RECORD OF DECISION

for

Reclamation of the Zortman and Landusky Mines

Phillips County, Montana

Prepared by:

Bureau of Land Management
Malta Field Office

State of Montana
Department of Environmental Quality

May 2002

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Dear Reader,

Enclosed is the signed Record of Decision (ROD) on reclamation of the Zortman and Landusky Mines. The decision is to select Alternatives Z6 and L4 from the Final Supplemental Environmental Impact Statement for reclamation of the Zortman and Landusky Mines, respectively.

Mine reclamation under Alternatives Z6 and L4 is dependent upon additional funding in the amount of approximately $22.5 million. In the event funding is not available within the next two years reclamation will be completed using Alternatives Z3 and L3, which can be implemented with the present reclamation funds.

The ROD also includes requirements for continued long-term water treatment with effluent limits established under the Montana Pollution Discharge Elimination System permits for each mine. The long-term water treatment trust fund needs approximately $11 million to maintain water treatment. This shortfall in water treatment funding exists independent of which set of alternatives is implemented and is the agencies' priority for expenditure of any additional funds obtained for the project.

We wish to thank everyone who participated in the EIS process and will keep you advised as to the progress of reclamation.

Sincerely,

Jan P. Sensibaugh, Director
State of Montana
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Bruce W. Reed, Field Manager
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Executive Summary

This Record of Decision (ROD) has been issued by the Montana Department of Environmental Quality (DEQ) and the U.S. Bureau of Land Management (BLM) to select final reclamation plans for the Zortman and Landusky Mines in Phillips County, Montana.

After considering all issues, alternatives, and consulting with the Fort Belknap government, the BLM and DEQ have selected Alternatives Z6 and L4 from the Supplemental EIS (SEIS) to reclaim the Zortman and Landusky Mines, respectively. The DEQ is also approving the Montana Discharge Elimination System (MPDES) permits for mine discharges to waters of the State as written in Appendix C of the Final SEIS.

The mine operator, Zortman Mining, Inc. (ZMI), is bankrupt, and unable to perform the required reclamation and water treatment. Therefore, the agencies will use money from the operator's surety bonds to complete the reclamation and conduct water treatment. Because ZMI's reclamation bonds are not adequate to completely pay for earthwork under Alternatives Z6 and L4, implementation of these alternatives is contingent upon the agencies obtaining additional funds ($5 million for the Zortman Mine and $17.5 million for the Landusky Mine). An estimated $11 million is also needed for the long-term water treatment trust fund to ensure the continued operation of the seepage capture and treatment systems.

Any additional funding received for this project will be applied to water treatment and reclamation activities according to the priorities listed in the ROD. The first and foremost funding priority is to supplement the long-term trust fund with $11 million for operation of the seepage capture systems and water treatment plants. The shortfall in funding for long-term water treatment exists regardless of which mine reclamation alternative is selected, and is the top priority for additional funds since continued water treatment is critical to environmental protection.

In the event additional funding is not obtained within the next two years, Alternatives Z3 and L3 have also been selected for mine reclamation. These alternatives can be implemented with the existing bonds and meet all applicable requirements for mine reclamation, but will require more long-term monitoring and maintenance to ensure reclamation performance.

Many of the reclamation measures in Alternatives Z3 and L3 are common to Alternatives Z6 and L4. Reclamation will begin immediately with these common measures and continue for the next two years. If at the end of two years the additional funds have not been obtained, then mine reclamation will be completed as described in Alternatives Z3 and L3 in order to limit the generation of additional mine waste water and to return the land to beneficial uses.

Other alternatives for reclamation of the mines were considered. Over the past three years a technical working group of specialists from DEQ, BLM, EPA and the Fort Belknap government have developed mine reclamation alternatives in addition to those considered in the 1996 Final EIS. These alternatives ranged from reclamation that can be achieved with the existing bond money, to alternatives that included completely backfilling all mine pits at an estimated cost of $175 million

over the reclamation bond amounts. A supplemental EIS was prepared to analyze the impacts and benefits of these 12 alternatives, and is the basis for this Record of Decision.

The reclamation alternatives involving large amounts of pit backfill (Alternatives Z4, Z5, L5, and L6) were not chosen because, in addition to being very expensive, the acid-generating character of the backfill needed for these alternatives could actually increase the release of acidity and metal contaminants, and degrade area water quality. The visual and aesthetic benefits to be gained from these pit backfilling alternatives could not be justified by their potential to cause negative impacts to water quality, especially to water in drainages which flow onto the Fort Belknap Indian Reservation. Water quality in these streams has been relatively unaffected by mining activities, and mine pit reclamation plans were selected to avoid creating any additional impacts to water quality.

Alternatives Z6 and L4 (or Alternatives Z3 and L3 using existing funds) have been selected because they place only the relatively non acid-generating waste rock as backfill in the mine pits, and leave the most strongly acid-generating waste rock on the lined leach pads where any leachate will be easier to control and treat. The mine pit reclamation in these alternatives includes pit configurations that provide for drainage of runoff and mitigation of visual impacts, but without increasing the potential for impacts to water quality.

All other mine facilities will be regraded, covered with soil, and revegetated so as to prevent unnecessary or undue degradation and provide comparable stability and utility as the adjacent lands. Post-reclamation monitoring and maintenance will be conducted to repair any damage from erosion and to ensure establishment of a self-sustaining stand of vegetation.

The selected and reserve selected alternatives satisfy all applicable State and Federal requirements for mine reclamation and protection of water quality. Reclamation of the Zortman and Landusky Mines using the reclamation plans in Alternatives Z6 and L4, or Alternatives Z3 and L3, will satisfy the federal government's requirement to protect the Tribal trust resources of the Fort Belknap Indian Reservation.

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Introduction & Background

This Record of Decision (ROD) has been prepared by the Bureau of Land Management (BLM) and the Montana Department of Environmental Quality (DEQ), referred to as *the agencies* throughout this document. The ROD documents the agencies' decisions on reclamation of the Zortman and Landusky Mines. The decisions and rationale presented in this ROD are based upon the analysis conducted in the March 1996 Final Environmental Impact Statement (FEIS), *Zortman and Landusky Mines Reclamation Plan Modifications and Mine Life Extensions*, and the December 2001 Final Supplemental Environmental Impact Statement (SEIS), *Reclamation of the Zortman and Landusky Mines*.

From 1979 through 1998, Pegasus Gold Corporation and its wholly owned subsidiary operating company, Zortman Mining, Inc. (ZMI), operated the Zortman and Landusky Mines in the Little Rocky Mountains of northcentral Montana (SEIS Figure 1.2-1). While historic underground mining had occurred in the area since the mid-1880s, the advent of cyanide heap leach technology, combined with a sharp rise in gold prices, prompted the development of open pit mining operations beginning in the late 1970s. A Draft EIS analyzing the impacts of the proposed Zortman and Landusky Mines was prepared by the Montana Department of State Lands[1] (DSL) in 1979. The State's Final EIS (responses to comments on the Draft EIS and adoption of the Draft as Final) was issued on May 17, 1979; along with state permits to operate the Zortman and Landusky Mines as open pit, heap leaching operations.

At the time the State Operating Permits were issued the BLM did not have any permitting or approval requirement for mining on public lands. In 1981 the BLM established regulations for operators that were mining on public lands under the Mining Law of 1872 (43 CFR 3809). The State Operating Permits for the Zortman and Landusky Mines were accepted by the BLM in 1981 under the 3809 regulations as pre-existing authorizations for a Plan of Operations.

The Zortman Mine is located in parts of Sections 7, 17, and 18, Township 25N, Range 25E, Montana Principal Meridian. The Landusky Mine is just west of the Zortman Mine in parts of Sections 14, 15, 22, and 23, Township 25N, Range 24E. Both mines are near the southern boundary of the Fort Belknap Indian Reservation in the southwest corner of Phillips County on a mixture of private land and public land managed by the BLM. Aerial photos taken in 1977 of the mining sites show extensive exploration and development disturbance that existed even before modern-day mining began in 1979 (FEIS Figures 1-2 and 1-3). FEIS Figure 1-4, taken in 1993, and photos on the cover of the SEIS taken in 1999 and 2001, show the mine disturbance as it generally looks today.

ZMI held BLM Plan of Operations MTM-77778 and DEQ Operating Permit No. 00096 for conducting operations at the Zortman Mine. Eleven amendments to the operating plans were approved between 1979 and 1988, which allowed the disturbance area to increase from the original

[1] In a 1995 reorganization the Montana DEQ was created from portions of the Montana Department of State Lands, the Montana Department of Health and Environmental Sciences, and the Montana Department of Natural Resources and Conservation.

permitted 273 acres to the present 406 acres. About 122 acres of the existing Zortman Mine disturbance is on BLM-administered lands. A history of permit amendments for the Zortman Mine is shown in Table 1-1 of the 1996 FEIS.

ZMI also held BLM Plan of Operations MTM-77779 and DEQ Operating Permit No. 00095 for conducting operations at the Landusky Mine. Ten amendments to the operating plans were approved between 1980 and 1991, which allowed the mine disturbance area to increase from 256 acres to the present 783 acres. About 472 acres of the existing Landusky Mine disturbance is on BLM-administered lands. A history of permit amendments for the Landusky Mine is shown in Table 1-2 of the 1996 FEIS.

Reclamation Plan Development History

The issuance of this Record of Decision approving reclamation plans for the Zortman and Landusky Mines is the culmination of a review process that began nearly 10 years ago.

In 1992, ZMI submitted plans for a major expansion at the Zortman Mine (see FEIS, pages 2-104 to 2-170). Review of water resources monitoring information, concurrent with review of the mine expansion plans, showed that acid rock drainage (ARD) was a widespread occurrence at both the Zortman Mine and the Landusky Mine. While past mining approvals and amendments included plans for reclamation, the agencies determined that those plans would not provide enough protection from the potential impacts of acid-forming mined waste rock and ore, and needed to be modified. In late 1992, the agencies requested that ZMI propose corrective measures to their existing mine operating and reclamation plans. In early 1993, the requests took the form of administrative orders issued under the authorities of §82-4-337(3), Montana Code Annotated (MCA) from DSL; and 43 CFR §3809.1-7(c) from BLM.

ZMI responded with proposed modifications to the reclamation plans that were analyzed in an environmental assessment and presented to the public in 1993. In response to public comment, and due to the technical complexity of the ARD issue when considered in combination with the mine expansion proposal, BLM and DSL decided to analyze the reclamation plan modifications in an EIS. The EIS scoping period on the Zortman Mine expansion application was reopened and the scope of the EIS analysis was broadened to include mine expansion and modified reclamation plans at both the Zortman and Landusky Mines.

Concurrent with the DSL and BLM efforts to modify ZMI's operating and reclamation plans, the Montana Department of Health and Environmental Sciences issued an enforcement order against ZMI for discharges from the mining areas to waters of the State. In August 1993, the State of Montana filed suit in State District Court against ZMI and Pegasus Gold, alleging violations of the Montana Water Quality Act. The Environmental Protection Agency (EPA) filed suit in Federal District Court of Montana in June 1995, alleging that discharges from the mine sites in seven drainages were in violation of the Federal Clean Water Act (Civil Action No. 95-95-BLG-JDS). The State of Montana then filed in Federal District Court and citizen suits were also filed in Federal District Court by Island Mountain Protectors and the Fort Belknap Indian Community Council (Fort

Belknap) (Civil Action No. 95-96-BLG-JDS). Settlement discussions in 1995 and early 1996 resulted in a Consent Decree effective September 27, 1996.

The Consent Decree required ZMI to implement various compliance plans involving monitoring, capture, and treatment of mine-impacted waters and to perform supplemental environmental projects benefitting the Fort Belknap Indian Reservation. However, the Consent Decree did not address surface reclamation requirements for the mines, which are beyond the scope of the water quality acts. The Consent Decree specified interim effluent limits for discharges of water from the mines, and directed ZMI to apply for Montana Pollution Discharge Elimination System (MPDES) permits for each mine. The MPDES permit applications were submitted to DEQ by ZMI on December 20, 1996. Processing of these discharge permits was delayed due to the subsequent bankruptcy of ZMI. Approval of the MPDES permits is also being made in this ROD.

After the completion of the FEIS and the signing of the water quality Consent Decree, the DEQ and BLM issued a Record of Decision on October 25, 1996. This ROD decided two things: One, it approved additional mining operations at both mines; and two, it required implementation of specific reclamation measures to control acid drainage development, including incorporation into the reclamation plans of various water management requirements from the Consent Decree (1996 FEIS Appendix A). The BLM decision to approve additional mining was appealed by Fort Belknap, Island Mountain Protectors, and the National Wildlife Federation to the Interior Board of Land Appeals (IBLA) in late 1996. The DEQ approval of expanded mining was challenged in State District Court in January 1997 by Fort Belknap, the National Wildlife Federation and Montana Environmental Information Center. In June 1997, the IBLA ordered the mine expansion approvals stayed while the administrative appeal was under consideration.

In January 1998, before a decision was issued on the merits of the appeal before IBLA, Pegasus Gold Corporation and ZMI filed for bankruptcy protection. On March 10, 1998, the companies announced they would not proceed with the approved mine expansion plans and instead would reclaim and close the mines. One result of the bankruptcy was that the reclamation bonds covering the existing mine disturbances would have to be used to reclaim the mines before the DEQ and BLM had a chance to make a decision on the reclamation plan modifications and bond review ordered in 1993.

To recalculate the necessary reclamation bonds in view of the pending bankruptcy proceedings and imminent mine closures, the agencies issued a second ROD on June 1, 1998. That decision rescinded the approved mine expansion and selected Alternative 3 from the 1996 FEIS for implementation. Alternative 3 did not provide for additional mining, but required reclamation of the existing disturbances using agency-developed mitigation to address the acid generating character of the waste rock and pit areas. The agencies then recalculated the bond and identified a shortfall of approximately $8.5 million which would be needed to implement Alternative 3. Both the State and BLM filed a claim against the operating companies in Bankruptcy Court for the shortfall. ZMI appealed the selection of Alternative 3 to IBLA, citing that reclamation under Alternative 3 would be too expensive and contained many requirements which were not necessary.

At the same time the agencies signed the June 1 ROD, the IBLA finally ruled on Fort Belknap's appeal of the 1996 mine expansion approvals.[2] The IBLA ruled that the 1996 FEIS did not contain enough information about groundwater conditions and therefore, BLM could not have adequately considered potential impacts to water resources, specifically, potential impact to Tribal water resources. The case was remanded to BLM.

BLM requested reconsideration of the IBLA decision, stating that absent a mine expansion proposal, the hydrologic data collected on the existing mines was sufficient for reclamation purposes. However, on November 20, 1998, the IBLA issued an order that set aside the BLM's decisions of June 1, 1998, and directed that, prior to selecting a final reclamation alternative, "...BLM must separately analyze, and consult with the Tribes about, potential effects on Tribal water resources and report on its actions in its decision."

As directed by the IBLA Order, the BLM and DEQ have been consulting with the Fort Belknap government since March 1999 on mine reclamation (see also SEIS Chapter 5 and subsequent section in this ROD on consultation with the Fort Belknap government). This consultation process utilized a technical working group of specialists from BLM, DEQ, EPA, and Fort Belknap to consider various environmental issues and reclamation options for the mines, with regular contact between agency decisionmakers and the Fort Belknap Indian Community Council. The technical working group developed five reclamation alternatives for the Zortman Mine and five reclamation alternatives for the Landusky Mine that are either more cost effective, more protective of the environment, or both, when compared to the Alternative 3 reclamation plan initially approved by the June 1998 ROD.

In March 2000, BLM and DEQ determined that selection of one of the additional reclamation alternatives developed during the consultation process may constitute a substantial change to the 1998 agency-proposed reclamation. Because a substantial change in the proposed action requires preparation of a supplemental EIS (40 CFR 1502.9(c)), a SEIS was prepared on the technical working group's 12 reclamation alternatives. The Final SEIS was completed in 2001 and is the supporting environmental analysis for selection of the mine reclamation plans and issuance of the MPDES permits.

[2] The agencies' June 1, 1998 ROD and the IBLA's decision of May 29, 1998 crossed in the mail. BLM had notified the IBLA of its intent to issue the ROD prior to June 1, but IBLA did not respond until after the ROD was signed.

Purpose of and Need for Action

The purpose of and need for action is to select reclamation plans for the Zortman and Landusky Mines which address the acid generating character of the mined material and pit areas, and which will successfully meet all applicable State and Federal requirements for mine reclamation with a reasonable assurance of long-term success. Also, the DEQ must act upon the MPDES permit applications submitted by ZMI in December 1996 as required by the Consent Decree.

Public Involvement

1996 EIS Public Involvement

Extensive public involvement occurred during preparation of the 1996 EIS to identify and address relevant environmental issues. A Notice of Intent, formally announcing the beginning of the EIS process, was published in the Federal Register in November 1992. The public was informed of, and involved in, the EIS process through additional Federal Register notices, news releases, direct mailings, and public meetings. Briefings were held throughout the process with the public, the Fort Belknap Indian Community Council, the Phillips County Commissioners, State Legislators and Congressional staffs.

To identify issues and concerns associated with mining and reclamation, public scoping meetings were conducted in the following communities:

- Dodson, December 15, 1992
  (26 people attended)
- Hays, December 17, 1992
  (27 people attended)
- Malta, December 16, 1992
  (39 people attended)
- Lodgepole, April 15, 1993
  (30 people attended the afternoon meeting)
  (75 people attended the evening meeting)

Project information was provided through press releases, mailed notices, and public service announcements. Copies of ZMI's proposed mining and reclamation plans were made available in Harlem, Malta, Lewistown, Billings, and Helena for public review. Summaries of the proposal were provided to the mailing list.

In November 1993, an environmental assessment on corrective reclamation measures to address acid drainage at the Landusky Mine was released for public comment. A public meeting was held in Dodson, Montana. In March 1994, the agencies decided to combine analysis of the Landusky Mine corrective measures with the Zortman Mine EIS process. A Federal Register Notice was published and a letter was sent to the public formally expanding the scope of the EIS to include the mining plans and modified reclamation plans at both mines.

On August 18, 1995, the Draft EIS, *Zortman and Landusky Mines Reclamation Plan Modifications and Mine Life Extensions* was released. The Draft EIS presented seven alternatives including the no action alternative, the agencies' preferred alternative (Alternative 7) and the company proposed action (Alternative 4). Approximately 400 copies of the Draft EIS were distributed to the public and other federal and state agencies. The agencies received 368 comment letters on the Draft EIS during the public comment period which ran through November 1, 1995. In addition to the written comments five open houses/public hearings were held in the following communities to receive oral comments on the Draft EIS:

- Medicine Bear Lodge in Lodgepole, September 18, 1995
  (129 people attended with 47 speakers),

- John Capture Center in Hays, September 19, 1995
  (153 people attended with 40 speakers),

- Guard Armory in Malta, September 20, 1995
  (186 people attended with 22 speakers),

- Community Hall in Landusky, September 21, 1995
  (108 people attended with 14 speakers), and

- East Middle School in Great Falls, September 26, 1995
  (280 people attended with 77 speakers)

Prior to the beginning of each hearing (except for in Great Falls) there was an open house where the EIS team specialists answered questions about the EIS and discussed the project impacts with the public. All participants were encouraged to submit written comments. These meetings were also a forum for the Army Corps of Engineers to collect public comments on ZMI's 404(b)(1) permit application for the mine expansions; and for DEQ to collect comments on the 401 certification. Written transcripts of the meetings were compiled so the agencies could address and respond to comments in the Final EIS.

