a business decision made by Meridian and is beyond the scope of the EIS. However, additional drilling would require a prospecting permit from Montana DSL.

78-58 Subsidence should not disrupt recreation activities.

78-59 This comment is beyond the scope of the EIS.

78-60 See response to comment 76-3.

78-61 See responses to comments 73-6 and 76-3.

78-62 Noted and acknowledged. Thank you.

78-63 Meridian's deals and contracts are beyond the scope of the EIS.

78-64 Ventilator shaft construction was not identified as an issue for analysis in the EIS and is therefore beyond the scope of the EIS.

78-65 Details of the heavy media separation process were not identified as an issue for analysis in the EIS and is therefore beyond the scope of the EIS.

78-66 Future plan revisions are beyond the scope of the EIS. Only the proposed plan has been analyzed. See response to comment 25-6.

78-67 See responses to 49-2 and 70-4.

78-68 Elk herds ranging onto private land are managed largely on landowner tolerance. An increase of elk on private lands within the Bull Mountains which resulted in measurable competition with

domestic livestock for forage would likely result in a decrease in the herd through an increase in permits issued.

78-69 As with other wells, horizontal drains are screened to prevent the migration of sediment into the system.

78-70 Fracture repair is one technique proposed for hydrologic mitigation. See text, Appendix A, Section F., Hydrologic Mitigation.

78-71 The precise configuration of the small areas from which livestock would be excluded as a result of mitigation efforts is beyond the scope of the EIS.

78-72 Noted and acknowledged. Thank you.

78-73 The coal would be air-dried by blowing ambient (unheated) air through it. In the primary phase of the Project, this would be done in the air classification system. A baghouse (fabric filtration) system would be used for particulate emission control. A coal-fired boiler is planned to provide space heat for buildings.

78-74 Meridian's relationships with other corporations is beyond the scope of the EIS.

78-75 Noted and acknowledged. Thank you.

78-76 See text and tables, Appendix A., Section F., Hydrologic Mitigation, for discussion of the 130 springs and seeps being monitored.

78-77 Discussion of detailed bonding requirements is beyond the scope of the EIS. See response to comment 22-6.

78-78 Noted and acknowledged. Thank you.

78-79 Noted and acknowledged. Thank you.

78-80 Noted and acknowledged. Thank you.

78-81 See text, Appendix A, Section A., Environmental Monitoring, for discussion of monitoring plans. All 130 springs would be monitored. Monitoring frequency could change as necessary.

78-82 See text, Chapter IV, Section 6., and Appendix A, Section F., Hydrologic Mitigation, for discussion of mitigation wells.

78-83 Mature ponderosa pine trees could lean or fall over, possibly resulting in tree mortality.

78-84 Noted and acknowledged. Thank you.

78-85 Predicting radon releases as a result of subsidence in the area was not identified as an issue for analysis in the EIS and is therefore beyond the scope of the EIS.

78-86 Angle or horizontal borings for the purpose of intercepting water sources is not a new technique and is not difficult to implement. Horizontal borings are presented as one potential technique for hydrologic mitigation. Extensive documentation is neither warranted nor within the scope of the EIS.

78-87 Noted and acknowledged. Thank you.

78-88 The analysis of the cost to the State of Montana to implement a proposed mitigation plan is beyond the scope of the EIS. The reclamation bond would cover the mitigation costs and these costs have been calculated and presented in the permit application. See response to comment 22-6.

78-89 Noted and acknowledged. Thank you.

78-90 Noted and acknowledged. Thank you.

78-91 Meridian must comply with all applicable Federal and State regulations including obtaining the required permits. The status of appropriate permitting is beyond the scope of the EIS.

79-1 See response to comment 6-8.

79-2 See responses to comments 6-8 and 10-1.

80-1 See text, Chapter III, Section J., Social Well-being, and Chapter IV, Section 11., impact topics f. and g. Also see response to comment 39-2.

80-2 Mental health aspects of coal hauling and operation of the Huntley loadout were not raised during the scoping procedure and have been brought up by few commentors. The Huntley loadout is only proposed for a short time; 2 years. Compliance with air quality regulations and additional permit conditions are designed to protect public health (see Chapter II, Section 1., and response 42-3).

80-3 See response to comment 80-2.

81-1 See response to comment 22-6.

81-2 Noted and acknowledged. Thank you.

83-1 See responses to comments 6-8 and 10-2.

83-2 See responses to comments 6-8 and 10-1.

83-3 See text, Appendix A, Section F., Reclamation Plan, for discussion of proposed mitigation.