Concurrent with public involvement during preparation of the 1996 FEIS, the BLM conducted consultation under Section 106 of the National Historic Preservation Act to identify and consider the effects of the undertaking on historic properties eligible for listing on the National Register of Historic Places. This process focused on the Little Rocky Mountains as a Traditional Cultural Property due to its association with American Indian traditional cultural values and practices. Also, consultation under the American Indian Religious Freedom Act was conducted to collect and consider the views of American Indians.

Consultation included soliciting input from American Indians regarding location and frequency of use of religious sites, and suggestions for mitigation of impacts to traditional cultural locations and practices. Many one-on-one discussions between BLM and Indian traditionalists were conducted. Often this included field visits to sites/areas of cultural significance. Direct input was solicited by BLM from Tribal elders, traditionalists and political leaders. Over 50 individuals were interviewed for an ethnographic study used in EIS preparation and section 106 consultation. In addition to the five public meetings held on the Draft EIS, nine public meetings were held specifically to discuss the Little Rocky Mountains as a Traditional Cultural Property and to develop mitigation for impacts to traditional cultural resources. In July 1995, staff from the Advisory Council on Historic Preservation toured the project area and attended three of the consultation meetings that were held to receive public input on a draft Programmatic Agreement.

All written and oral comments received on the Draft EIS were reviewed and considered in preparation of the Final EIS. Many of the comments tended to be polarized with those supporting

additional mining urging selection of Alternative 7, and those opposed to mining asking that Alternative 3 be selected. Comments that presented new data, questioned facts or analysis, or raised questions or issues bearing directly upon the alternatives or environmental analysis were responded to in Sections 6.1 through 6.17 of the Final EIS. Comments expressing personal opinions or statements were considered but not responded to directly. The EPA Notice of Availability for the Final EIS was published in the Federal Register on April 5, 1996. The Record of Decision selecting Alternative 7 was signed on October 25, 1996.

2001 Supplemental EIS Public Involvement

In 1998, after Pegasus Gold filed for bankruptcy and cancelled the expansion plans, the agencies consulted with the various stakeholder groups regarding mine closure. The groups consulted included technical and legal representatives from the Fort Belknap Community Council, the Island Mountain Protectors, Indian Law Resource Center, the National Wildlife Federation and the Montana Environmental Information Center. The agencies explained that in view of the bankruptcy and cancelled mine expansion plans, the Record of Decision would be reissued and Alternative 3 from the FEIS would be selected. This decision occurred in June 1998 but was vacated by IBLA in November 1998, with direction to consult further with the Fort Belknap Tribal government on reclamation.

As consultation with the Fort Belknap government on mine reclamation continued through 1999 and into 2000, additional reclamation alternatives were developed by the technical working group as part of the Multiple Accounts Analysis (MAA) process. The agencies decided to prepare a supplemental EIS on the new reclamation alternatives and a notice of intent announcing the EIS was published in the Federal Register on August 3, 2000. A public scoping notice describing the SEIS process, requesting public comments, and announcing the schedule of public scoping meetings was sent to a mailing list of over 100 individuals and groups. The scoping meetings for the SEIS were conducted in September of 2000 at the following locations:

- Lodgepole, September 19, 2000 (16 people attended)
- Hays, September 20, 2000 (19 people attended)
- Landusky, September 21, 2000 (16 people attended)

Oral comments were taken at the scoping meetings and written comments were received through October 2000. As part of the scoping process, a presentation was made to the Malta Chamber of Commerce on September 18 regarding the reclamation project, SEIS analysis, and the alternatives developed by the technical working group. Approximately 13 people attended this meeting.

On May 11, 2001, the Draft SEIS, *Reclamation of the Zortman and Landusky Mines, Phillips County, Montana*, was released for public comment. About 150 copies were sent to individuals or groups on the mailing list. Press releases were distributed announcing the availability of the Draft SEIS and the schedule of public meetings. Electronic versions of the Draft SEIS were posted on the

internet through the BLM and DEQ websites. Public meetings were held to collect comments on the Draft SEIS, and Draft MPDES permits, in the following communities:

- Lodgepole, June 5, 2001 (17 people attended)
- Hays, June 6, 2001 (6 people attended)
- Landusky, June 7, 2001 (21 people attended)

In response to public requests, the comment period was extended through August 9, 2001. A total of 53 comment letters were received on the Draft SEIS. Comments that presented new data, questioned facts or analysis, or raised questions or issues bearing directly upon the alternatives or environmental analysis were considered and responded to in Chapter 6 of the Final SEIS. Comments expressing personal opinions or statements were considered but not responded to directly. The Final SEIS was distributed to the mailing list and the EPA Notice of Availability of the Final SEIS was published in the Federal Register on January 18, 2002.

Issues and Alternatives

Consideration of Significant Issues

A complete description of the issues identified by the public, the technical working group, and the interdisciplinary team is explained in Section 1.5.2 of the SEIS and includes:

- Final Amounts of Mine Pit Backfill.
- Relocation of Mine Waste Facilities.
- Drainage of the Mine Pits.
- Reclamation Slope Regrading and Cover Design.
- Non-acid Generating Criteria for Mine Waste.
- Revegetation Measures.
- Water Management and Treatment.
- Protection of Water Quality (Groundwater and Surface Water).
- Protection-Restoration of Water Quantity (Groundwater and Surface Water).
- Land Application Disposal (LAD) of Heap Solution.
- American Indian Traditional Use and Cultural Properties.
- Employment and Economic Development.

In order to develop alternatives, the issues were grouped into six categories: Mine Pit Backfill; Relocation of Mine Waste Facilities; Drainage of Mine Pits; Protection/Restoration of Water Quality and Quantity; Reclamation Grading, Cover Design, and Revegetation; and Restoration of Area Aesthetics and Land Use. The following sections describe how the significant issues were used to develop the alternatives.

Mine Pit Backfill

The amount of mined waste rock and spent ore to be backfilled into the open pits during reclamation is a significant issue for both economic and environmental reasons at the Zortman and Landusky Mines (FEIS, Section 2.2.5). Economic considerations include the high cost associated with even a modest amount of backfilling. To place some of the closest waste rock back into the pits would cost at least $1 per ton. This unit cost escalates quickly the farther the material has to be hauled. If the haul involves moving the material uphill, the unit cost increases even more rapidly. Costs of over $4 per ton would be incurred for backfilling some of the mined material. Since over 200 million tons of ore and waste rock have been mined, backfilling even a fraction of it would cost tens of millions of dollars.

However, pit backfilling is one way to mitigate many of the environmental impacts from mining. Rock placed in the Zortman and Landusky Mine pits can protect water quality by placing it to direct surface runoff out of the pit, or by using it to cover pit highwalls containing sulfide minerals which might release acidity and metals during weathering. Backfilling of mine pits can also reduce the visual and cultural impacts of the mine disturbance on American Indian traditional cultural activities

and on recreationists visiting the public lands. Backfilling also reduces or eliminates the safety hazard often posed by pit highwalls.

Conversely, pit backfilling activities create added impacts due to earthmoving equipment exhaust, dust, and noise. In addition, the nature of the backfilled material and its placement can increase environmental risks to surface or groundwater and may adversely affect soil conditions and revegetation success. There are also private property concerns with pit backfilling at the Zortman and Landusky Mines. The vast majority of the mine pit areas are located on private land where BLM has no jurisdiction and the private owner may object to placement of acid-forming waste rock, or to waste rock beyond the amount needed to meet State mine reclamation requirements.

There is also an upper limit on the amount of material that can be placed back in the mine pits. It is not possible to backfill 100% of the mined material due to the increase in volume that occurs when rock is broken during mining. All the mined rock will not fit back in the pits. And, since some of the original pre-mine slopes were steeper than 2H:1V, reconstructing the slopes with backfill would make them more susceptible to erosion or failures than adjacent slopes which developed naturally.

Alternatives developed in response to the pit backfill issue cover the full range of backfilling options. All Zortman Mine reclamation alternatives include backfilling and grading of the mine pit floors to achieve a free draining condition. At the Landusky Mine, the alternatives include free draining pit backfill alternatives, groundwater drawdown alternatives, and horizontal borehole alternatives to prevent water from impounding in the mine pit. Other alternatives have been developed to include additional backfilling to cover the most sulfidic portions of the pit highwalls. And finally, alternatives have been developed that would restore the mine pit topography to near pre-mining conditions to address cultural and aesthetic concerns. Mitigation measures have been included in the alternatives to address the potential for increased contaminants in groundwater from acid generating backfill sources,and to protect revegetation from contact with acid generating materials. Alternatives with large amounts of pit backfilling (Alternatives Z4, Z5, L5, and L6) have been included in the analysis to consider their aesthetic benefits, even though they present increased risks to Tribal water resources which cannot be mitigated below significance.

Relocation of Mine Waste Facilities

The removal and relocation of certain mine waste facilities such as waste rock dumps and spent ore heaps were part of the alternatives development. Relocating mine waste materials away from close proximity to surface waters can improve the efficiency of seepage capture systems while providing the material needed for mine pit backfill. Removal or relocation of mine waste was incorporated in the alternatives to support pit backfilling and to enhance the protection of water quality in certain impacted drainages such as Alder Gulch and Montana Gulch.

At the Zortman Mine, the Alder Gulch waste rock dump, Z85/86 leach pad/dike, and O.K. waste rock dump are the three mine waste units considered for relocation. The Z82 leach pad, the Z82 sulfide dump, the Ruby sulfide stockpile, and portions of the Z85/86 leach pad and the South Ruby

dump have already been backfilled into the O.K. and Mint pits as part of interim reclamation conducted during 2001, so backfilling of this material is common to all alternatives.

Removal of the Alder Gulch waste rock dump at the Zortman Mine was required in the 1998 ROD to provide a source of pit backfill, eliminate a source of contamination to Alder Gulch, reduce water capture system requirements, and ease surface reclamation difficulties on the steep dump slope. This removal action has been carried forward under some of the Zortman Mine reclamation alternatives. Other alternatives would either leave the Alder Gulch waste rock dump in place or remove only a portion of the dump and seal the top with a synthetic liner.

Similarly, removal of the Z85/86 leach pad and dike were part of Alternative 3 in the 1996 FEIS, but were not adopted by the 1998 ROD due to concerns with placement of cyanidated material off the lined area. The SEIS reconsiders the relocation issue of the Z85/86 leach pad with alternatives that range from reclaiming the majority of the spent ore in its present location, to total removal and placement of the spent ore as mine pit backfill.

At the Landusky Mine, materials from seven mine waste facilities are considered for relocation. These include a portion of the Montana Gulch waste rock dump, the L85/86 leach pad and dike, the August #1 and #2 waste rock dumps, the Gold Bug yellow waste rock dump, part of the L87 leach pad, and a portion of the L91 leach pad. Removal of portions of the Montana Gulch waste rock dump is part of alternatives which would excavate a notch through the south end of the August Pit to provide for drainage from the Landusky Mine pit complex.

Removal actions for the L85/86 leach pad vary by alternative. However, all alternatives would remove some material to aid in unblocking the western tributary of the drainage. Three of the alternatives consider complete removal of the leach pad and dike for use as pit backfill.

A portion of the August #2 waste rock dump at the head of King Creek is removed under all alternatives to eliminate a potential source of contamination and to provide pit backfill material. Removal of material from the large L87 and L91 leach pads is part of the restoration alternatives that require large volumes of backfill. However, none of the alternatives totally remove the L87/91 leach pad complex, as all the spent ore would not fit back into the mine pits.

Drainage of Mine Pits

As noted in SEIS Section 1.5.2, drainage of the mine pits is related to the formation of pit lakes, protection of water quality, and re-establishing the hydrologic balance. While the pit drainage issue is significant at the Landusky Mine, drainage of the Zortman Mine pits are also a concern.

The pits at the Zortman Mine have not been excavated deep enough to intercept the groundwater table and therefore do not create permanent pit lakes. However, precipitation and runoff do infiltrate through the pit floors, resulting in a considerable volume of water with ARD contamination reporting to the Ruby Gulch capture system. Backfilling of the Zortman Mine pits to reduce infiltration, limit precipitation from contact with acid-forming minerals, and to route runoff out of the pit areas does not require substantial amounts of material compared to the quantity needed at the

Landusky Mine pits to achieve a similar result. Because interim reclamation work has established free draining conditions at the Ross, Mint, O.K./Ruby, and South Alabama pits by a combination of backfill and grading, all of the alternatives start from this configuration.

Alternatives for drainage of the Zortman Mine pits range from limited backfilling to create a relatively flat, but free-draining surface, to using a substantial amount of backfilling to re-create the approximate original runoff pattern of the mountain. These alternatives were all developed to establish free-draining conditions that would not impound water in the pit areas. One important concern is for all alternatives to route runoff away from the Lodgepole Creek watershed until the quality of runoff water can be assured without the need for treatment. Since Lodgepole Creek is presently unimpacted by mine drainage, the alternatives were all developed to avoid routing any runoff to this drainage where it might create impacts in an unimpacted drainage. This does not interfere with the reclamation objective of restoring the hydrologic balance since the volume of runoff water that would normally flow in this direction is insignificant.

The 1998 ROD requirement for pit drainage at the Landusky Mine included cutting a large drainage notch at the south end of the pit complex so that runoff from the pit area would discharge to Montana Gulch. This is a high cost reclamation item that would expose additional sulfide minerals in the walls of the drainage notch. Other alternatives have been developed by the technical working group that also would achieve the desired free-draining conditions in the pit, but without creating the adverse impacts associated with the excavation of a drainage notch.

Artesian well WS-3, located near the bottom of Montana Gulch, has a direct influence on the water level beneath the Landusky Mine pits (see SEIS Section 3.3.3). At one time the mine operators had a 95 gpm water right to the flow from well WS-3 which they used for leaching operations. When the well was closed after mine operations ceased in 1998, the water table rose and a shallow pit lake formed at the south end of the pit complex. When the well was opened, the pit lake drained and the floor of the pit is presently dry.

Reclamation alternatives have been developed which use well WS-3 as a way to influence movement of contaminated groundwater and as the primary discharge point for surface runoff. Alternative L2 would grade the pit floor so runoff is directed to the south end of the pit complex where it would infiltrate to groundwater appearing as discharge through the wellhead, and then treated at the Landusky water treatment plant. Alternatives L3 and L4 would also use well WS-3 for groundwater discharge and runoff control, but include construction of a directional borehole to further enhance this drainage pathway and serve as a backup in the event the artesian well collapsed or became plugged.

Alternative L5 involves partial backfilling of the pit to the level where only a relatively small drainage notch would need to be constructed for runoff control, but without intersecting the sulfide-rich portion of the pit. Alternative L6 includes such large amounts of backfill that runoff could be routed directly as surface flow without the need for construction of a drainage notch. Well WS-3 would still need to be used under Alternatives L5 and L6 to pull contaminated groundwater from the north side of the backfilled mine pits, but would not be used to manage surface runoff from the reclaimed pit areas.

Protection/Restoration of Water Quality and Quantity

A common element in all reclamation alternatives is the need to protect area water quality, meet the effluent limits in the MPDES permits, and to restore the area streamflows and hydrologic balance. As the contaminant loading analysis shows (see SEIS Section 4.3), the protection of water quality depends mostly upon the continued operation of the seepage capture systems and water treatment plants. Contaminant loads reporting to the existing capture systems would not be dramatically changed by the surface reclamation conducted on the mine waste units. Therefore, most alternatives will meet the effluent levels of protection for water quality so long as the seepage capture and treatment systems continue to operate, as required under all reclamation alternatives at both mines. Other alternatives include significant amounts of waste rock placed as backfill at the head of northern drainages that are presently without capture systems. To make these alternatives feasible, additional capture systems are included as part of the alternative description; although there is an increased risk that MPDES effluent limits would be exceeded in these situations.

Undoing the preferential groundwater flow paths created by the historic underground mining would be both technically unfeasible and outside the scope of reclaiming disturbance that occurred under the existing mine permits. However, several alternatives have been developed which address the hydrologic balance and the restoration of area water quantity by re-establishing the area topography to the extent that the natural distribution of surface runoff would be restored to pre-mine drainages. In addition, two of the Landusky Mine alternatives incorporate pumping and piping operations to return treated water to the drainage where it was captured to preserve streamflow volume. The Zortman Mine reclamation alternatives have the option of being constructed so that the surface runoff from the Ross Pit could be routed to the north at a later date, once good water quality is assured. This would compensate for any water presently being diverted to the south by the mine disturbance. Calculations indicate that moving a relatively small volume of water would mitigate both the historic disruption in groundwater flow and the current disruption in surface runoff patterns caused by the Zortman Mine pits (see also SEIS Section 3.3.3).

Adequate Water Resources Information

One issue related to the *protection/restoration of water quality and quantity* is concern over the adequacy of the water resources information. In 1998, the IBLA found the information on water resources to be insufficient in their review of the 1996 and 1998 records of decision. IBLA required BLM to obtain any information relevant to reasonably foreseeable significant adverse impacts as required under 40 CFR 1502.22(a), or explain why such information was not needed.

Since the IBLA decision, a variety of additional studies and reports on water resources have been completed. These studies are listed in the Final SEIS on pages 3-11 and 3-12 and their results have been incorporated into the Supplemental EIS. Overall, the results of the new studies do not change the basic findings in the 1996 Final EIS regarding hydrologic conditions in and around the Zortman and Landusky Mines. The studies have added further specifics regarding quantities of infiltration and mass loading on an individual watershed basis. The studies have also provided additional information on groundwater movement beneath the pit areas at the Landusky Mine. Though it was previously known that groundwater movement beneath the pits was preferentially to the south, the

water balance, chemical mass loading, and hydrologic impact studies completed since the 1996 Final EIS have developed quantitative estimates of the amount of flow to the south and the relationship between discharge from well WS-3 and groundwater movement. This quantitative determination will aid in controlling post-reclamation water movement beneath the mine pits and prevent significant impacts to northern-flowing drainages.

Reclamation Grading, Cover Design, and Revegetation

The surface reclamation of mine waste facilities often has to meet multiple and sometimes conflicting objectives. Surface reclamation is desired to be stable and erosion resistant, prevent or limit the infiltration of precipitation which might generate leachate, contain enough soil and nutrients to support a self-sustaining stand of native vegetation, provide for wildlife habitat, and present an aesthetically pleasing environment. Reclamation cover designs, therefore, require consideration of the grading or degree of slope that the reshaped material must achieve, specification on the soil or other material placement and thickness, and plans for revegetation. Since these items are all interrelated, how one is accomplished can affect or dictate the options available for the remaining reclamation items. For example, a steep reclamation slope may be needed to match the pre-mine topography, but may not be stable if covered with a clay or geomembrane (plastic) cover. Or, a thick soil cover needed to hold moisture for revegetation may require new surface disturbance to obtain the soil material, creating its own set of impacts.

The surface reclamation measures that have been considered range from those proposed in the 1998 ROD to measures developed by the technical working group. The alternatives vary from the application of a single lift of cover soil to highly engineered barrier cover systems that use synthetic materials. Various reclamation techniques such as the selective use of water barrier and water balance covers dependent upon slope; incorporation of available tailings in the cover soil; soil organic amendments and fertilizers; seed mix; weed control; visual impact mitigation through selective tree planting; and infiltration minimization have all been considered in developing the surface reclamation alternatives.

Restoration of Area Aesthetics and Land Use

The existing mine disturbance has had a significant impact on the aesthetics of the area and, in turn, on some of the land uses. Unreclaimed surfaces are not productive compared to the adjacent undisturbed environment. The visual impacts created by the pit areas, leach pads, waste rock dumps, and support facilities have had an adverse effect on American Indian traditional uses in the Little Rocky Mountains and on recreationists seeking hiking, hunting, or other outdoor activities.