83-4 See response to comment 80-2.

83-5 See response to comment 80-2.

83-8 See Chapter III, Section J., Law Enforcement and Fire Protection, for discussion on the limited fire protection in Huntley.

83-9 See response to comment 10-6.

83-10 See response to comment 38-8.

83-11 See response to comment 6-12 and 14-2. See text, Chapter IV, Section 6., and Appendix A, Section C., Other Facilities, for discussion of the existing Huntley loadout well.

83-12 See response to comment 42-1. The full Chrome Corporation of American baseline report is on file at the DHES Air Quality Bureau.

83-13 See response to comment 39-2.

83-14 Noted and acknowledged. Thank you. See responses to comments 6-8, 10-1, and 10-2.

83-15 See revised conditions, Chapter II, Section 1., and Appendix A, Section F., for discussion of conditions and mitigation.

83-16 See response to comment 80-1 and 80-2.

83-17 See text, Chapter IV, Section 1., Assumptions for Alternative 1, and Appendix B for cumulative impacts discussion.

83-18 See response to comment 6-14.

83-19 Noted and acknowledged. Thank you.

83-20 The results of the social survey were used to describe existing conditions and project potential impacts. The results of the survey are available from Montana DSL.

83-21 Mental health effects related to risk of decrease in property values is beyond the scope of MEPA.

83-22 See response to comment 38-8.

83-23 See responses to comments 6-12, 14-2, and 83-11. No other known wells exist within 1,000 feet of the loadout well at a similar depth. Potential impacts are based on aquifer material characteristics.

83-24 See responses to comments 42-1 and 83-12.

83-25 See response to comment 39-2.

ORAL TESTIMONY

H-1 See Chapter III, Section J., Social Well-being, for discussion on past use of existing Montana Rail Link low-volume coal loadout facility in Huntley in 1990.

H-2 There is no known technical model or basis that would assist in considering the movement of coal particles through the soil and into the ground water. There is no basis for considering the danger of ground water contamination by coal particles moving through the soil.

H-3 See Chapter IV, Section 9., impact topic a.

H-4 Farmers would experience road conditions and hazards similar to those discussed in the transportation sections of Chapters III and IV of the EIS.

H-5 The exact number of increased accidents cannot be quantified.

H-6 See text Chapter IV, Section 9., impact topics a. and c. See Letter 57 from Montana Department of Transportation.

H-7 The improved design of the loadout facility includes the following air pollution mitigation measures:
(1) A drive-over truck dump bin;
(2) A radial-stacking conveyor with a flexible-discharge chute;
(3) An underground (underpile) reclaim system with a conveyor to the rail cars and a flexible-discharge chute; and
(4) A water spray system for the access road and stockpile. (Waterline freezing can be avoided by heat-tracing or self-draining lines.)
This overall design minimizes the amount of coal re-handling by loaders.

H-8 The type of emission controls to be used was analyzed by Yellowstone County through the air quality permit process. Enclosure of the pile would provide a higher level of control but would be prohibitively expensive, especially given the short-term nature of the Project. This is consistent with the State and Federal application of Best Available Control Technology (BACT).

H-9 If a situation was identified that created an imminent danger to the health or safety of the public, the operation could be shut down immediately.

H-10 See response to comment 76-3.

H-11 The consideration of Meridian's markets and contracts are beyond the scope of the EIS. See response to comment 76-3 concerning the loadout.

H-12 The projected truck traffic may induce some commuters to use the interstate highway; however, there is no way to predict exactly how much traffic may be re-routed or what impact this would have on business in Billings Heights.

H-13 See response to comment 10-1.

H-14 See text, Chapter IV, Section 9., impact topic a., See Chapter IV, Section 11., impact topic g., for discussion of impacts from the operation of the proposed loadout in Huntley.

H-15 See response to comment 13-2.

H-16 The comment is correct. See Letter 12, and Chapter IV, Section 11., impact topic b., for a discussion of costs and revenues that would accrue to Musselshell County as a result of the proposed Project.

H-17 Noted and acknowledged. Thank you.

H-18 Noted and acknowledged. Thank you.

H-19 See response to comment 7-9 regarding the cost of the crosswalk. The condition of Highway 312 is acknowledged in Chapter III, throughout Section H.

H-20 Noted and acknowledged. Thank you.

H-21 There are coal tax funds available for highway impacts.

H-22 See revised text, Chapter II, Section 1., revised conditions. See response to comment 76-3 concerning the loadout.

H-23 There are 45 jobs projected for coal transport operations for years 1 and 2. Calculations noted.

H-24 This comment is beyond the scope of the EIS. This is a business decision to be made by Meridian.

H-25 See responses to comments 6-8 and 10-1.

H-26 See Table II-1 for a cost comparison of constructing the loadout.

H-27 See responses to comments 6-8 and 10-1.

H-28 Most of this statement is true, however, fuel taxes are never put into the general fund.

H-29 See Letter 47 from Montana Department of Transportation.

H-30 See response to comment 38-8.

H-31 The amount of coal mined per year would be a business decision on the part of Meridian and is considered beyond the scope of the EIS. See response to comment 76-3 concerning the loadout.

H-32 Wildlife in the Huntley loadout area was not addressed because a beet-loading facility would already be classified as an industrial/commercial site and as such have little wildlife habitat. Those species associated with this type habitat (e.g., rock doves[domestic pigeons], starlings, English sparrows) would probably be little affected by increased industrial activity.

H-33 Considering the origination point of applicants for jobs in the proposed mine is beyond the scope of the EIS.

H-34 Noted and acknowledged. Thank you.

H-35 Noted and amended. Thank you.

H-36 Noted and amended. Thank you.

H-37 See response to comment 42-1.

H-38 The preliminary air quality permit determination issued by the Yellowstone County Air Pollution Control District stipulates 3 particulate air monitoring sites and a meteorological site around the facility. Operation of the network is the responsibility of Meridian, but there are numerous quality assurance procedures implemented by the County and State to assess the adequacy and quality of the data.

H-39 Noted and acknowledged. Thank you.

H-40 The maximum number of trucks added to the roadways would be 4 trucks per hour or a total of 192 trucks per day.

H-41 See Chapter IV, Section 9., impact topic a., regarding interaction of coal- and beet-hauling traffic.

H-42 See Appendix A, Section C., The Huntley Loadout, for discussion of dust control at the proposed loadout at Huntley. See response to comment 76-3 concerning the loadout.

H-43 See responses to comments 38-8 and 80-2.

H-44 Assuming that the church is 1,000 feet from the coal dump, air quality impacts should be less than the maximum impacts predicted by the dispersion modeling. The modeling receptor points were at closer distances and particulate levels were predicted to be well below applicable air quality standards. Noise impacts in the Huntley area are discussed in Chapter IV, Section 10., impact topic c. See also Chapter II, Section 1., new conditions.

H-45 Noted and acknowledged. Thank you. See response to comment 38-8.

H-46 See response to comment 10-1.

H-47 See response to comment H-32.

H-48 See response to comment H-40.

H-49 The quoted statistics relate to Highway 87 and not Highway 312. Accidents occurring along Highway 312 are generally less severe than those on other roads in the State.

H-50 See responses to comments 38-8 and 80-2.

H-51 See response to comment 80-2.

H-52 See responses to comments 38-8 and 80-2.

H-53 See response to comment 6-11.

H-54 See response to comment 38-8.

H-55 See response to comment 38-8.

H-56 See response to comment 38-8.

H-57 See response to comment 38-8.

H-58 See response to comment 38-8. See revised text, Chapter II, Section 1., Condition 6.

H-59 Noted and acknowledged. Thank you.

H-60 Noted and acknowledged. Thank you.

H-61 Noted and acknowledged. Thank you.

H-62 This has been acknowledged in the text, however, placement of stop signs is the responsibility of the Montana Department of Transportation.

H-63 This has been acknowledged in the text, however, placement of traffic lights is the responsibility of the Montana Department of Transportation.

H-64 Noted and acknowledged. Thank you.

H-65 The period during which public comment on the draft EIS and ended on October 5, 1992. The address to which substantive comments were to be mailed during that period was presented in the cover letter for the draft EIS.

H-66 Noted and acknowledged. See Letter 57.

H-67 There will be road maintenance and possible improvements based on the maintenance schedule and funding priorities of the Montana Department of Transportation.

H-68 See response to comment 83-8.

H-69 The employment figures for transportation were supplied by Meridian.

H-70 It is recognized in the text that traffic flow and public safety would be impacted on the local road system as a result of mine-related traffic. See Chapter IV, Section 9., impact topic a.

H-71 Noted and acknowledged. See response to comment H-70.

H-72 See response to comment 80-2.

H-73 See response to comment 80-2.

B-1 Meridian must comply with all applicable Federal and State regulations including obtaining required permits. Upon the expiration of a permit, application must be made to the appropriate agency for extensions or new permits.