Alternatives were developed to address these issues by reclaiming disturbed areas to productive conditions comparable to the undisturbed areas. The degree to which restoration of pre-mine conditions is attained varies by alternative. Generally, the greater the amount of mine pit backfilling, the closer the alternative comes to restoration of the pre-mining topography. Even in alternatives where restoration of the pre-mining topography is not achieved, other reclamation activities such as regrading to blend mine disturbance with adjacent landforms; replacement of the

soil cover; revegetation techniques; capture and treatment of impacted waters; and re-establishment of wildlife habitat will restore some of the area aesthetics and land uses.

Alternative Development Process

In addition to the technical issues discussed above, several management issues influenced development of the alternatives. These include:

- Examining reclamation and water management practices to identify those measures that would best protect Tribal trust resources, with an emphasis on water quality.

- Determining how to best use the available reclamation bonds and water management bonds to reclaim and manage the mine sites should funding be limited to these sources.

- Examining additional reclamation alternatives beyond those affordable under the reclamation bonds to ensure that the best practical reclamation alternative has been considered. This includes identifying and establishing a priority of additional reclamation measures to be implemented should funds become available.

- Continuing to identify reclamation measures common to all alternatives that could be implemented as interim reclamation. Performance of interim reclamation is desirable because it maximizes effective use of the bonds' present value and reduces existing environmental impacts, yet preserves final reclamation options.

Development of the reclamation alternatives for the SEIS began with an evaluation of the reclamation plans in the June 1998 ROD. Those 1998 reclamation plans are used in this SEIS as the base case, or "no action" alternatives (designated Alternative Z1 for the Zortman Mine and Alternative L1 for the Landusky Mine). While there has been no final BLM decision to approve the 1998 reclamation plans due to action by the IBLA, the DEQ's 1998 decision is still in effect. In this particular circumstance the BLM must issue a new decision before the existing state-approved reclamation plan could be implemented on BLM-managed lands.

After reviewing the 1998 ROD reclamation plans and considering the issues discussed previously, other alternatives for reclaiming the mines were developed by a technical working group composed of representatives from BLM, DEQ, EPA, and Fort Belknap. The technical working group developed the alternatives using a "Multiple Accounts Analysis" (MAA) process under the direction of Robertson GeoConsultants and Spectrum Engineering.

The MAA is an iterative process of considering possible reclamation measures under a central theme, evaluating the effectiveness of the reclamation alternatives, and then revising the alternatives to optimize their effectiveness (see also SEIS Section 4.13 and Appendix A). Although the alternatives vary in emphasizing different aspects of reclamation, all alternatives were formulated by the agencies' engineering consultants, under the direction of the technical working group, to meet

the applicable regulatory requirements and standards for mine reclamation with some alternatives posing a greater risk of failure than others, or requiring more intensive long-term management.

The technical working group developed reclamation alternatives to address the issues at each mine under several Phase 1 and Phase 2 scenarios. Under Phase 1, the group assumed reclamation expenditures would be limited to those funds available from the reclamation bonds. Phase 2 reclamation alternatives were developed without regard for the limits of the reclamation bonds. While cost was not a limiting factor, Phase 2 reclamation alternatives did not ignore the need for the reclamation to be financially responsible.

The public was involved in the MAA assessments and alternatives development process. Two meetings were sponsored by the Fort Belknap Indian Community Council on the Reservation. The initial MAA results and alternatives were discussed with Fort Belknap residents at these meetings. During the public scoping meetings for the SEIS, the technical working group alternatives were presented to the public for review and comment. When the draft SEIS was released for comment, the MAA scoring sheets were included for public review.

Phase 1 alternative development for reclamation of the Zortman Mine considered how to best utilize the existing bond monies under several approaches. One alternative was to reduce the long-term operating and maintenance costs of the water treatment plant by using part of the reclamation bond monies to relocate the ARD water treatment plant to Goslin Flats. This would allow captured water to be routed to the treatment plant without pumping (Alternative Z2). The second alternative was continued operation of the water treatment plant in its present location, with all the reclamation bond used to conduct regrading and reclamation cover placement. This approach emphasized controlling infiltration that might create leachate requiring water treatment (Alternative Z3).

Reclamation alternatives for the Zortman Mine under Phase 2 of the MAA combined the reclamation strategies of minimizing water treatment costs in Alternative Z2 and source control under Alternative Z3, with additional amounts of pit backfilling to further enhance source control and restore the area topography. Alternative Z4 includes additional pit backfilling and waste rock dump removal with application of engineered barrier reclamation covers to minimize the amount of water requiring treatment. Alternative Z5 was developed to address the issue of restoring the original topography to the extent technically feasible. Alternatives Z4 and Z5 were derived, in part, from the alternative reclamation plan proposal submitted by Fort Belknap at the beginning of the consultation process (Fort Belknap 1999).

Zortman Mine Alternative Z6 was developed by the technical working group after an initial evaluation of Alternatives Z1 through Z5. Alternative Z6 combines the most environmentally beneficial aspects of Alternative Z4 with Alternative Z3 in order to optimize reclamation performance. This alternative uses engineered barrier covers in select areas while providing two feet of growth medium over the majority of the reclaimed area. Alternative Z6 includes extensive surface regrading with partial removal of the Alder Gulch waste rock dump.

The Phase 1 alternative development for reclamation of the Landusky Mine considered how to best utilize the existing bond monies. Alternative L2 optimizes the amount of reclamation earthwork throughout the mine by regrading the ore heaps and waste rock dumps, replacing cover soil, re-establishing vegetation, providing for pit drainage, and continued capture and treatment of mine-impacted waters. Only a single Phase 1 alternative was developed for the Landusky Mine. Relocating the Landusky Mine water treatment plant was considered; but because relocation would not provide any substantial cost or environmental benefit, it was not included in any of the alternatives.

Reclamation alternatives for the Landusky Mine under Phase 2 of the MAA were developed to incrementally consider the advantages and disadvantages of various amounts of additional mine pit backfill. Each of these alternatives include provisions for management of runoff or drainage from the pit area, removal of mine waste facilities to improve water management, and an increase in the areas where revegetation would be established.

Alternative L3 addresses the issue of reliable drainage from the Landusky Mine pit complex by including the drilling of a directional borehole to provide a backup mechanism for drainage. Alternative L3 also addresses the visual impacts of the highwalls by blasting along a portion of the upper bench the pit highwall and would cover approximately 80% of the sulfide portion of the pit highwalls. Alternative L4 increases the amount of pit backfill and unblocks the Montana Gulch drainage to address concerns with water management around the L85/86 leach pad. Alternative L4 also addresses the visual impacts by highwall reduction through blasting and covers about 85% of the exposed sulfide minerals in the highwall to protect water quality. Alternative L5 addresses the same issues as Alternative L4, but increases the amount of backfill so pit drainage can be achieved without relying on subsurface means and with virtually all exposed sulfides in the mine pit highwalls covered. Alternative L6 would restore the mining area topography to near its pre-mining configuration. It addresses the issue of impacts to traditional cultural use of the area, maximizes area aesthetics, and restores the surface water drainage configuration. Alternatives L5 and L6 were derived, in part, from the alternative reclamation plan proposal submitted by Fort Belknap at the beginning of the consultation process.

Alternatives Considered in Detail

As a result of the alternative development process, the following alternatives were considered in detail in the Supplemental EIS.

Zortman Mine Reclamation Alternatives

Section 2.4.2 of the Final SEIS describes in detail the six alternatives for reclamation of the Zortman Mine. The major difference between the alternatives is the amount of pit backfill placed in the North and South Alabama, Ross, O.K./Ruby and Mint pits. The amount of backfilling dictates the amount of waste rock dump and leach pad material that can be removed from their present locations.

Alternative Z1 is basically the same reclamation plan as initially selected in the agencies' June 1998 Record of Decision, and is based on Alternative 3 of the 1996 FEIS. It has been modified slightly to account for the interim reclamation that has been completed to date.

Alternative Z2 is designed to be affordable within the current reclamation bond amount and to optimize the long-term economics of the water treatment plant operation. The funding would first be used to relocate the water treatment plant to Goslin Flats. The remainder would be for regrading, soil placement, and revegetation of the mine disturbance.

Alternative Z3 is also designed to be affordable within the current reclamation bond amounts. The water treatment plant would be left in its current location. The reclamation funds would be used to place a greater thickness of growth medium over all regraded surfaces so as to further limit water contact with acid generating materials. The additional growth medium would be obtained from the Ruby Gulch tailings.

Alternative Z4 costs would exceed the funds available from the reclamation bonds by approximately $29 million. The alternative includes removal of the Alder Gulch waste rock dump and backfilling the upper mine pits to cover the majority of sulfide minerals exposed in the pit highwalls. Additional regrading of the leach pads would be conducted and all potentially acid generating materials would be covered with water barrier or water balance reclamation covers.

Alternative Z5 costs would also exceed the funding available from the reclamation bonds. It is the highest cost Zortman Mine reclamation alternative, estimated at $37.1 million over the bond amount. The mine pits would be backfilled using material from the waste rock dumps and portions of the leach pads in order to restore the approximate pre-mine topography.

Alternative Z6 is identified in the Final SEIS as the agencies' *preferred alternative* for reclamation of the Zortman Mine. It is estimated to cost approximately $5 million more than is available from the reclamation bond. The water treatment plant would be left at its current location. The alternative includes partial relocation of the Alder Gulch waste rock dump to the North Alabama pit, covering exposed sulfides in the Ross pit, and additional regrading. Synthetic liners would be placed over the regraded surface of the O.K./Ruby pit backfill, the Alder Gulch waste rock dump,

and North Alabama pit backfill. A 24-inch thick soil/tailings cover would be placed over the most of the regraded area to support vegetation.

Landusky Mine Reclamation Alternatives

Section 2.4.3 of the Final SEIS describes in detail the six alternatives for reclamation of the Landusky Mine. The major difference between alternatives is the amount of pit backfill placed in the mine pits. The amount of backfilling in each alternative determines whether additional mine dumps or spent ore heaps are removed and placed back into the pits. Another difference in the alternatives is the method of ensuring free draining conditions from the pit complex. Some of the alternatives rely on surface drainage routing, while others use groundwater discharge to control runoff from the reclaimed pit area.

Alternative L1 is the same reclamation plan as that initially selected in the agencies' June 1998 Record of Decision, and is based on Alternative 3 of the 1996 FEIS.

Alternative L2 is designed to be affordable within the existing reclamation bond amount. Leach pad slopes would be regraded, covered with soil, and revegetated. The pit complex would be drained via artesian well WS-3. A partial drainage notch would be cut around the west side of the L85/86 leach pad in order to prevent runoff from ponding behind the leach pad in the western tributary to Montana Gulch.

Alternative L3 includes all the provisions of Alternative L2, plus several additional reclamation features. The estimated costs for this alternative slightly exceed the bond amount, but may be doable with cost savings realized through construction management and the competitive bidding process. Backup drainage for the mine pit complex would be provided by a directional drill hole into Montana Gulch. Sulfides exposed in the highwall and upper bench of the Suprise pit would be covered.

Alternative L4 is identified in the Final SEIS as the agencies' *preferred alternative* for reclamation of the Landusky Mine. It is estimated to cost $17.5 million more than the reclamation bond amounts. It includes all provisions of Alternative L3, plus removal of the L85/86 leach pad and dike from the Montana Gulch drainage. The excavated material would be used to cover highwalls, to partially backfill the August/ Little Ben, and South Gold Bug pits, and to reduce the slope of the L84 leach pad dike. Sulfides exposed in the highwall and upper bench of the Suprise pit would be covered using material from the August #2 waste rock dump. The pit complex would be drained via groundwater discharge through the existing artesian well with a directional drill hole to Montana Gulch providing backup drainage. Highwall reduction in the Gold Bug Pit would be used to cover the pit walls. The L87/91 leach pad would be reclaimed in place, with the spent ore regraded to an overall slope of 2.5H:1V.

Alternative L5 includes the reclamation features of Alternative L4, with additional backfilling of the mine pits to the level where most of the sulfide-rich highwalls are covered. The L85/86 leach pad and dike, and much of the acid generating spent ore from the L87 leach pad would be removed and used as backfill. A synthetic liner would be installed over the entire floor of the pit complex prior

to backfilling. A small notch would be cut through the highwall at the south end of the pit complex to provide drainage from the pit area. The estimated cost for Alternative L5 is $68.5 million, or $48.9 million over the bond amount.

Alternative L6 includes backfilling of the mine pits to approximate the pre-mining topography. Much of the backfill material would come from the spent ore on the L87/91 leach pads. The north-south surface drainage divide in the pit area would be re-established. All regraded surfaces would be covered with low-infiltration water barrier or water balance reclamation covers, depending on slope steepness. Low permeability liners would be installed over the backfilled and graded pit floors in the August/Little Ben/Suprise/Queen Rose pit complex. The estimated cost for Alternative L6 is $157.3 million, or $137.7 million over the bond amount.

Chapter 2 of the Final SEIS contains a complete description of the alternatives. Tables 2.7-1 and 2.7-2 in the Final SEIS summarize and compare the major reclamation elements of each alternative. Final SEIS Tables 2.8-1 and 2.8-2 compare the environmental impact of each alternative.

Alternatives Considered But Eliminated from Detailed Analysis

An alternative to move the Landusky Mine water treatment plant to a lower elevation (similar to Alternative Z2 for the Zortman Mine) was considered and eliminated from detailed analysis. The present location of the Landusky Mine water treatment plant is optimal as it allows most flows from the seepage capture systems to be gravity fed to the plant with minimum pumping. Moving the treatment plant further downhill does not offer any significant environmental or cost benefits. In fact, it could actually increase costs if future water capture in the northern drainages has to be pumped back to those drainages after treatment.

Alternatives which applied reclamation measures only to a single mine facility, to the exclusion of other disturbance areas, were not considered in detail. For example, reclamation plans which only worked on water resource protection or only addressed pit backfilling were not considered in detail as they would not meet minimum regulatory requirements for reclamation of the remaining disturbance areas.

Several modifications to Alternative L5 were considered and eliminated from detailed analysis (SEIS Section 2.3). One possible alternative was to obtain “clean” fill from offsite as pit backfill instead of using spent ore from the L87/91 leach pad. This was considered as a way to eliminate potential impacts to water resources from backfilling the pit with the leach pad material, which is acid generating. Preliminary calculations show that to haul in clean fill from within 10 miles would require 378,000 haul truck trips through or near (depending on road routing) the community of Hays, on the Fort Belknap Reservation, and would take an estimated 63 years to complete. It would also increase the estimated cost for Alternative L5 by over 2½ times, from $68.5 million to $170.8 million. Due to the extreme timeframe required for reclamation completion, the inherent safety hazard from haul traffic, and the potential for severe offsite impacts from haul truck traffic, noise, and dust, this alternative was eliminated from detailed analysis and further consideration.

The second Alternative L5 modification considered was to amend the pit backfill material obtained from the L87/91 leach pad with lime in order to neutralize acidity in the backfill. Estimates show that it would require approximately 431,500 tons of agricultural lime to amend the backfill as it is placed in the pit. This option would more than double the estimated cost of Alternative L5, increasing it from $68.5 million to $135.9 million and would probably still fail to protect water quality.

Liming is a preventative measure which may provide sufficient water quality protection when the materials involved are near neutral or need to be buffered where in contact with growth medium. However, liming does not carry the same level of protection as keeping the material away from the pits in the first place. Lime application does not function well as a water quality protection mechanism when it is used to treat materials that are strongly acid generating as is the case with spent ore from the L87/91 leach pad. While neutralization of leachate may be achieved, in the sense that the effluent pH is neutral, the neutralizing reaction results in products of its own which may degrade water quality with contaminants such as sulfate and other dissolved solids. Although this leachate would not contain significant amounts of metals such as copper, lead and zinc that are mobile at a low pH, it could very well contain other metals such as arsenic and selenium that are mobile under the alkaline conditions that would exist in the lime-amended pit backfill. In fact, liming could actually promote the release of arsenic and selenium. Additionally, the life of lime treatment is finite. As the lime neutralizes ARD that is produced within the backfill, the lime is dissolved along preferred flow paths and eventually the ARD is discharged relatively untreated.

In addition, estimates show that to place the amount of lime that would be required to neutralize the waste rock would take 431,500 tons of lime, or approximately 21,600 truckloads. The lime would have to be hauled through the town of Landusky, generating dust and safety hazards for this residential area. This was considered impractical for similar reasons that making 378,750 truck trips through Hays was considered impractical. Due to the low feasibility for lime amended backfill to substantially increase the protection of water quality, this alternative was eliminated from detailed analysis and further consideration.

Environmentally Preferred Alternatives

Identification of the environmentally preferred alternatives is required in a Record of Decision under the Council on Environmental Quality regulations at 40 CFR 1505.2(b). Identification of the environmentally preferred alternatives for reclamation at the Zortman and Landusky Mines is complicated by the amount of weight given to the various impacts occurring under each alternative.

In both the 1996 and 1998 RODs, Alternative 3 from the 1996 Final EIS was identified as the environmentally preferred alternative. Alternative 3 is the same as Alternatives Z1 and L1 in the Supplemental EIS. However, since 1998 the agencies have been reevaluating reclamation options and have developed a new set of alternatives in conjunction with the Fort Belknap government and EPA. A technical working group composed of the various stakeholders has evaluated the performance of the alternatives using the Multiple Accounts Analysis (MAA) process. The results of the MAA provide a numeric scoring of each alternative's performance in a variety of

environmental categories on a scale from 1 to 9. The composite score of all environmental performance categories (i.e., excluding costs) is one method that can be used to identify the environmentally preferred alternatives. The results of the MAA for the reclamation alternatives are shown below in Table R1:

Table R1. Overall MAA Results by Alternative

Zortman Mine	Overall MAA Score	Landusky Mine	Overall MAA Score
Alternative Z1	7.3	Alternative L1	7.2
Alternative Z2	6.4	Alternative L2	7.0
Alternative Z3	6.4	Alternative L3	7.0
Alternative Z4	8.0	Alternative L4	7.3
Alternative Z5	**8.5**	Alternative L5	7.9
Alternative Z6	7.6	Alternative L6	**8.1**

Using the results of the MAA composite scores for all categories except economics, Alternative Z5 would score as the environmentally preferred alternative for reclamation of the Zortman Mine; and Alternative L6 as the environmentally preferred alternative for reclamation of the Landusky Mine. The result is primarily due to the benefits of full backfilling of the mine pits on visual, aesthetic, cultural and recreational values. The difficulty or caution in this approach is that a high score in some categories can overshadow a low score in other critical categories. In this case, within the MAA composite scores there are some considerably negative impacts to water resources associated with pit backfilling, especially to the northern-flowing drainages. A comparison of the MAA line-item scores for protection of water quality in the northern flowing drainages of Lodgepole Creek and Swift Gulch illustrates this effect, as shown below in Table R2.

Table R2. MAA Results on Northern Drainage Water Quality by Alternative

Zortman Mine	MAA Score Lodgepole Ck. Water Quality	Landusky Mine	MAA Score Swift Gulch Water Quality
Alternative Z1	7	Alternative L1	**9**
Alternative Z2	7	Alternative L2	**9**
Alternative Z3	7	Alternative L3	**9**
Alternative Z4	5	Alternative L4	**9**
Alternative Z5	5	Alternative L5	5
Alternative Z6	**9**	Alternative L6	**3**

Because protection of water quality carries additional weight under the State and Federal Clean Water Acts, and because of the BLM's requirement to protect Indian trust resources, the MAA water quality protection indicators for northern drainages best reflect the environmentally preferred alternatives. Using this indicator, Alternative Z6 is the environmentally preferred alternative for reclamation of the Zortman Mine, and Alternatives L1 through L4 are tied as the environmentally preferred alternative for reclamation of the Landusky Mine.

Consultation with the Fort Belknap Government

In a decision dated May 29, 1998, the Interior Board of Land Appeals (IBLA) required the BLM to consult with the Fort Belknap Tribes and to identify, protect, and conserve trust resources, trust assets, and Tribal health and safety; and to report on its actions in issuing a decision on final reclamation plans (144 IBLA 185). In response to a request for reconsideration, IBLA issued an Order on November 20, 1998, which further directed that, "...BLM must separately analyze, and consult with the Tribes about, potential effects on Tribal water resources and report on its actions in its decision." The following information constitutes the BLM's report on its consultation efforts as required by IBLA.

From February 1999 through early 2002 the BLM consulted with the Fort Belknap government on reclamation of the Zortman and Landusky Mines. Consultation activities included establishment of a technical working group of staff specialists to review reclamation actions, BLM funding of Fort Belknap staff to participate in the technical working group, one-on-one discussions between agency decisionmakers and Fort Belknap Indian Community Council members, joint review of additional studies on reclamation, identification of interim reclamation that could proceed immediately, signing of a Memorandum of Understanding (MOU) for preparation of a Supplemental EIS on reclamation, and collaboration on the preferred reclamation alternatives.

During the consultation process, BLM decisionmakers met with members of the Fort Belknap Indian Community Council on over 20 separate occasions to discuss reclamation issues and provide direction to the technical working group. In addition to the decisionmaker meetings, the technical working group composed of specialists from BLM, DEQ, EPA and Fort Belknap met on 27 separate occasions to discuss mine reclamation issues, with some of the meetings lasting two to three days. A chronology of the consultation process with the Fort Belknap government is contained in Appendix R of this ROD. The results of the consultation effort are discussed below.

Technical Working Group Process

To facilitate government-to-government consultation with Fort Belknap, the BLM, Fort Belknap, EPA and the DEQ formed a technical working group to discuss and analyze the issues associated with mine reclamation. The purpose of the technical working group was to formulate a common understanding of the technical issues associated with reclamation and to oversee the ongoing interim reclamation activities. Technical working group members reported back to each party's respective decisionmakers.

The technical working group met numerous times over a three year period either at the mine site or at a convenient mutually agreed upon location. Accomplishments of the technical working group included: development of the reclamation alternatives, preparation of the Multiple Accounts Analysis, the hosting of public briefings and mine tours on the reclamation effort, overseeing development of minewide revegetation plans, overseeing development of operating plans for the land application disposal area, reviewing supplemental geochemical and hydrological reports,

selection of a treatment system and contractor for treating the residual leach pad waters, development of the long-term water resources monitoring plans, identification of interim reclamation measures which could be immediately implemented, development of a MOU for preparation of the Supplemental EIS, briefings for the decisionmakers, and review of draft Supplemental EIS material.

Consultation Findings and Conclusions

The following are specific areas where IBLA ordered BLM to report on the results of BLM's consultation with the Fort Belknap government.

Identification of Trust Resources and Assets

The Zortman and Landusky Mines are located on a combination of private lands and public lands managed by the BLM. The mines are not located within the Fort Belknap Indian Reservation or on any Tribal lands. However, the mines are located near Tribal lands and have the potential to cause impacts to trust resources that are located downstream. In addition, the Tribes attach religious and cultural significance to the Little Rocky Mountains, a portion of which were ceded to the United States in 1895.

There are no trust resources or assets in the mining area over which Fort Belknap has ownership or property rights, with the possible exception of downstream water rights to some of the runoff from the mining areas. The closest the Zortman Mine disturbance comes to the Fort Belknap Reservation is approximately 3 miles. The closest the Landusky Mine disturbance comes to the Fort Belknap Reservation is approximately 1/4 mile from Mission Peak to the Landusky pit complex. Stream distance between the Landusky Mine and the Fort Belknap Reservation is approximately 2,500 feet along King Creek and approximately 6,000 feet along Swift Gulch/South Bighorn Creek.

Trust resources that have been identified in the mining areas are limited to surface and ground water runoff which may eventually flow onto the Fort Belknap Reservation. The exact amount of water that Fort Belknap is entitled to should be determined as part of the water compact negotiations between the United States and the State of Montana.

Potential Effects on Tribal Water Resources

Estimates have been completed on the amount of runoff intercepted by the mine disturbance areas which might otherwise enter drainages flowing toward the Fort Belknap Reservation. The amount of water falling on the mine disturbance at the head of Lodgepole Creek is extremely small, estimated at 0.6% of the drainage basin total area. Any change in streamflow resulting from this mine would not be detectable at the Reservation boundary approximately 3 miles downstream, and there is no discernable impact on trust resources from the Zortman Mine.

The situation at the Landusky Mine is more complex than that described for the Zortman Mine. Natural geologic structures such as shear zones and faults, combined with historic underground mine

workings, have caused the groundwater to preferentially flow to the south, away from the Fort Belknap Reservation. Since the discharge of shallow groundwater makes up most of the stream flow in these upper reaches of the mountains, changes in groundwater flow can directly affect the amount of streamflow in the upper segments of drainages near the mine. The preferential flow of groundwater to the south has been greatly increased by flow from artesian well WS-3 located in the Montana Gulch drainage.

Specific studies of the Landusky Mine's hydrologic impact to King Creek and Swift Gulch were prepared in order to quantify the change in flow due to the present and past mining. The study found that with artesian well WS-3 closed there is a net decrease in groundwater recharge to the northern drainages of only about 5 gallons per minute (gpm). However, with well WS-3 flowing the situation is considerably different. A worse case analysis shows that with WS-3 flowing the net loss in flow to King Creek and Swift Gulch combined is 64 to 76 gpm.

BLM, DEQ, and the technical working group have determined that to protect water quality in King Creek and Swift Gulch, well WS-3 should remain open in the near future because groundwater beneath the mine pits is of poor quality, containing elevated metals, sulfate and acidity; and must be directed away from the Reservation. Because well WS-3 is open to protect water quality, the quantity of groundwater entering the northern drainages will continue to be less than it would be with the well closed.

Protection of Trust Resources and Assets

The Zortman Mine, even in its present unreclaimed condition, does not threaten to impact trust resources and assets. However, reclamation of the Zortman Mine using either Alternatives Z4 or Z5 would increase the risk of impacts to Tribal water quality and should not be selected in order to protect trust resources and assets. Protection of Fort Belknap trust resources and assets needs to focus on reclamation actions at the Landusky Mine that could affect either the quality or quantity of water entering King Creek and Swift Gulch, which eventually flow onto the Fort Belknap Reservation.

To protect Fort Belknap water resources, reclamation actions at the Landusky Mine must include measures to keep degraded water from forming and entering the northern flowing drainage. If enough contaminants enter these drainages they could degrade the water in downstream reaches of King Creek and Swift Gulch, where they extend onto the Reservation. At present, King Creek water is of good quality and Swift Gulch water, although mine-impacted, is still of acceptable quality at the Reservation boundary. This condition exists with well WS-3 left open to "pull" most of the impacted groundwater beneath the pits south to the water treatment plant, and with the northern portion of the mine pit floor open to infiltrating precipitation.

In order to maintain, and improve upon, existing conditions so as to protect trust resources, several reclamation actions must occur: 1) Well WS-3 must remain open to limit northward movement of contaminants in the groundwater system; 2) the northern portions of the pit area must be reclaimed with low permeability reclamation covers to restrict acid-forming rock from contact with water (this

is in progress); and 3) no additional acid-forming material should be placed north of the groundwater divide where it has the potential to further release contaminants which may degrade water quality.

Reclamation of the Landusky Mine under Alternatives L1 through L4 would achieve these three objectives with barrier reclamation covers over the northern mine pit floors and maintenance of the WS-3 drainage system. Alternative L4 would take the relatively non-acid generating material from the L85/86 leach pad and use it as pit backfill. Alternatives L5 and L6 would not protect trust water resources because they involve removing acid-forming spent ore from the lined L87/91 leach pads (located on the south side of the drainage divide) and placing it as pit backfill on the north side of the drainage divide where it could release additional contaminants that would impact tribal water resources. Alternative L6, which remediates most of the aesthetic impacts, would be especially risky for trust resources due to the large amounts of acid generating material that would be used to backfill the mine pits.

The potential contaminant load that would be generated in King Creek and Swift Gulch are shown in Final SEIS Table 4.3-3. A portion of Table 4.3-3 is presented below in Table R3 showing the predicted contaminant loads for these northern drainages by alternative.

The predicted contaminant loads to the northern drainages are the same under Alternative L3 and Alternative L4, and are considerably less than that predicted for Alternative L5. Both Alternatives L3 and L4 would protect Tribal water resources. Even using environmental controls such as recovery wells and seepage capture systems, the impacts to King Creek and Swift Gulch under Alternatives L5 and L6 could not be reduced to less than significant (meaning there is a better than even chance water quality standards would not be met). BLM cannot support the implementation of Alternatives L5 or L6 because they do not ensure that Tribal water resources would be protected, even if funding was available for their implementation. DEQ cannot support Alternatives L5 or L6 because they increase the risk of discharges that would exceed the water quality standards.

Table R3. Modified Final SEIS Table 4.3-3

Constituent	Drainage	Existing Conditions	Alternative L1	Alternative L2	Alternative L3	Alternative L4	Alternative L5	Alternative L6
pH (s.u.)	King Creek	7.0 to 8.0	7.5	7.5	7.5	7.5	6.0	5.5
	Swift Creek	6.5 to 7.5	6.5	6.5	6.5	6.5	5.5	3.0
Sulfate Load	King Creek	66,000	65,000	65,000	65,000	64,000	151,000	216,000
(lbs/yr)	Swift Creek	85,000	52,000	54,000	54,000	54,000	141,000	186,000
Iron Load	King Creek	26	26	26	26	26	60	89
(lbs/yr)	Swift Creek	1,500	900	900	900	900	1,300	1,200
Aluminum Load	King Creek	17	17	17	17	17	130	220
(lbs/yr)	Swift Creek	30	19	20	20	20	110	170
Zinc Load	King Creek	7	6	6	6	6	66	120
(lbs/yr)	Swift Creek	60	40	40	40	40	100	130
Arsenic Load	King Creek	1	1	1	1	1	1	1
(lbs/yr)	Swift Creek	5	3	3	3	3	4	4
Copper Load	King Creek	1	1	1	1	1	5	8
(lbs/yr)	Swift Creek	1	0	0	0	0	3	5
Cadmium Load	King Creek	0	0	0	0	0	1	2
(lbs/yr)	Swift Creek	0	0	0	0	0	1	2

Protection of Tribal Health and Safety

The Agency for Toxic Substances and Disease Registry (ATSDR) completed a Public Health Assessment in 1998 on the health effects of the Zortman and Landusky Mines to the people of the Fort Belknap Indian Reservation. The study concluded that, "*Based on the data reviewed...the gold mining operations are no apparent public health hazard to the residents of Fort Belknap*." Since the ATSDR study was conducted there has not been any additional mining, only reclamation. These reclamation measures have reduced the potential for exposure to mine wastes from that present when ATSDR conducted its review.

During the summer of 2000, the EPA conducted an evaluation of domestic water supply wells on the south end of the Fort Belknap Indian Reservation to check water quality and to look for any mining-related contamination. As a result of the testing, EPA concluded that the mines have not impacted domestic water supplies on the Fort Belknap Indian Reservation.

Selection of Alternatives Z6 and L4, or Z3 and L3, will reduce even further any potential for mine waste products to release contaminants over current conditions, thereby protecting Tribal health and safety. Alternatives which involve backfilling of mine pits with acid-forming spent ore or waste rock increase the potential for leachate to enter area drainages, and increase the potential for exposure to mine contaminants such as heavy metals. Therefore, to protect Tribal health and safety, Alternatives Z4, Z5, L5, and L6 should not be selected.

Consultation Conclusions

The risk to water quality from mine pit backfill material is the most serious threat to Tribal trust resources (water). Any benefits associated with the restoration of the pre-mining landform, or with restoring natural surface water flow patterns, would be minor compared to the increased risk of serious groundwater contamination migrating north, even with application of the best available pollution prevention technology.

Reclamation measures need to be avoided which involve placing acid generating materials into groundwater recharge areas that eventually discharge to the Fort Belknap Reservation. Reclamation alternatives that place acid generating rock in these watersheds will be opposed by the agencies with trust responsibilities, regardless of whether or not funding was available for their implementation, due to the potential for such alternatives to impact Tribal water resources.

Monitoring must continue to be targeted in the Swift Gulch and King Creek drainages to ensure the continued protection of downstream trust resources. Monitoring also needs to be maintained in Lodgepole Creek, but to a lesser extent due to the low risk of impacts to this drainage from the preferred alternatives.

The success of reclamation measures in reducing the iron-colored seeps in Swift Gulch is to be part of the long-term monitoring program to ensure protection of Tribal water resources. If the interim reclamation in the Suprise and Queen Rose pit areas does not improve Swift Gulch water quality then installation of passive or semi-passive treatment may be required to protect the quality of downstream Tribal water resources.

Artesian well WS-3 must remain open for the foreseeable future to protect groundwater quality in northern drainages. Once water rights have been adjudicated, any loss in water flow to Fort Belknap could be remediated by pumping the treated WS-3 well water from the Landusky Water Treatment Plant to a discharge point in upper King Creek or Swift Gulch, or possibly through other actions designed to compensate for reductions in streamflow.

Decisions

After consulting with the Fort Belknap government, and considering all relevant issues, alternatives, potential impacts, public comments, effects on Tribal water resources, and management constraints, the BLM and DEQ hereby select Alternative Z6 for reclamation of the Zortman Mine and Alternative L4 for reclamation of the Landusky Mine. These alternatives will best meet the purpose and need to reclaim the mines with a reasonable assurance of long-term success in meeting the State and Federal requirements for mine reclamation, while protecting human health, the environment, and trust resources. Implementation of the selected alternatives is contingent upon the availability of funding.

Because implementation of Alternatives Z6 and L4 is contingent upon additional funding, it is also the agencies' decision to select Alternatives Z3 for reclamation of the Zortman Mine and Alternative L3 for reclamation of the Landusky Mine, in the event the additional funds needed to complete Alternatives Z6 and L4 are not obtained within the next two years. Alternatives Z3 and L3, as the reserve selected alternatives, also satisfy the purpose and need to reclaim the mines with a reasonable assurance for long-term success in meeting the State and Federal requirements for mine reclamation, while protecting human health, the environment, and trust resources. However, these alternatives will require somewhat greater post-reclamation care and maintenance to ensure resource protection, and do not reduce the aesthetic impacts associated with the pit highwalls to the same degree as Alternatives Z6 and L4. See the section on *Implementation of the Decisions* for a discussion of funding priorities and how reclamation under the selected and reserve selected alternatives is to be scheduled.

In addition to decisions on mine reclamation, the DEQ hereby approves MPDES permits #MT-0024856 for the Zortman Mine facilities, and #MT-0024864 for the Landusky Mine facilities. Copies of these permits are in Appendix C of the Final SEIS. The discharge limitations and monitoring requirements in the MPDES permits will ensure that all project-related discharges comply with the Montana Water Quality Act. The effluent limits and other conditions of the MPDES permits are based on state water quality standards to protect all applicable beneficial uses.

Chapter 2 of the Final SEIS provides a comprehensive description of all the alternatives considered. A brief description of the selected and reserve selected alternatives follows:

Selected Alternatives

Zortman Mine Reclamation, Alternative Z6

The cost of Alternative Z6 will exceed the funding available under the reclamation bonds by an estimated $5 million. This alternative includes removal of the top lifts of the Alder Gulch waste rock dump. Material excavated from the waste rock dump will be placed into the North Alabama pit. Additional backfilling in the Ross pit with non-acid generating rock from the area between the North and South Alabama pits will be used to cover sulfide minerals exposed in the pit highwalls.

Water barrier reclamation covers will be placed over the excavated area of the Alder Gulch waste rock dump, over the backfilled area in the North Alabama Pit, and over the backfill in the O.K./Ruby Pit. All other areas will be reclaimed with 6 inches of tailings and 18 inches of soil. Because only about half of the necessary soil is available on the site, soil will be hauled from the Landusky Mine. The water treatment plant will be left at its present location. The reclamation action for each mine feature is shown in Final SEIS Figure 2.4-8.

Landusky Mine Reclamation, Alternative L4

The cost of Alternative L4 will exceed the funding available under the reclamation bonds by an estimated $17.5 million. This alternative includes all of the reclamation measures from Alternative L3, plus additional work to improve long-term reclamation performance. Most notably Alternative L4 includes removal of the L85/86 leach pad and dike from the Montana Gulch drainage and hauling the material to the August/Little Ben and South Gold Bug pits for use as pit backfill. Highwall reduction and backfill will be used to cover sections of the pit walls, resulting in about 85% coverage of the "sulfide" portions of the pit highwalls. The reclamation action for each mine feature is shown in Final SEIS Figure 2.4-12.

Reserve Selected Alternatives

Zortman Mine Reclamation, Alternative Z3

Alternative Z3 can be implemented within the current reclamation bond funding while satisfying the State and Federal requirements for mine reclamation. The water treatment plant will continue operation at its current location. Reclamation includes buttressing the Z85/86 leach pad dike to improve stability and creating a 24-inch thick NAG zone over acid generating surfaces by lime amendment. A growth medium layer consisting of 7 inches of tailings and 11 inches of soil will be placed over most disturbance areas. The reclamation action for each mine feature is shown in SEIS Figure 2.4-5.

Landusky Mine Reclamation, Alternative L3

Alternative L3 includes all of the Alternative L2 reclamation measures (SEIS page 2-88) plus the following actions to improve reclamation performance. Drainage for the August/Little Ben pit will be provided by a directional drill hole as backup for artesian well WS-3. The entire east lobe of the August #2 waste rock dump will be removed and used to cover sulfidic highwalls in the Suprise pit. A drainage will be excavated on the west side of the L85/86 leach pad to eliminate impoundment of water behind the leach pad. The reclamation action for each mine feature is shown in SEIS Figure 2.4-11.

Implementation of the Decisions

The decisions made by DEQ and BLM in this ROD are the manner and degree to which the mine reclamation plans in the Operating Permits and Plans of Operations must be modified. However, since the operator is bankrupt, the actual implementation of the decisions will be carried out by the agencies using funds from the surety companies and, possibly, from other sources. Reclamation will continue until Alternatives Z6 and L4 have been completed, or until reclamation funds have been spent, whichever comes first. Implementation of these decisions will begin with reclamation actions consistent with Alternatives Z3 and L3. Any additional funding or cost savings realized through the contracting process will be used to implement Alternatives Z6 and L4 reclamation measures in accordance with the *Scheduling and Funding Priorities* section of this ROD.

Implementation Costs

Reclamation Earthwork Costs

Tables R4 and R5 detail the estimated costs of the selected alternatives for reclamation of the Zortman and Landusky Mines, respectively. Each table compares the reclamation costs by mine facility for the selected and reserve selected alternatives, showing where the added funds will be spent.

Table R4 shows that most of the additional expense to complete Alternative Z6 is for removal of a portion of the Alder Gulch waste rock dump and placement of the waste rock in the mine pit areas. An additional $471,000 needs to be spent on removing tailings from Ruby Gulch for use as subsoil. Other expenses over the Alternative Z3 funding level will be to enhance the existing revegetation.