B-2 In the permit application, Meridian proposes to use the loadout for 24 months. One of the conditions in the Department's preferred alternative is that the loadout be used for no more than 24 consecutive months from the time coal is first deposited at the site. See revised text Chapter II, Section B. The additional 12 months (total 36 months) allows for start-up construction and reclamation. See Appendix A, sections A., C., and E., for discussions of the Huntley loadout.

B-3 The schedule for hauling coal to the Huntley loadout would be based on a business decision made by Meridian and is beyond the scope of the EIS. Also see response to comment B-2.

B-4 See Appendix A, Section C., The Huntley Loadout, for discussion of dust control at the Huntley loadout.

B-5 See response to comment 22-6.

B-6 See response to comment 22-5.

B-7 See response to comment 53-1.

B-8 Generally, mitigation wells would be the final step or phase in mitigating an impacted water source. Mitigation wells would not be sited or installed until monitoring indicated the need and other mitigation alternatives were not appropriate or failed.

B-9 See response to comment 78-34.

B-10 See response to comment 22-1.

B-11 See response to comment 22-1.

B-12 See response to comment 10-1.

B-13 Guzzler systems are designed with the primary goal of serving wildlife. See Appendix A, Section F., Hydrologic Mitigation.

B-14 Although guzzlers are more commonly used as a water supply for game birds inhabiting arid areas in the southwest, the larger ones described in the draft EIS were to collect water which would then be released to smaller tanks for use primarily by domestic livestock. These larger storage tanks would have a 10,000 to 20,000 gallon capacity, not 216 gallons as indicated in the testimony.

B-15 See Appendix A, Section E., Hydrologic Mitigation, for discussion of guzzlers. Guzzlers are proposed to mitigate impacts at 2 springs with average flows in the 0.2 to 0.4 gpm range. Guzzlers are not discussed as being equivalent to any natural water source.

B-16 See response to comment 10-1.

B-17 See response to comment 9-1.

B-18 The text recognized that activities connected with the sugar beet stockpile are seasonal, occurring for a maximum of 4 months. See Appendix B, Section 4. for a discussion of the sugar beet loading site.

B-19 According to Meridian's development schedule, construction, 24 months of loadout, use, and loadout reclamation would take a maximum of 3 years. The remainder of the comment is noted.

R-1 There are no improvements proposed as part of this Project. Musselshell County maintains Old Divide Road, therefore any questions should be directed to the County. See Letter 12.

R-2 See response to comment 22-6.

R-3 The suggested mitigation would screen the waste disposal area but would not alter the loss of the visual resource.

R-4 See response to comment 25-6.

R-5 Noted and amended. Thank you.

R-6 Noted and amended. Thank you.

R-7 Noted and acknowledged. Thank you.

R-8 Noted and acknowledged. Thank you.

R-9 As stated in the text, the proposed and approved method of road dust control would be watering. The State Air Quality Bureau's position is that an adequate level of road dust control can be maintained if the watering frequency is proper on an as-necessary basis. A specific watering frequency is not stipulated because of the variability in weather conditions. The adequacy of dust control would be evaluated primarily through visual observation by Montana DSL and Air Quality Bureau personnel and, to some extent, by air monitoring. If problems were identified, further mitigation could be required such as chemical stabilization or road surfacing. The agencies would be as responsive as possible to local residents' concerns and would appreciate their evaluation of dust control adequacy on an on-going basis if the Project was developed. See Chapter II, Section 1., new condition 5.

R-10 See response to comment R-9.

R-11 The water supply system in Roundup is underutilized and adequate for the existing population. See Chapter III, Section J., Public Water Supply, Wastewater Treatment, and Solid Waste.

R-12 The loss is not really "lost revenues", but lost opportunity or foregone revenues.

R-13 See response to comment 9-1.

R-14 By law, any permit issued is a 5-year permit that is not automatically renewable.

R-15 See responses to comments 6-8 and 10-1.

R-16 Please refer to Letter 57, Montana Department of Transportation's review of the draft EIS. Please note that the Department's review of the draft EIS found issues properly addressed.

R-17 Highway 12 is only associated with loadout sites that were eliminated from further discussion. Alternative hauling routes were not identified as an issue during scoping for the EIS. See Letter 57 for further discussion of transportation mitigations.

R-18 Refer to Letter 57.

R-19 Noted and acknowledged. Thank you. See Chapter III, Section J., Human Services and Health Care Facilities, for discussion of increase in caseloads over the past couple years.

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