As Table R5 shows, the largest cost increase for reclamation of the Landusky Mine under Alternative L4, when compared to Alternative L3, is for removal of the L85/86 leach pad and dike and its placement as backfill in the mine pits. Other costs of Alternative L4 are for enhanced revegetation on the L87/91 leach pad, mine pit highwall reduction, reclamation cover improvement on the Montana Gulch waste rock dump, leach pad water management, and reclamation overhead.

Table R4. Zortman Mine Reclamation Costs

Mine Feature	Selected Alternatives		Difference in Costs Z6 over Z3	% Increase from Z3
	Alternative Z3	Alternative Z6		
Mine Pits:				
O.K./Ruby Pit	$1,793,000	$1,793,000	$0	0%
Mint Pit	$315,300	$315,300	$0	0%
Ross Pit	$203,900	$370,200	$166,300	82%
North Alabama Pit	$40,000	$84,000	$44,000	110%
South Alabama Pit	$214,000	$667,000	$453,000	212%
Leach Pads:				
Z79-81 Pad (Reclaimed in 1991)	$7,600	$7,600	$0	0%
Z82 Pad (Recl.in 2001)& Z82 North Slope	$1,456,400	$1,456,400	$0	0%
Z83, Z84, Z89 Pads(Recl.in 2000-2001)	$575,000	$575,000	$0	0%
Z85/86 Pad	$965,200	$965,200	$0	0%
Leach Pad Dikes:				
Z83 Pad Dike (Reclaimed in 1992)	$3,000	$3,000	$0	0%
Z84 Pad Dike (Reclaimed in 1992)	$1,800	$1,800	$0	0%
Z85/86 Pad Dike	$217,000	$217,000	$0	0%
Z89 Pad Dike (Reclaimed in 1989)	$2,000	$2,000	$0	0%
Rock Dumps & Stockpiles:				
Alder Gulch Waste Rock Dump	$0	$1,873,000	$1,873,000	na
O.K. Waste Rock Dump	$0	$369,800	$369,800	na
Z82 Sulfide Stockpile, South Ruby Dump	$571,000	$571,000	$0	0%
North Ruby Soil Stockpile	$8,000	$8,000	$0	0%
Ruby Gulch Tailings Removal	$51,000	$522,000	$471,000	924%
Haul Roads, Support Facilities & Other:				
Ruby Gulch Drain Notch (By Z85/86 Pad)	$140,000	$140,000	$0	0%
Surface Water Controls	$110,900	$110,900	$0	0%
Mine Facilities	$29,000	$29,000	$0	0%
Reclaim Water Treatment Plant Ponds	$133,000	$133,000	$0	0%
Process Water Management	$2,355,000	$2,626,000	$271,000	12%
Reclamation Maintenance	$232,000	$773,000	$541,000	233%
Reclamation Overhead	$600,000	$1,400,000	$800,000	133%
Totals:				
Total Reclamation Costs	**$10,024,100**	**$15,013,200**	**$4,989,100**	**50%**
Excess Cost Over $10.02MM Bond Amount	$0	$4,989,100		

Table R5. Landusky Mine Reclamation Costs

Mine Feature	Selected Alternatives		Difference in Costs L4 over L3	% Increase from L3
	Alternative L3	Alternative L4		
Mine Pits:				
August/Little Ben & Suprise Pit Complex	$1,161,000	$1,929,000	$768,000	66%
August/Little Ben Drainage (Drill Hole)	$676,000	$1,055,500	$379,500	56%
Queen Rose Pit	$528,000	$528,000	$0	0%
Gold Bug & South Gold Bug Pits	$1,191,000	$2,076,000	$885,000	74%
Leach Pads:				
L79 Pad (Recl. in 1991) Added Revegetation	$2,000	$2,000	$0	0%
L80-82, L83, & L84 Pads (Recl. in 2001)	$1,695,000	$1,695,000	$0	0%
L85/86 Pad	$1,083,000	$8,274,000	$7,191,000	664%
L87/91 Pad Complex	$6,090,000	$7,249,000	$1,159,000	19%
Leach Pad Dikes:				
L83 Pad Dike (Reclaimed in 1988)	$10,000	$10,000	$0	0%
L84 Pad Dike (Reclaimed in 2001)	$0	$0	$0	na
L85/86 Pad Dike	$66,000	In Pad Removal $	($66,000)	-100%
L91 Dike (Recl. in 1991) Added Revegetation	$13,000	$13,000	$0	0%
Rock Dumps and Stockpiles:				
Mill Gulch Waste Rock Dump	$83,000	$83,000	$0	0%
Montana Gulch Waste Rock Dump	$80,000	$525,000	$445,000	556%
August #1 Waste Rock Dump	$283,000	$283,000	$0	0%
August #2 Waste Dump (East & West Lobes)	$58,000	$58,000	$0	0%
Gold Bug Yellow Waste Rock Dump	$201,000	$203,000	$2,000	1%
Gold Bug Blue Waste & Limestone Stockpiles	$205,000	$186,000	($19,000)	-9%
Gold Bug Soil Stockpile	$3,000	$3,000	$0	0%
Haul Roads, Support Facilities & Other:				
West MT Gulch Drain (By L85/86 Pad)	$768,000	$0	($768,000)	-100%
Surface Water Controls	$342,000	$527,000	$185,000	54%
Mine Facilities	$174,000	$181,000	$7,000	4%
Process Water Management	$5,036,000	$6,098,000	$1,062,000	21%
Big Horn Ramp Revegetation	$32,000	$32,000	$0	0%
Reclamation Cover Repair	$444,000	$506,000	$62,000	14%
Reclamation Overhead	$2,531,000	$5,609,000	$3,078,000	122%
Totals:				
Total Reclamation Costs	**$22,755,000**	**$37,125,500**	**$14,370,500**	**63%**
Excess Cost Over $19.6MM Bond Amount	$3,155,000	$17,525,500		

Summary of Funding Needs

The additional funding required to implement Alternatives Z6 and L4, and to support the long-term water treatments needs, is estimated at approximately $33.5 million as shown below:

Zortman Mine Reclamation using Alternative Z6	$15,013,200		
Landusky Mine Reclamation using Alternative L4	$37,125,500		
Long-Term Water Treatment Trust Fund Need	$24,800,000		
Required Funding		$76,938,700	
Zortman Mine Reclamation Bond	$10,020,000		
Landusky Mine Reclamation Bond	$19,600,000		
Year 2017 Value Water Treatment Fund	$13,800,000		
Available Funding		$43,420,000	
Total Shortfall			$33,518,700

Scheduling and Funding Priorities

As previously stated, reclamation using Alternatives Z6 and L4 is dependent upon funding, with Alternative Z6 costing approximately $5 million more than is available under the Zortman Mine reclamation bond; and Alternative L4 costing approximately $17.5 million more than is available under the Landusky Mine reclamation bond. However, the reclamation measures for Alternatives Z3 and L3 are generally consistent with Alternatives Z6 and L4, respectively. The decision is to proceed immediately and implement Alternatives Z3 and L3, while seeking additional funds to implement Alternatives Z6 and L4. If the additional funding required for Alternatives Z6 and L4 is not forthcoming within two years of this decision, then Alternatives Z3 and L3 will be completed using the available reclamation bond.

As reclamation work progresses on Alternatives Z3 and L3 over the next two years, any funds available after completion of Alternatives Z3 and L3 reclamation actions will be expended on reclamation actions consistent with Alternatives Z6 and L4. Completion of Alternatives Z3 and L3 will not preclude the addition of the reclamation elements contained in Alternatives Z6 and L4 at a later date if supplemental funding becomes available sometime in the future.

Without additional funding, the long-term trust fund that pays for water treatment beginning in 2017, is projected to be exhausted by year 2028. Because continued operation of the seepage capture systems and water treatment plants is essential to continued environmental protection under all reclamation alternatives, any additional funding obtained for the project will first be allocated to the water treatment trust fund.

Near-Term Water Treatment Costs

The near-term water treatment bonds provide $731,231 per year through 2017. Presently these funds pay for the ongoing operation of the seepage capture and water treatment systems at the mines. These funds have not been enough to cover all of the annual costs for the last three years. Water treatment costs during calendar year 2001 were $880,000, approximately $150,000 more than was covered by the water treatment bonds. This annual deficit in the near-term water treatment funding has been paid for by the agencies out of their operating budgets. Reclamation under either the selected or reserve selected alternatives will reduce the amount of water requiring treatment, but probably won't reduce the overall costs of running the seepage capture and treatment systems. At the same time, treatment plant upgrades to meet the new arsenic limit may increase overall costs. While cost saving measures are under development, any shortfall in the annual water treatment costs through 2017 will continue to be paid for out of the agencies' program budgets.

Long-Term Water Treatment Costs

All of the mine reclamation alternatives include provisions for long-term capture and treatment of acid rock drainage. The long-term water treatment trust fund, which begins paying for water treatment in 2017, is presently funded to have $13.8 million available for treatment beginning in 2017. This trust fund needs to be supplemented with an additional $11 million to ensure that long-term funding for capture and treatment of impacted waters can continue (SEIS Section 4.12.3). Without additional funding, the capture and treatment systems cannot be maintained beyond year 2028, and significant environmental damage could occur if the treatment systems were shut down.

This funding shortage for long-term water treatment exists independent of which mine reclamation alternative is selected. Due to the structure of the reclamation bonds, it is not possible to transfer bond monies to the trust fund in the amounts necessary to make up the shortfall. Both the BLM and the DEQ will request additional funding to supplement the trust fund to ensure that long-term water treatment needs are met.

The longer the water treatment trust fund remains underfunded, the more money is required to supplement the fund. Because the trust fund requirement is calculated using a discount rate of 6% (i.e., assumes that the fund accrues interest at 6% yearly) the $11 million shortfall in the trust fund projected for 2002 will increase to $11,660,000 in 2003, and to $12,359,600 in the year 2004. It is therefore important that the trust fund shortfall be addressed quickly, as the amount needed to fund the trust will continue to grow at a compound rate.

After implementing reclamation under Alternatives Z3 or L3, and supplementing the water treatment trust fund with the required $11 million, any additional funding will be used in the following order of priority:

- Additional backfilling of the South Alabama Pit.
- Additional backfilling of the Ross Pit.
- Partial removal of the Alder Gulch Waste Rock Dump.
- Removal of the L85/86 leach pad to the Landusky Pit complex.
- Remaining Alternative Z6 reclamation actions for the Zortman Mine.
- Remaining Alternative L4 reclamation actions for the Landusky Mine.
- Retention of funds for management of residual process solutions.
- Retention of funds for monitoring and maintenance of reclamation covers.

As reclamation progresses minor modifications may be made to the reclamation plans. Such changes may be appropriate to provide for the use of alternate mitigation technologies that become available or to respond to an improved understanding of site conditions gained through operational experience. Any change in reclamation procedures, scheduling, design, or mitigating measures will be reviewed by the agencies and accepted if it provides equal or greater resource protection than the original requirement and does not result in previously undisclosed significant impacts. Changes which would not achieve the same level of resource protection, or would result in previously undisclosed significant impacts, will receive supplemental analysis under NEPA and MEPA prior to determining their acceptability.

Rationale for the Decisions

The preferred alternative identified in the 1996 Final EIS (Alternative 7) is no longer viable because Pegasus Gold and ZMI cancelled their plans for additional mining at the Zortman and Landusky mines. Therefore, non-mine expansion and reclamation alternatives have to be selected in order to reclaim the existing mine disturbance in accordance with State and Federal requirements.

The agencies have selected Alternative Z6 for reclamation of the Zortman Mine and Alternative L4 for reclamation of the Landusky Mine because these alternatives will best meet the purpose and need to reclaim the mines in accordance with State and Federal reclamation requirements; minimize the long-term, post-reclamation care and maintenance needs; and protect human health, the environment, and Tribal trust resources.

Alternatives Z3 and L3 have been selected in case the funding for reclamation is limited to the amounts available from the reclamation bonds. These alternatives will also meet the purpose and need to reclaim the mines in accordance with State and Federal reclamation requirements, while protecting human health, the environment, and Tribal trust resources.

The following sections discuss in detail the rationale for selection of Alternatives Z6 and L4, along with the rationale for selection of Alternatives Z3 and L3 as the alternatives to be implemented should funding not be available to completely implement Alternatives Z6 and L4.

All practicable means to avoid or minimize environmental harm have been included in the selected and reserve selected alternatives. Pit backfilling requirements have been selected to maximize the use of available material suitable for backfill in order to protect area water quality and Tribal water resources. Reclamation covers have been selected to enhance the potential for long-term reclamation success and reduce the potential for surface water to infiltrate into reclaimed mine waste facilities. These measures, together with other reclamation and water treatment actions, will meet all applicable requirements, achieve water quality standards, prevent unnecessary or undue degradation, and provide for comparable stability and utility of mined lands with adjacent areas.

The MPDES permits have been approved because the reclamation plans in Alternatives Z6 or Z3, and L4 or L3, along with the water management plans for these alternatives, as well the Consent Decree, its appendices, and the MPDES permit applications, will effectively control the discharge of potential pollutants from the mine sites. The Final SEIS, Pages 4-11 through 4-60, contains an analysis of water quality protection under the various reclamation alternatives. All selected reclamation alternatives are capable of achieving water quality standards, outside of any applicable mixing zones, provided that compliance monitoring continues and that the seepage collection systems are properly maintained and upgraded if necessary.

Use of the Multiple Accounts Analysis Results

The Multiple Accounts Analysis (MAA) process was used during consultation with the Fort Belknap Tribes to evaluate the reclamation alternatives and their potential effects on Tribal water resources. The process involved a team effort using individuals with technical expertise from the State and Federal agencies, the Fort Belknap government, and the parties' various environmental and engineering consultants. Final SEIS Section 2.2 discusses how the MAA process was used to develop the alternatives.

Assessment of the positive and negative impacts, or the relative strengths and weaknesses of each of the reclamation alternatives were evaluated by the technical working group. Input on the initial results of the evaluation were presented to the public at several meetings and briefings over the course of a year. The final results of the MAA represent the consensus opinion of the technical working group members as to the relative impacts of each alternative and the relative weight given to each affected resource.

The MAA evaluated reclamation performance in four fundamental areas called accounts: Technical, Project Economics, Environmental, and Socioeconomics. While all accounts are important to the evaluation process, the results of the Environmental account served as the basis for the environmental impacts described in the SEIS. SEIS Appendix A provides the results of the complete MAA.

The results of the MAA are not a substitute for the decisionmaking process. One limitation of the MAA process is that it does not include scoring of the various legal and regulatory requirements that ultimately affect the agencies' decision. For example, protection of Tribal resources is a mandate which BLM must follow in making its decision on reclamation. Likewise, the requirements of the Montana Water Quality Act must be met. Satisfying the requirement to protect trust resources was not included as a line item in the MAA scores since the parties involved have varying legal opinions on what that requirement means. Despite these shortcomings, the MAA process does provide a sound technical basis from which to consider the legal requirements of mine reclamation. Agency findings and conclusions on legal issues such as protection of trust resources and compliance with the water quality statutes are discussed in the *Management Rationale for the Selected Alternatives* section of this ROD.

<u>Zortman Mine MAA Results</u>

The detailed spreadsheets showing the Zortman Mine MAA evaluations are provided in Appendix A of the Final SEIS. Figure R1 displays the Zortman Mine MAA scores in a manner which shows a comparative cost-benefit analysis for each alternative. This figure shows the estimated cost for each Zortman Mine reclamation alternative against the MAA score that only considers the environmental performance of that alternative (i.e., excludes economic issues such as cost and jobs). A best-fit trendline has been drawn on the graph to illustrate the relationship between the alternatives' overall performance in the categories analyzed by the technical working group versus cost. In general, the higher cost alternatives at the Zortman Mine have a higher environmental score (greater environmental benefit); however, the environmental benefit per dollar spent on reclamation

decreases as the overall cost increases, and the curve flattens out. This flattening trend in the curve illustrates two common results when evaluating alternatives with different amounts of mine pit backfilling. One, the more pit backfilling involved, the more expensive the alternative, sometimes by large multiples in cost over alternatives with little backfilling. And two, that most of the benefits associated with pit backfilling occur with the initial, relatively small, volumes of backfilling used to reestablish vegetation and to route runoff out of the pit area to protect water quality. The additional amounts of backfill in the higher cost alternatives result in the added benefits which are mostly limited to aesthetic considerations (i.e., the area looks nicer). Consequently, the MAA score depicting environmental performance does not increase proportionally to the amount of money spent on reclamation and the curve flattens out.

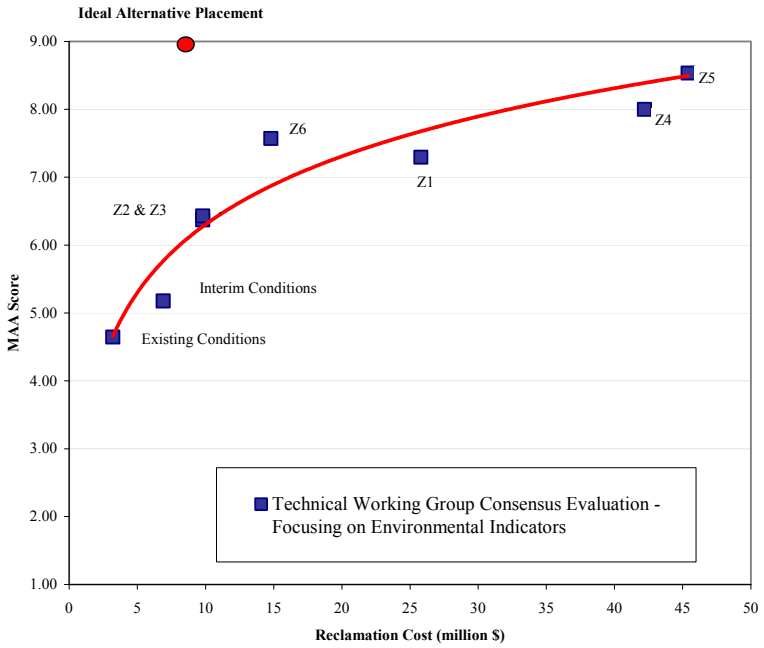

Figure R1 - MAA Environmental Score versus Cost. Flattening of Curve at Higher Cost Alternatives Indicates Less Benefit per $ Spent.

Ideally, an alternative that plotted near the top left corner (i.e. all the environmental benefit for the existing bond amount) would be the best option from a cost-benefit perspective, for those issues considered by the MAA analysis. Alternative Z6 plots nearest to that corner. Conversely, an alternative that plotted highest on the vertical will have the best overall performance and would appear to be the best option from an environmental performance perspective. Alternative Z5 plots highest in performance. However, a careful consideration of the issues and legal requirements associated with selecting a reclamation plan for the Zortman Mine shows an increased risk of impacts to water quality in Lodgepole Creek (water quality protection scores of only 5) under Alternatives Z4 and Z5, compared with Alternatives Z3 and Z6 (scores of 7 and 9, respectively). Consideration of the legal requirement to protect water quality and trust resources has resulted in the selection of Alternatives Z3 and Z6 for reclamation of the Zortman Mine.

Landusky Mine MAA Results

The detailed spreadsheets showing the Landusky Mine MAA evaluation are provided in Appendix A of the Final SEIS. Figure R2 displays the results of the Landusky Mine MAA scores in a manner that gives a comparative cost-benefit analysis for each alternative. This figure shows the estimated cost for each Landusky Mine reclamation alternative against the MAA score that only considers the environmental performance of that alternative (i.e., excludes economic issues such as cost and jobs). A best-fit trendline is shown on the graph to illustrate the relationship between the alternatives' overall performance in the categories analyzed by the technical working group versus cost. In general, the higher cost alternatives at the Landusky Mine have a higher environmental score (greater environmental benefit); however, the environmental benefit per dollar spent on reclamation decreases as the overall cost increases, and the curve flattens out. As described above for the Zortman Mine, this flattening trend in the curve illustrates two common results when evaluating alternatives with different amounts of mine pit backfilling. One, the more pit backfilling involved, the more expensive the alternative, sometimes by large multiples in cost over alternatives with little backfilling. And two, that most of the benefits associated with pit backfilling occur with the initial, relatively small, volumes of backfilling used to reestablish vegetation and to route runoff out of the pit area to protect water quality. With additional amounts of backfill in the higher cost alternatives the added benefits are mostly limited to aesthetic considerations (i.e., the pit area looks nicer). Consequently, the MAA score depicting environmental performance does not increase proportionally to the amount of money spent on reclamation and the curve flattens out.

Ideally, an alternative that plotted near the top left corner (i.e. all the environmental benefit for the existing bond amount) would be the best option from a cost-benefit perspective for those issues considered by the MAA analysis. Alternative L4 plots nearest to that corner. Conversely, an alternative that plotted highest on the vertical axis will have the best overall performance and would appear to be the best option from an environmental performance perspective. Alternative L6 plots highest in performance.

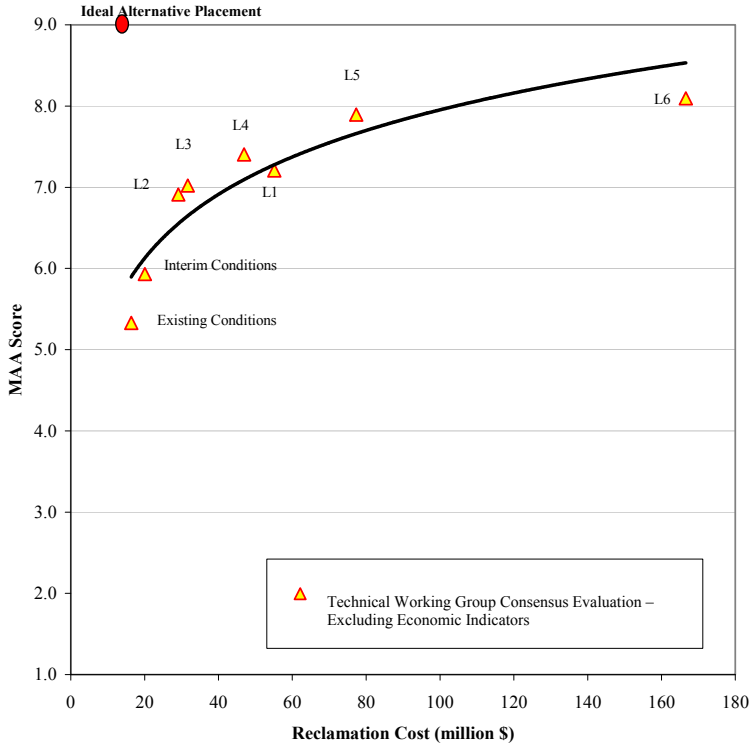

FIGURE R2 - MAA Environmental Score versus Cost. Flattening of Curve at Higher Cost Alternatives Indicates Less Benefit per $ Spent.

However, a careful consideration of all the issues and legal requirements associated with selecting a reclamation plan for the Landusky Mine shows that the composite scores for Alternatives L5 and L6 are only slightly better than Alternative L4 yet conceal a serious risk of increased impacts to water quality in northern drainages, especially in Swift Gulch (groundwater quality protection scores of only 3 under Alternative 6, and a score of 5 under Alternative L5, compared with scores of 9 under both Alternatives L3 and L4). Impacts to these "sub-account" resource categories were given additional weight by the agencies under their legal requirement to protect water quality and trust resources when making a decision on mine reclamation. This consideration elevates the importance of preventing impacts to northern drainages in deciding upon a reclamation plan for the Landusky Mine. As a result, Alternatives L3 and L4 have been selected for reclamation of the Landusky Mine.

How the Selected Alternatives Address the Issues

Mine Pit Backfill

In the normal mine permitting process, a decision on the amount of mine pit backfill needed for reclamation is made concurrent with approval of the mining plans. This is because the often high costs associated with pit backfilling can determine overall project feasibility; or at the least significantly affect the handling and placement plans for waste rock and ore. The most recent decisions approving mining were made in 1988 and 1991 for the Zortman and Landusky Mines,

respectively, and did not include any pit backfilling for reclamation purposes. The agencies have reconsidered backfilling requirements because backfilling is one of many mitigation techniques for addressing reclamation issues.

Zortman Mine

The selected and reserve selected alternatives resolve the pit backfill issue at the Zortman Mine by backfilling and grading all mine pits so that they are free-draining, preventing precipitation from accumulating in the pit area and forming a pit lake. The majority of the precipitation falling over the reclaimed pit area will run off the pit floor as stormwater, rather than infiltrate through the bottom of the pit where it would come in contact with sulfide minerals and discharge acidic and metal-bearing leachate to the groundwater.

In the past, infiltrating surface waters have emerged in Ruby Gulch, considerably degraded from contact with sulfide minerals beneath the pit floor or present in the subsurface. The mine pit backfill configuration in Alternative Z6 will greatly reduce and possibly eliminate this source of degradation by preventing contact between water and sulfide minerals. The mine pit backfill configuration under Alternative Z3 will also greatly reduce contact between water and sulfide-rich zones, though a slightly greater amount of the pit highwalls would remain exposed in the North Alabama Pit than under Alternative Z6. This would not result in a noticeable difference in affects to water quality compared to reclamation under Alternative Z6 because there are no exposed sulfide-rich zones in the North Alabama Pit area. What little water infiltrates the pit floors, or comes in contact with sulfides in the remaining pit highwalls, will be recovered by the seepage capture system located in Ruby Gulch and treated. Thus, the mine pit backfill configuration under either Alternative Z3 or Z6 will meet the dual pit reclamation objectives of creating a free-draining surface and covering the majority of the pit floor and highwalls where there are areas of sulfide-rich mineralization.

Landusky Mine

The pit backfill issue at the Landusky Mine is more complex due to the greater size and depth of the Landusky Mine pits (about five times as much rock was mined at Landusky compared to Zortman), the limited amount of material suitable for pit backfill, the greater amounts of exposed sulfide-rich highwall zones, and the presence of geologic structures beneath the pits capable of transmitting large amounts of groundwater to the north.

Several approaches were considered to configure the Landusky Mine pit complex so that it does not impound precipitation and create a pit lake that might impact water quality. Alternative L1 would cut a drainage outlet through the south end of the pit highwall to allow runoff to leave the pit. Alternative L1 was not selected because construction of the drainage outlet would create additional highwall areas exposing even more sulfide mineralization.

Alternatives L2, L3, and L4 use the high permeability shear zone beneath the August Pit floor and its connection to well WS-3 in Montana Gulch to drain runoff from the pit complex. Well tests conducted in 2000 show that well WS-3 can be used to drain accumulated water from the pit complex, much like leaving the drain open in a bathtub. Alternatives L2, L3, and L4 also include

placement of varying amounts of pit backfill to ensure runoff drains to the south end of the pit complex where it can be discharged from well WS-3, and to cover portions of the pit highwalls to minimize release of metals and acidity. Alternative L4 has been selected because it takes all of the readily available non-acid forming material and uses it as pit backfill. Alternative L4 optimizes the amount of pit backfilling with water quality protection by using the maximum amount of available material for backfill without increasing the risk of impacts to water quality, especially in the northern-flowing drainages. Alternative L3 is the reserve selected alternative because it provides for pit backfilling and drainage without an increased risk of impacts to water resources, can be implemented with the existing reclamation bond, and does not preclude future backfilling should funds be available.

Alternative L5 would use spent ore from the L87 leach pad as backfill in the Landusky Mine pits to achieve a near-flat configuration over the pit area with a highwall on one side. A much shallower drainage notch than proposed under Alternative L1 would be cut through the highwall at the south end of the pit complex to provide for drainage of runoff. Well WS-3 would remain open to draw down groundwater that might come in contact with the backfilled mine waste. Recovery wells would be placed at the north end of the pit complex to intercept contaminated groundwater. Alternative L5 was not selected because moving acid-forming spent ore, which also contains residual cyanide and nitrates, from the lined leach pads to the pit complex greatly increases the potential for impacts to water quality and for impacts to Tribal water resources. Any benefits from Alternative L5 to aesthetic conditions, pit runoff drainage, or increased coverage of sulfidic pit highwalls are outweighed by the increased potential for impacts to water quality in the northern drainages and downstream impacts to Tribal water quality. The addition of recovery wells along the northern pit perimeter, as a mitigation measure, does not provide the same level of protection for water quality and trust resources as leaving the spent ore on the lined leach pad located south of the drainage divide. Likewise, Alternative L6 was not selected because while it would virtually eliminate the mine pits, the resulting backfill would considerably increase the risk of water quality degradation in King Creek, Swift Gulch, and Montana Gulch.

Relocation of Mine Waste Facilities

There are two reasons for moving an existing mine waste rock dump or spent ore pile during reclamation, 1) the material is of suitable quality and quantity that it can be used beneficially during reclamation construction; or 2) the material is causing or has the potential to cause environmental impacts in its present location. Both of these factors were used to select the reclamation alternatives.

Zortman Mine

Several mine waste facilities were identified for removal during interim reclamation because they were a convenient source of material for pit backfilling. These included the Z82 leach pad and sulfide stockpile, the South Ruby waste rock dump, and the Ruby sulfide stockpile. The relatively small sulfide stockpiles had the potential to cause environmental degradation at their near-surface location, so burial in the mine pits on the south side of the drainage divide was preferable to in-place reclamation. These reclamation actions were conducted as part of interim reclamation and are common to all alternatives.

The Alder Gulch waste rock dump contains a moderate amount of material that is releasing acidic leachate which must be captured at the base of the dump. Waste rock within the dump is generally suitable for covering the pit highwalls, yet is not desirable for use in large quantities as backfill if placed north of the Lodgepole-Ruby drainage divide. Selected Alternative Z6 removes about 430,000 cubic yards of material from the dump top to backfill the North Alabama Pit. The excavated dump top will then be covered with a synthetic liner to limit infiltration. Thus the selected alternative removes material from the dump to the point where further excavation will provide little benefit to reclamation construction. The undesirable leachate that would be generated by the remaining dump material is addressed by covering the top with a synthetic liner to reduce infiltration, and by continued operation of the Alder Gulch seepage capture system. Reserve selected Alternative Z3 continues to rely on the existing seepage capture and treatment systems to prevent impacts to water quality from the Alder Gulch waste rock dump. These systems are presently in operation and will continue to protect the downstream water quality in Alder Gulch.

Landusky Mine

The issue of relocating mine waste facilities at the Landusky Mine centers on two leach pad areas, the L85/86 leach pad in Montana Gulch, and the L87/91 leach pad (which is actually two leach pads joined together) in upper Mill Gulch and Rock Creek, respectively. The remaining leach pads and waste rock dumps at the Landusky Mine were not considered for relocation because of one or more of the following: they were constructed in a location with few long-term management problems, they do not represent a sizable source of construction material, or they have already been reclaimed and their re-disturbance offers little potential benefit.

The L87/91 leach pad contains large quantities of material that would be used in Alternative L5 or L6 as backfill in the Landusky Mine pits. However, removal and use of the L87/91 spent ore is not part of the selected alternatives because the material on these leach pads is acid generating and not of a suitable quality for placement in the headwaters area of drainages that flow toward the Fort Belknap Reservation. Furthermore, leachate from the L87/91 spent ore is being contained at its present location without causing environmental problems. The leach pads are located at the very head of the drainages with little runon water to divert. The spent ore is on the lined leach pads where it was originally leached and the liner systems at the base of the heap are intact. Seepage capture systems are located downstream of the leach pad in the event a leak occurs in the future. Virtually all the leachate generated by precipitation over the leach pad is being collected within the leach pad, treated, and released. Moving the spent ore from the leach pads to the pit complex for use as backfill will increase the potential for the release of contaminants to the environment. For these reasons, selected Alternative L4 and reserve selected Alternative L3 both require the L87/91 spent ore heaps to be reclaimed in place on the leach pad liners.

Conversely, the material on the L85/86 leach pad is of relatively non-acid generating character and is suitable for use in reclamation construction, but the leach pad is in a problematic location if long-term stability is to be maintained, making it a candidate for removal or alteration. The L85/86 leach pad was constructed across Montana Gulch at a mid point in the stream reach where streamflow must to be routed around or under the leach pad. The leach pad also blocks a western tributary to Montana Gulch, impounding runoff which must also be routed around or under the leach pad. This

situation presents a long-term monitoring and maintenance problem. A large storm event may overwhelm or plug the runoff diversion ditches or underdrains, causing an influx of stormwater to enter the heap. This may overwhelm the containment capacity of the leach pad resulting in the discharge of residual process solutions containing cyanides, nitrates and metals; or even cause a mass failure of the heap retaining dike.

Selected Alternative L4 includes removal of the L85/86 leach pad and dike from the Montana Gulch drainage, reestablishes the drainage topography, and uses the spent ore as backfill and cover over the acid generating pit floor and wall rock in the Landusky Mine pit complex. Reserve selected Alternative L3 does not require relocation of the L85/86 leach pad, but instead excavates a channel around the leach pad so stormwater will not be impounded behind the leach pad in the western tributary. Most of the leach pad will be reclaimed in place. While Alternative L3 will address the problems with controlling runoff in Montana Gulch, it will require more long-term monitoring and maintenance than would total removal of the leach pad.

Drainage of Mine Pits

Zortman Mine

Selected Alternative Z6 and the reserve selected Alternative Z3 both provide for drainage of the Zortman Mine pits by backfilling and grading the pit floors so that runoff does not accumulate in the reclaimed pit areas. Runoff from the pits is then routed to a tributary of Ruby Gulch where it can either be discharged, if it is of acceptable quality, or directed into the capture system if it requires treatment. The placement of a synthetic liner as part of the reclamation cover under both alternatives will greatly reduce the amount of precipitation which infiltrates into the OK/Ruby pit area.

Landusky Mine

At the Landusky Mine, the Gold Bug and South Gold Bug pit floors will be reclaimed to a free-draining condition under both Alternative L4 and Alternative L3. Runoff will be routed out of the pit area and will not accumulate in the pits where it could generate undesirable leachate. The Queen Rose-Suprise-August pit complex will be graded so that all runoff is routed to the south end of the pit complex, terminating at the southern highwall of the August Pit in the Montana Gulch watershed. The general pit drainage pattern will be the same under both Alternative L4 and Alternative L3, but the bottom of the pit floor will be higher due to backfilling the pit with material from the L85/86 leach pad. The pit floor north of the groundwater divide will be lined with a synthetic liner under both alternatives to promote the movement of runoff to the south and away from Swift Gulch, thus protecting the water quality in the northern drainages.

Both Alternative L3 and L4 provide for discharge of runoff from the south end of the August Pit via infiltration to groundwater and release through artesian well WS-3, which reports to the Landusky water treatment plant. A directional borehole will also be constructed, if necessary, under both alternatives to provide a backup means of discharge in the event well WS-3 becomes plugged. The connection between discharge from WS-3 and the control of the groundwater level at the southern

end of the pit complex has been well established by drawdown studies conducted on the Landusky Pit lake during 1999 and 2000.

Using the groundwater connection to well WS-3 for release of stormwater from the reclaimed pit is preferable to constructing a drainage notch through the pit highwall as proposed in Alternative L1. This is because the drainage notch would have to be excavated to a depth that intersected the sulfide zone, creating additional disturbance and exposing more sulfide minerals to weathering. The groundwater discharge system is also preferable over the drainage plan in Alternative L5 or L6 which would raise the pit floor elevation by placing large amounts of backfill in the pit from the L87/91 leach pad. The leach pad material is acid generating and would increase the risk of impacts to water quality if placed in the pits over groundwater recharge areas, especially recharge areas for the relatively unimpacted northern drainages.

Protection/Restoration of Water Quality and Quantity

Under the 1996 Consent Decree, water quality is to be protected through the use of seepage capture systems constructed in those stream drainages where mine facilities were discharging acidic drainage. Captured acidic and metal-bearing waters are then treated and released in accordance with interim effluent limits. Process solutions containing cyanide, nitrates, selenium and other contaminants that have accumulated within the lined leach pads are also treated to remove contaminants prior to release. As interim reclamation has progressed, more areas have been regraded and covered with soil, decreasing the amount of precipitation entering mine waste units, which decreases the amount of leachate requiring capture and treatment. Selected Alternatives Z3, Z6, L3 and L4 will continue to reduce the amount of leachate formed by covering acid-forming minerals during reclamation. Source control from surface reclamation, in combination with seepage capture and treatment, will protect water quality and meet the effluent limits in the MPDES permits.

Since some infiltration will always occur through any reclamation cover, and because the natural background level of some contaminants is so close to the effluent limits that must be met for discharge of mine drainage, there are no reclamation alternatives that can eliminate the need for long-term seepage capture and treatment at the mines. However, the selected alternatives will minimize the amount of potential contaminants available for release to the environment. Alternatives Z4, Z5, L5 and L6, which involve large amounts of backfill, have not been selected because the contaminant loads derived from the backfill actually increases the risk of degrading water quality despite the mitigation provided by the capture and treatment systems. In addition, capture systems would have to be constructed in northern drainages impacted by Alternatives Z4, Z5, L5 and L6, creating even more surface disturbance in these steep-sided drainages.

Zortman Mine

Selected Alternatives Z3 and Z6 will protect water quality by gradually decreasing the amount of infiltration over the mine pits, leach pads, and waste rock dumps. The majority of ARD-related water quality problems at the Zortman Mine were from the sulfide minerals exposed in the mine pit floor which came in contact with precipitation, generating ARD discharges in Ruby Gulch. Reclamation that routes runoff away from the pit area under Alternatives Z3 and Z6, will greatly

reduce the volume of water requiring capture and treatment in Ruby Gulch. As reclamation layers of vegetation, soil, subsoil, synthetic liner, and non-acid generating rock are placed over the various mine waste units at the Zortman Mine, a greater percentage of the annual precipitation will accumulate in the reclamation cover and either move laterally, away from the reactive mine waste, or evapotranspirate back to the atmosphere, instead of infiltrating through the waste rock. Only a very small portion of the water will be able to infiltrate into the mine waste where it can react with the sulfide mineralization to create ARD. The capture and treatment systems will remain in operation to collect any residual contaminated leachate. These systems have prevented impacts to water quality and will continue to operate as reclamation decreases the amount of water reporting to the capture and treatment system.

The amount of mine disturbance that occurs in the Lodgepole Creek drainage is extremely small, only 0.6% of the total watershed area upstream of the Fort Belknap Reservation (FEIS, Table 4.2-2a). Due to the small impact to water quantity, and the risk of actually increasing water quality degradation by trying to remediate it, the selected Alternatives Z3 and Z6 do not re-create the pre-Zortman Mine drainage pattern which would require discharging surface runoff from the Ross Pit area into Lodgepole Creek. However, Alternatives Z3 and Z6 do preserve the option of routing runoff from the Ross Pit area into Lodgepole Creek at some future date once the quality of the runoff can be assured. Alternatives Z4 and Z5 were not selected since backfilling would require the placement of waste rock in the Ross Pit which could impact water quality in the Lodgepole Creek watershed.

Landusky Mine

Alternative L4 is selected for reclamation of the Landusky Mine because it will isolate or control toxic or deleterious materials and covers approximately 85% of the sulfide portions of the mine pit highwalls with backfill or rubble slopes. Alternative L4 takes all the readily available, relatively non-acid generating material and use it as backfill in the mine pits. Alternative L4 avoids the potential negative impacts on the drainages to the north of the mine that would occur with the use of spent ore from the L87/91 leach pad as backfill. In addition, Alternative L4 will remove the L85/86 leach pad that is obstructing the Montana Gulch drainage thereby making long-term stormwater management easier to maintain, eliminating the potential for failure of the leach pad dike and the release of mined rock or residual process solutions into adjacent waters. The continued use of the capture and treatment systems, in combination with reclamation under selected Alternative L4, will restore and protect water quality in and around the Landusky Mine.

Reserve selected Alternative L3 will accomplish nearly the same level of protection for water resources as provided by Alternative L4. Alternative L3 will avoid the undesirable effects of placing additional acid-forming rock in the pit complex. Alternative L3 will cover over 80% of the acid generating pit highwalls, and Alternative L3 will improve the routing of stream runoff around the L85/86 leach pad. While leaving most of the L85/86 leach pad in place under Alternative L3 has greater long-term monitoring and maintenance needs when compared to Alternative L4, this alternative will still provide for protection of the water quality in Montana Gulch. Continued use of the capture and treatment systems, in combination with the Alternative L3 reclamation, will restore and protect water quality in and around the Landusky Mine.

Routing surface runoff from the reclaimed mine pit area toward the northern drainages to restore the pre-mine water flow pattern at the Landusky Mine will increase the risk of water quality degradation. Since surface runoff diversion due to the mine pits has had very little impact on the amount of stream flow in Swift Gulch or King Creek, the selected Alternatives L3 and L4 will continue to route surface runoff to the south in order to avoid potentially negative impacts to water quality in northern drainages.

Most of the flow from the mining area that enters Swift Gulch or King Creek occurs as groundwater discharge in the upper reaches of these streams. Both historic and present day mining activities have shifted the groundwater divide beneath the mining area and changed the amount of groundwater which discharges to King Creek and Swift Gulch. As the analysis prepared for the Final SEIS describes, the overall loss in recharge to King Creek and Swift Gulch attributable to both historic and present day mining is less than 5 gpm with artesian well WS-3 closed (FSEIS 3-100). Thus, for practical purposes, groundwater recharge distribution is at baseline, pre-mining, conditions with well WS-3 closed.

When well WS-3 is open, a "worse case" estimate is that the northern drainages lose 64 to 76 gpm of groundwater recharge (FSEIS 3-100). Since groundwater quality beneath the Landusky pits has been impacted by mining, it is necessary to leave well WS-3 open in order to "pull" as much of the impacted groundwater as it can to the south where it can be captured and treated. This water management strategy is common to all Landusky Mine reclamation alternatives. Thus surface reclamation does not determine if or how streamflow volume is restored to natural conditions; rather, it is whether well WS-3 is left open or closed. At present, it is the agencies' determination that well WS-3 is to be left open to recover groundwater for capture and treatment. If the well is closed, groundwater discharge in Swift Gulch will likely be of such degraded quality that construction of one or more capture systems would be necessary, requiring considerable surface disturbance in this steep drainage. Moreover, there is no guarantee of recovering all the contaminated groundwater which presents a threat to downstream water quality on the Fort Belknap Reservation. If required, treated water from the Landusky water treatment plant could be piped to Swift Gulch or King Creek to make up for any loss in steamflow, or continue to be directed to downstream users on the south side of the mountains who may also have water rights.

Several comments collected on the Draft SEIS, including those from the Fort Belknap government, questioned at length the preference of Alternative L4 over Alternative L5, especially with regard to water quality protection. To more clearly illustrate the agencies' preference for Alternatives L3 or L4 over Alternative L5, a side-by-side comparison of the differences and similarities in the three alternatives is shown below in Table R6:

Table R6. Comparison of Alternatives L3, L4 and L5

Alternative L3 (Selected)	Alternative L4 (Selected)	Alternative L5
Estimated Cost: $22.8 million ($3.2 million over bond, but probably within reach using existing funds)	Estimated Cost: $37.1 million (almost double the funds available from the reclamation bond)	Estimated Cost: $68.5 million (more than triple the funds available from the reclamation bond)
Amount/type of pit backfill: Very little beyond amounts used during interim reclamation to grade pit floor to be free draining and to cover highwall.	Amount/type of pit backfill: 2.6 Myd^3 from the L85/86 leach pad (non-acid forming material)	Amount/type of pit backfill: 2.3 Myd^3 from the L85/86 leach pad (non-acid forming material) 10.6 Myd^3 from the L87 leach pad (acid forming)
"Sulfide-rich" portion of the pit highwalls covered with backfill: ~80%	"Sulfide-rich" portion of the pit highwalls covered with backfill: ~85% (~100% north side of divide)	"Sulfide-rich" portion of the pit highwalls covered with backfill: ~100%
Post-reclamation highwalls: Several hundred vertical feet of highwall visible from a distance. Pit configuration: Readily visible to site visitors.	Post-reclamation highwalls: Several hundred vertical feet of highwall visible from a distance. Pit configuration: Still visible to site visitors.	Post-reclamation highwalls: Several hundred vertical feet of highwall visible from a distance. Pit configuration: Low visibility to site visitors.
Amount of disturbance area revegetated: 78%	Amount of disturbance area revegetated: 81%	Amount of disturbance area revegetated: 85%
Minewide estimated infiltration: 297 gpm	Minewide estimated infiltration: 289 gpm	Minewide estimated infiltration: 287 gpm
Reduction from existing infiltration rate: 61%	Reduction from existing infiltration rate: 61%	Reduction from existing infiltration rate: 62%
Predicted pit infiltration: 96 gpm	Predicted pit infiltration: 89 gpm	Predicted pit infiltration: 84 gpm
Reduction from existing pit infiltration rate: 51%	Reduction from existing pit infiltration rate: 54%	Reduction from existing pit infiltration rate: 57%
Sulfate load to Swift Gulch: decreases by 36%	Sulfate load to Swift Gulch: decreases by 36%	Sulfate load to Swift Gulch: increases by 66%
Number long-term seepage capture systems required: Four, same as existing.	Number long-term seepage capture systems required: Four, same as existing.	Number long-term seepage capture systems required: Additional systems needed in Swift Gulch and possibly King Creek.
Estimated Northern Drainage Basin Contaminant Loads (from SEIS Table 4.3-3)		
Sulfate Load (lbs/year): King Creek: 65,000 Swift Creek: 54,000	Sulfate Load (lbs/year): King Creek: 64,000 Swift Creek: 54,000	Sulfate Load (lbs/year): King Creek: 151,000 Swift Creek: 141,000

Alternative L3 (Selected)	Alternative L4 (Selected)	Alternative L5
Iron Load (lbs/year): King Creek: 26 Swift Creek: 900	Iron Load (lbs/year): King Creek: 26 Swift Creek: 900	Iron Load (lbs/year): King Creek: 60 Swift Creek: 1,300
Aluminum Load (lbs/year): King Creek: 17 Swift Creek: 20	Aluminum Load (lbs/year): King Creek: 17 Swift Creek: 20	Aluminum Load (lbs/year): King Creek: 130 Swift Creek: 110
Zinc Load (lbs/year): King Creek: 6 Swift Creek: 40	Zinc Load (lbs/year): King Creek: 6 Swift Creek: 40	Zinc Load (lbs/year): King Creek: 66 Swift Creek: 100
Arsenic Load (lbs/year): King Creek: 1 Swift Creek: 3	Arsenic Load (lbs/year): King Creek: 1 Swift Creek: 3	Arsenic Load (lbs/year): King Creek: 1 Swift Creek: 4
Copper Load (lbs/year): King Creek: 1 Swift Creek: 0	Copper Load (lbs/year): King Creek: 1 Swift Creek: 0	Copper Load (lbs/year): King Creek: 5 Swift Creek: 3
Cadmium Load (lbs/year): King Creek: 0 Swift Creek: 0	Cadmium Load (lbs/year): King Creek: 0 Swift Creek: 0	Cadmium Load (lbs/year): King Creek: 1 Swift Creek: 1
Multiple Accounts Analysis (MAA) Scores (scale of 1 to 9)		
Technical working group score: 7.1 (includes all accounts)	Technical working group score: 7.2 (includes all accounts)	Technical working group score: 7.2 (includes all accounts)
Technical working group score: 7.0 (environmental performance only)	Technical working group score: 7.3 (environmental performance only)	Technical working group score: 7.9 (environmental performance only)
Technical working group score: 9.0 (Swift Gulch groundwater protection)	Technical working group score: 9.0 (Swift Gulch groundwater protection)	Technical working group score: 5.0 (Swift Gulch groundwater protection)
MAA cost-benefit score: 5.0 (environmental performance/ reclamation $)	MAA cost-benefit score: 4.2 (environmental performance/ reclamation $)	MAA cost-benefit score: 3.2 (environmental performance/ reclamation $)

The overriding rationale for selecting Alternative L4 and Alternative L3 over Alternative L5 is that the extra backfill needed to implement Alternative L5 would have to be obtained by moving cyanidated and acid generating materials off the lined L87/91 leach pads, which are located in an area that drains away from the Fort Belknap Reservation, and placing that material at the head of drainages that flow toward the Reservation. This creates an inherently greater risk to Tribal water resources and to water quality in relatively unimpacted drainages.

The L87/91 leach pads are constructed in a bowl-shaped lined containment area at the heads of Mill Gulch and Sullivan Gulch. The liner beneath these leach pads consists of two feet of compacted clay overlain by a 30 mil PVC synthetic liner. The containment area is sloped to the south so that water infiltrating through the rock on the leach pad collects along the liner and is directed to sumps

in the ponded area at the base of the leach pads in upper Mill and Sullivan Gulches. This water is then treated and released as part of mine reclamation under Alternatives L3 or L4. The liner systems beneath the L87 and L91 leach pads are functioning quite well. If these liners do fail, the contaminated leachate will flow down Mill Gulch or Sullivan Gulch where it will be intercepted by the capture system. Any contamination that is not recovered by the capture systems will continue to flow toward the south and away from the Fort Belknap Reservation.

In contrast to the anticipated performance of Alternatives L3 or L4, Alternatives L5or L6 would remove a large portion of the material from the L87/91 leach pads (10.6 or 38.4 million cubic yards, under Alternative L5 or L6, respectively) and place it in the mine pits. Despite placement of a synthetic liner over the pit floor, some of the backfill material would need to be placed off-liner as buttress against the highwalls. Even where backfill is placed on a liner there is no certainty the pit liner would function properly or indefinitely. The backfill material would overlie the August Shear Zone which provides a groundwater recharge conduit to Swift Gulch. Some of the precipitation that falls on the backfilled mine pits would infiltrate into the mine waste and generate acidic drainage with elevated metal content. Contaminated leachate bypassing the pit liner would enter the groundwater system beneath the northern half of the pit and eventually reappear in Swift Gulch as contaminated surface flow. While groundwater recovery wells would be installed north of the backfilled pit as part of Alternative L5 or L6, and well WS-3 would remain open, it is not likely that all the contaminated groundwater could be recovered due to the difficulty of intercepting flow in fractured bedrock. Construction of effective capture systems in Swift Gulch to intercept seepage would also be extremely difficult due to the presence of a number of small seeps spread out over a large reach of the stream. In addition, the construction activity itself would create considerable surface disturbance in this steep-sided valley, would cost additional money to construct, and would require perpetual maintenance.

Stated another way, contaminated groundwater is much more likely to escape capture as it enters Swift Gulch than similar waters entering Mill Gulch or Sullivan Gulch, and would discharge toward the Fort Belknap Reservation. Thus, despite the best engineering controls, placement of acid generating material in the mine pits north of the Swift Gulch-Montana Gulch groundwater divide creates the potential for substantial impacts to Tribal water resources which cannot be mitigated below significance. Alternatives L3 and L4 have been selected over Alternatives L5 and L6 because they use only relatively non-acid generating material for pit backfill and do not increase the risks of impacts to water quality. In fact, the removal of the L85/86 leach pad from Montana Gulch in Alternative L4 will lessen the risk of impacts on water quality by unblocking that drainage. At the same time, use of the L85/86 material as backfill will reduce the potential for impacts to groundwater beneath the pit area by covering most of the sulfides exposed in the highwalls that might release contaminants. Table R6 shows how the contaminant loads are likely to increase under Alternative L5 in the northern-flowing drainages, especially in Swift Gulch, with placement of material from the L87/91 leach pad in the pit area.

Furthermore, the environmental performance of Alternative L5 is not necessarily superior to Alternatives L3 or L4 as it relates to controlling sulfide reactivity in the pit highwalls. The overall amount of sulfide-rich highwall that will be covered by Alternatives L3 and L4 is estimated at 80% and 85%, respectively. The remaining 15-20% of sulfidic highwall will mostly be in those portions

of the pit highwalls located south of the drainage divide, away from Fort Belknap, and consist of rock faces with a relatively low chemical reactivity. In Alternative L5, 100% of the sulfide-rich highwalls would be covered, however, the backfill used to cover the highwalls would be composed of broken acid generating rock, with orders of magnitude greater reactivity than the solid rock faces exposed under Alternatives L3 and L4. This would offset any environmental benefit of covering the last 15% of the sulfide-rich highwall rock faces under Alternative L5.

Reclamation Grading, Cover Design, and Revegetation

It is the movement of ARD reaction products within mine waste that causes impacts to water quality, soils and vegetation. By limiting the amount of water that can enter mine waste, the movement of ARD reaction products is limited, and the environmental impact of acid-forming minerals is reduced. Water infiltration is minimized under the selected and reserve selected alternatives by diverting runon water away from reclaimed mine areas, and by placement of reclamation covers which provide long-term stability and promote evapotranspiration of precipitation before it can infiltrate into the underlying waste rock. To achieve stability, all reclamation covers will be built at slopes less than 2H:1V with benches at least every 100 feet of height. Field observations of past mine reclamation at this site shows that reclaimed slopes of 2H:1V are stable as long as the slope lengths are not greater than several hundred feet.

Revegetation of mine disturbance areas will be conducted in generally the same way across all alternatives (FSEIS 4-69). Since a limiting factor for wildlife in the Little Rocky Mountains is lack of forage found in open parks and meadows, the revegetation seed mix will use tree seedlings only in limited areas. Revegetation will consist primarily of grasses and forbs planted in a mosaic pattern to improve wildlife habitat. Both native and non-native species will be used to establish cover. Introduced species used in revegetation will be non-persistent, allowing for invasion by native species gradually over time. Successful revegetation has already been demonstrated in areas such as the Mill Gulch waste rock dump. The disturbance areas are anticipated to successfully revegetate and post-reclamation vegetation may eventually attain a higher wildlife value than was available during pre-mining conditions when some of the area was covered with dense stands of “dog hair” Lodgepole pine. The spread of noxious weeds will be controlled as part of the revegetation effort. Revegetation will be considered successful when at least 55% canopy coverage of perennials and up to 5% (annuals + biennials, no noxious weeds) is achieved. Monitoring of revegetation success will occur every two years for the ten years following completion of reclamation.

Zortman Mine

The reclamation covers in selected Alternative Z6 will reduce infiltration by retaining precipitation in the upper soil profile where it can evaporate or be used by vegetation. The Alternative Z6 reclamation covers all contain at least two feet of soil and subsoil as a growth medium over two additional feet of non-acid generating material. The four feet of cover placed over the regraded mine waste will support both grass and tree growth, plus have the moisture storage capacity needed to support vegetation and promote evapotranspiration of precipitation. The regraded slope angle and coarse soil fraction have proven stable in other reclaimed areas at the mine and will be stable over the long-term. Alternative Z6 reclamation covers approximately 76% of the mine disturbance area

with vegetation. The remaining unvegetated areas consist of treatment facilities, access roads, and pit highwalls. Table 4.5-1 of the Final SEIS compares vegetation acreage by alternative.

Alternative Z3 reclamation covers will provide nearly the same thickness of cover as Alternative Z6. However, to conserve soil resources, 12 inches and 18 inches of growth medium is to be placed over the North Alabama and South Alabama pit floors, respectively, instead of 24 inches as under Alternative Z6. Similarly, the Z85/86 leach pad will be covered with 18 inches of growth medium under Alternative Z3 versus the 24 inches under Z6. And finally the top of the Alder Gulch waste rock dump will be covered with a synthetic barrier in Alternative Z6 while Alternative Z3 uses the existing 12-inch soil cover for reclamation (SEIS Figure 2.4-1). The reclamation covers to be used under Alternative Z3 will also reduce infiltration and provide a suitable substrate for vegetation growth; although tree planting will be limited to those areas that provide a rooting depth of at least four feet of material over a non-acid forming substrate. Alternative Z3 reclamation also vegetates approximately 76% of the mine disturbance area with unvegetated areas at the treatment facilities, access roads, and pit mine highwalls.

Landusky Mine

The reclamation covers that will be used under Alternatives L4 and L3 at the Landusky Mine are virtually identical for all mine facilities (SEIS Figure 2.4-2). The reclamation covers consist of 24 inches of soil over 24 inches of non-acid generating material, and are for the most part constructed without the use of tailings as a subsoil. The result is a more fertile reclamation cover than at the Zortman Mine which will limit infiltration and support both tree and grass vegetation under either Alternative L3 or L4. Virtually the same amount of disturbance is vegetated under either alternatives at 78% and 81%, respectively. The remaining unvegetated areas occur at treatment facilities, access roads, and mine pit highwalls. Table 4.5-2 of the Final SEIS compares vegetation acreage.

Restoration of Area Aesthetics and Land Use

Restoration of area aesthetics and land use includes such issues as visual impact mitigation and the use of the area for traditional cultural practices. The visual impacts of the mine disturbance will be reduced by grading of the terraced waste rock dumps and leach pads, and by revegetation of the mine disturbance. Interim reclamation efforts already underway have demonstrated that area aesthetics will improve with reclamation (e.g., see photos on Final SEIS cover from left to right). All previously disturbed areas will be available as wildlife habitat except those small locations where treatment facilities occupy the surface. The mine pit highwalls are already being used as escape habitat by Bighorn Sheep.

While reclamation will reduce the present adverse visual impacts to American Indian traditional cultural practitioners, many of the traditionalists commented during preparation of the 1996 Final EIS and the recent SEIS that mining is a desecration that cannot be undone by reclamation. Given the truth of this assertion, regardless of the reclamation alternative selected, it is not possible to reduce impacts to American Indian traditional cultural resources to less than significant. Even full pit backfilling to near-original topography, as is favored by some American Indian commenters on

the SEIS, will not undo the impact past mining activity has had on the Little Rocky Mountains as a sacred landform. Still, the selected alternatives will reduce the visual impact of the existing mine disturbance on the landform as a whole. Potentially this action will provide traditionalists the opportunity to engage in traditional cultural practices in the Little Rocky Mountains with less visual intrusion due to the mines.

Zortman Mine

Alternative Z6 has been selected because it will reduce visual impacts by regrading the mine disturbance to blend with the adjacent topography. Approximately 76% of the surface disturbance area will be revegetated. The remaining unvegetated area includes the pit highwalls and access roads. The visual impacts of the highwalls will be reduced from present conditions by selective blasting and natural erosion to conditions that resemble a scree or talus slope. Reserve selected Alternative Z3 will also accomplish essentially the same result. Alternatives such as Z5, that include pit backfilling to restore the topography of the pit area, were considered but not selected since they create an increased risk to water quality and increase the reclamation cost.

Landusky Mine

Alternative L4 has been selected because it reduces the visual impact of the mine disturbance by grading the waste rock dumps and spent ore heaps to remove the terraced appearance and blend with the adjacent topography. Approximately 81% of the surface disturbance area will be revegetated. The remaining unvegetated area includes the pit highwalls and access roads. The visual impacts of the highwalls will be reduced from present conditions by selective blasting and natural erosion to resemble a scree or talus slope. The reserve selected Alternative L3 will also accomplish a similar reduction in visual impacts through regrading and highwall blasting; although leaving the L85/86 leach pad in Montana Gulch under Alternative L3 will leave a visual contrast in this drainage. There is no basic difference in the appearance of the highwalls to distant viewers between Alternatives L3 or L4.

Alternative L5 was not selected because it would add acid generating material to the pit area in close proximity to the groundwater recharge area without a significant improvement in the visual character of the pit area when compared to Alternatives L3 or L4. The main visual advantage of Alternative L5 is that the pit would more closely resemble a large bench or shallow valley. However, the amount of highwall visible to viewers outside the immediate mining area would be essentially the same under all three alternatives. None of these alternatives would restore the aesthetics of the area to pre-mining conditions.

Alternative L6 was not selected because while it would likely mitigate most of the visual impacts caused by the mine pit highwalls, it would almost certainly result in significant increases in acidity and metal contaminants reporting to King Creek, Swift Gulch, and Montana Gulch. The increased risk to water resources, in particular Tribal water resources, in combination with the approximately $120 million in added taxpayer cost to implement Alternative L6, cannot be justified by the reduction in visual impacts that would be achieved under Alternative L6 when compared to what would be achieved by Alternatives L3 or L4.

Alternative L1 was not selected because construction of the drainage notch would increase the visual impact of the mine pits by creating new highwall areas. Alternative L2 was not selected to address the area aesthetics and land use issue because it does not contain enough highwall reduction work to address the most noticeable visual impacts.

Management Rationale for the Selected Alternative

This section explains how the selected alternatives satisfy the agencies' major legal, regulatory, and policy mandates or objectives. It is not exhaustive of all applicable management constraints, but explains why the alternatives were selected and how they conform with legal, regulatory, and policy requirements.

Many of the State and Federal reclamation requirements are generally non-quantitative with regard to reclamation elements such as grading, soil cover, revegetation, etc. Requirements are outcome based, calling for reclamation performance to achieve comparable stability and utility, provide for soil cover to support revegetation, minimize erosion, achieve a beneficial use, etc. In this regard, all the alternatives presented in the SEIS could meet these requirements. However, some alternatives meet the requirements better or quicker than others, or involve less risk of failure over the long term. The selected and reserve selected alternatives have been chosen because they provide the best means to meet the regulatory requirements with the least likelihood of requiring remedial action over the long term.

Quantitative performance requirements are most evident in the area of water quality, which has specific numeric effluent limits and standards. Under all alternatives (and even under present conditions) the seepage capture and water treatment plants will continue to operate. At present, the effluent discharge from both water treatment plants is meeting the legal numeric requirements.

Mine discharges will have to continue meeting the effluent limits under each of the reclamation alternatives considered. The main difference in the alternatives is the degree of difficulty in maintaining compliance with the effluent limits and the potential impacts of an accidental solution release, or from inefficient seepage capture. Alternatives Z4, Z5, L5 and L6 increase the risk of a spill or release exceeding the water quality requirements by using acid generating spent ore and waste rock as pit backfill. Alternatives Z3, Z6, and L2 through L4 will make it easier to meet water quality requirements by keeping acid generating materials on lined areas and covering them with soil to limit infiltration and acid generation. Effluent discharges under selected Alternatives Z3, Z6,L3, and L4 will continue to meet water quality requirements and decrease the potential for impacts to water quality from present conditions.

National and Montana Environmental Policy Acts (NEPA and MEPA)

The National Environmental Policy Act is the procedural requirement that mandates Federal agencies take a hard look at the potential impacts of an action prior to a decision. The Montana Environmental Policy Act (MEPA) is the State counterpart to NEPA, and mandates that State agencies, such as DEQ, consider the potential impacts of an action prior to making a decision.

The impacts of the selected alternatives have been evaluated in the Final Supplemental Environmental Impact Statement prepared in 2001 by BLM and DEQ, with EPA and the Fort Belknap government as participating agencies. Information on groundwater conditions has been updated from that presented in the 1996 Final EIS, with nine subsequent studies or reports in order to meet the requirements of NEPA and MEPA regarding adequate resource information (see SEIS Section 3.3.1).

The agencies have completed the required "hard look" at the potential impacts of mine reclamation and are issuing this ROD as the final step in the NEPA/MEPA processes.

FLPMA-Prevention of *Unnecessary or Undue Degradation*

The prevention of unnecessary or undue degradation is the overall performance standard for mining activity on BLM-managed lands. Section 302(b) of the Federal Land Policy and Management Act of 1976 (FLPMA) directs the Secretary of the Interior to, "by regulation, or otherwise, take any action necessary to prevent unnecessary or undue degradation of the lands." (43 USC §1732(b)). In 1981 the BLM promulgated regulations (the 3809 regulations) under Title 43 Code of Federal Regulations, Subpart 3809, to implement the FLPMA requirements for mining and reclamation activities on BLM-managed lands.

Unnecessary or undue degradation is defined in the BLM 3809 regulations at 3809.0-5(k) and briefly means: (1) surface disturbance greater than what would normally result when activity is being accomplished by a prudent operator; (2) failure to take into consideration the effects of operations on other resources and land uses; (3) failure to initiate and complete reasonable mitigation measures, including reclamation; and (4) failure to comply with applicable environmental statutes and regulations.

On January 20, 2001, BLM promulgated new surface management regulations at 43 CFR subpart 3809 and subsequently modified these regulations in a rulemaking that was effective on December 31, 2001. Under these new 3809 regulations, existing operations such as the Zortman and Landusky Mines are not subject to the new regulation requirements (§3809.400(a)). However, the new definition of "unnecessary or undue degradation" while not applicable to the reclamation decisions, provides an additional check on the proficiency of the reclamation alternatives. The pertinent part of the new definition says "unnecessary or undue degradation" means conditions, activities, or practices that: (1) fail to comply with the performance standards in 3809.420, the terms and conditions of an approved Plan of Operations, or with other federal and state laws related to environmental protection and protection of cultural resources.

The selected and reserve alternatives meet or surpass the more specific reclamation performance requirements in the new regulations at §3809.420, especially with regard to the standards for reclamation of acid-forming, toxic, or deleterious materials.

Zortman Mine

Reclamation of the Zortman Mine using selected Alternative Z6 will meet the requirements of the 3809 regulations and prevent unnecessary or undue degradation. Alternative Z6 will cover disturbance areas and potentially acid-forming material with the necessary growth medium needed to establish a self-sustaining cover of vegetation. This cover will also reduce the formation and movement of acidic leachate within the mine waste, further protecting area water resources, soil, vegetation and wildlife. Seepage capture systems located downgradient of reclaimed mine facilities will continue to collect residual contaminated leachate for treatment in order to meet State and Federal water quality laws. This is in accordance with both the new and old BLM performance standards in the 3809 regulations regarding reclamation of acid-forming, toxic, or other deleterious materials.

Selected Alternative Z6 will provide for an optimal amount of highwall cover in order to reduce visual impacts of the mine pit highwalls and to cover potentially acid-forming rock faces, while not increasing risks to water quality. Alternative Z6 satisfies the requirements of the 3809 regulations regarding reclamation of mine disturbance.

Reserve selected Alternative Z3 also meets the requirements of the 3809 regulations for reclamation of mine disturbance. The reclamation covers are very similar to those included in Alternative Z6 and will restrict the infiltration of precipitation so as to control the generation and movement of ARD.

The remaining Zortman Mine reclamation alternatives would also nominally satisfy the requirements of the 3809 regulations but have not been selected for a variety of reasons. Alternatives Z1, Z4, and Z5 involve the redisturbance and placement of a considerable amount of waste rock which could actually release additional contaminants. This increased risk is not justified by the mostly aesthetic benefit these alternatives offer over Alternatives Z3 and Z6. Alternative Z2 was not selected because moving the Zortman water treatment plant to Goslin Flats presents little, if any, cost savings in water treatment and would create additional disturbance.

Landusky Mine

Reclamation of the Landusky Mine using selected Alternative L4 will meet the requirements of the 3809 regulations and prevent unnecessary or undue degradation. Alternative L4 will cover disturbance areas and potentially acid-forming material with the necessary growth medium needed to establish a self-sustaining cover of vegetation. This cover will also reduce the formation and movement of acidic leachate within the mine waste, further protecting area water resources, soil, vegetation and wildlife. Seepage capture systems located downgradient of reclaimed mine facilities will continue to collect residual contaminated leachate for treatment in order to satisfy State and

Federal water quality laws. This is in accordance with both the new and old BLM performance standards in the 3809 regulations regarding acid-forming, toxic, or other deleterious materials.

Selected Alternative L4 will provide for an optimal amount of highwall cover in order to reduce visual impacts of the mine pit highwalls and to cover potentially acid-forming rock faces, while not increasing risks to water quality by moving acid generating material off the leach pads. Alternative L4 satisfies the requirements of the 3809 regulations regarding reclamation of mine disturbance.

Reserve Selected Alternative L3 also meets the requirements of the 3809 regulations for reclamation of mine disturbance. The reclamation covers are very similar to those used in Alternative L4, and will restrict the infiltration of precipitation in order to control the generation and movement of ARD. While Alternative L3 will leave the L85/86 leach pad in its present location, the regrading and revegetation plans for this facility provide the runoff control needed to meet the requirements of the 3809 regulations.

The other Landusky Mine reclamation alternatives would also nominally satisfy the requirements of the 3809 regulations, but have not been selected for a variety of reasons. Alternatives L5 and L6 involve re-disturbance in acid-forming rock and the placement of a considerable amount of waste rock in locations that would actually increase the potential for release of contaminants. This increased risk is not justified by the mostly aesthetic benefit these alternatives offer over Alternatives L3 and L4. While mitigating measures such as liners and recovery wells have been incorporated into the pit backfill plans under Alternatives L5 and L6, these alternatives still present a significant risk of not meeting the 3809 performance standards for the isolation and control of toxic or deleterious materials. The agencies choose not to undertake that risk given the very real potential for these alternatives to impact trust resources.

Alternative L2 was not selected because the amount of reshaping used to cover the pit highwalls and reduce visual impacts is not optimal when compared to that available under the other alternatives. Alternative L1 was not selected because, while at one time it represented the agencies' preferred alternative, more efficient ways have been found to provide for drainage of the Landusky Mine pits without creating additional disturbance by excavating the pit drainage notch as proposed by Alternative L1.

implemented if a mine expansion alternative was selected. No Treatment Plans were required for non-mining (reclamation only) alternatives.

Another Section 106 review was completed for the current decision. This review was completed under BLM's National Programmatic Agreement signed in 1997, and the Montana Protocol signed in 1998.

The Section 106 review for this decision shows that the additional reclamation alternatives analyzed in the SEIS were merely variations of the non-mining alternatives considered in the 1996 Final EIS and supporting Programmatic Agreement. That is, there would be no new disturbance of historic properties not previously considered in the Final EIS and Programmatic Agreement. Therefore, no further actions are required under Section 106 of the NHPA.

American Indian Religious Freedoms Act

The American Indian Religious Freedoms Act (AIRFA) was passed as a joint resolution of Congress. The resolution states that it shall be the policy of the United States to protect and preserve for the American Indian the inherent right of freedom to believe, express and exercise their traditional religions, to use sacred objects and to worship through ceremonies and ritual. BLM complies with this Act by consulting with and considering the views of American Indians when a proposed land use might conflict with traditional American Indian religious beliefs or practices. The Act does not require that land uses be denied which conflict with such religious beliefs or practices.

Under all alternatives, the visual and audible disruption created by the reclamation activity will affect some American Indian traditionalists who may be worshiping in portions of the mountains. While the entire mountain range is regarded by many traditionalists as sacred, no specific sites will be directly affected by reclamation activity. In selecting the reclamation alternatives the agencies acknowledge the American Indian position that no amount of reclamation will restore the sacred nature of the land since the impacts have been as much spiritual as they have been physical.

However, it is important to note that this decision does not limit the American Indians' freedom to believe, express or exercise their traditional religious beliefs, their right to possession of sacred objects and freedom to worship through ceremonies and traditional rites as required by AIRFA. Once reclamation is complete, access to the area will be open. Thus, reclamation of the mines will enhance the ability to exercise traditional cultural practices when compared to current conditions.

This decision is consistent with Executive Order 3007 which requires each agency, to the extent practicable, to accommodate access to and use of sacred sites by Indian religious practitioners, and to avoid adversely affecting the physical integrity of such sacred sites. No "sacred site(s)" as defined in the Executive Order, have been identified that will be disturbed by implementation of the selected reclamation alternatives.

FLPMA-Land Use Plan Conformance

The majority of public lands in the Little Rocky Mountains are open to operation of the Mining Law in conformance with the approved Judith-Valley-Phillips Resource Management Plan/EIS (JVP RMP 1994). Although the area within and around the mines is temporarily withdrawn in order to facilitate reclamation work, this withdrawal will expire in 2005. The selected alternatives are consistent with the Hardrock Mineral Resources Reasonably Foreseeable Development Scenario presented in Appendix C of the JVP RMP. The selection of alternatives to reclaim and close the mines does not preclude future mineral exploration or development as anticipated by the approved RMP.

American Indian Trust Responsibilities

The Department of the Interior consults with Indian Tribes on a government-to-government basis whenever plans or actions potentially affect Tribal trust resources, trust assets, or Tribal health and safety. The BLM has conducted consultation with the Fort Belknap Indian Community Council during development, environmental analysis, and selection of the mine reclamation plans. Numerous briefings, meetings, and mine tours have been held for members of the Fort Belknap Council and their employees or consultants in deciding upon the selected alternatives (see consultation section).

The reclamation plans have been selected to minimize the potential for impacts to Tribal water resources. Reclamation under the selected alternatives occurs on private lands, or public lands under the administration of the BLM. There are no Tribal or trust lands in the mining operations area. Approval of the modified Plans of Operations by BLM to reclaim the public lands using the selected or reserve selected alternatives is consistent with BLM's trust responsibilities and will protect Tribal trust resources, assets, and Tribal health and safety.

National Historic Preservation Act

BLM has completed the process for considering the effect of the undertaking on historic properties as required by Section 106 of the National Historic Preservation Act (NHPA). The area of potential effect has been inventoried, historic properties identified, interested parties consulted, and a Programmatic Agreement developed.

Consultation under Section 106 of the NHPA was completed in 1995 for mine expansion and reclamation alternatives with the State Historic Preservation Office, the Advisory Council on Historic Preservation and the interested parties. The Advisory Council on Historic Preservation signed a Programmatic Agreement in November, 1995 along with the BLM, SHPO, and ZMI.

Signing of the Programmatic Agreement by BLM and the Advisory Council completed review under Section 106 of the NHPA and allowed BLM to proceed with the 1996 decision. The Programmatic Agreement is contained in Appendix E of the 1996 Final EIS. The Programmatic Agreement included Treatment Plans for historic properties, including Native American Traditional Cultural Properties, an archaeological site, and historic mining properties that were required to be

Endangered Species Act

There will be no adverse impacts to species listed under the Endangered Species Act or their critical habitat from any of the mine reclamation alternatives. The U.S. Fish and Wildlife Service has concurred with BLM's determination of no effect.

Executive Order 12898 on Environmental Justice

The 1994 Executive Order on environmental justice (EO 12898) requires Federal agencies to address environmental justice when implementing their respective programs. In order to describe how environmental justice has been addressed, it is necessary to first define what may constitute an environmental justice concern. Environmental justice concerns can be grouped in three general categories: 1) facility siting and opposition, 2) regulatory agency discrimination, and 3) equitable distribution of project benefits and risks. Below is an explanation of each environmental justice category, followed by an explanation of how the concern has been address by selection of the reclamation alternatives.

1) Facility Siting and Opposition

> *Concern:* The targeted siting of potentially polluting facilities in areas with racial minorities or impoverished populations. The motives often attributed to the proponent are: a) that they do not care about the effects on minority populations; and/or b) that the site is desirable because minorities and the poor do not have the resources to oppose the project.

While there will not be any new mine facilities as a result of this decision, the past siting of leach pads and waste rock dumps has been driven by the intent to avoid impacts to American Indian communities or resources. Since the ore body is fixed by the geology, little flexibility was available to the agencies under the mining laws regarding where the mine pits were to be excavated. Still, preferential siting criteria was used by the agencies to protect Fort Belknap communities from possible mine impacts. The operator was required to construct virtually all mine facilities under which there was some agency discretion regarding location, such as leach pads, waste rock, and processing plants, in watersheds that flowed away from the Fort Belknap Indian Reservation.

The selected alternatives will maintain this siting preference by reclaiming these same mine facilities in their present relatively "safe" locations away from Fort Belknap watersheds. The one exception is the use of the L85/86 leach pad material under Alternative L4 as backfill. This material has value as a source of cover material to mitigate the negative impacts from the Landusky Mine pits on watersheds upstream of Fort Belknap. Other mine facilities, such as the spent ore on the L87/91 pads, poses too great a pollution risk and will be left on their lined containment areas outside of Fort Belknap watersheds. Runoff from both the Zortman and the Landusky mine pits will continue to be directed away from Fort Belknap in order to protect the water quality in the Fort Belknap communities.

Residents of Fort Belknap have had access to technical and legal resources to make their concerns about mine reclamation known to the agencies and to participate in the reclamation plan development and review process. Fort Belknap residents opposed to mining have received advice and assistance from various attorneys, regional and national environmental groups, government agencies and technical professionals. They have participated in past administrative appeals before the Interior Board of Land Appeals, have been involved in litigation against the mines in both State and Federal courts, and have provided testimony during the public meetings. Numerous substantive and detailed legal and technical comments were provided on the Draft SEIS from both government and private parties on behalf of the Fort Belknap residents.

2) Regulatory Agency Discrimination

> *Concern:* Discrimination by regulatory agencies in enforcement of environmental standards where projects may be affecting low income or minority populations. The argument is that these groups cannot obtain the same level of regulatory protection as other groups that may be wealthier, more politically powerful or of a different race.

The EPA, DOJ, BIA, DEQ, BLM, and the Agency for Toxic Substances and Disease Registry (ATSDR) have all devoted considerable regulatory resources to studying the mines' potential effects on Fort Belknap and to providing the residents with direct access to agency representatives. Federal and State water quality enforcement actions and site investigations have been undertaken at least in part due to the potential for impacts to water quality on the Reservation. Likewise, in 1993 the BLM and DEQ ordered that modified mine reclamation plans be prepared due in part to the potential for impacts to nearby residents.

An intensive effort has been made to provide opportunities for communities on the Fort Belknap Reservation to have input on mining issues. Since 1990, the agencies have held dozens of public meetings, numerous briefings for the Fort Belknap Indian Community Council, mine tours, one-on-one visits, field trips, work groups, etc. to obtain the input from Fort Belknap residents and to provide them with information on mining issues. Public meetings have been held in communities on or adjacent to the Reservation to promote the participation of those who may not have had access to transportation, or those who may not have been comfortable traveling to a meeting location off the Reservation. There have been numerous opportunities for Fort Belknap residents to have access to agency officials involved in the reclamation decisions.

During development and review of the reclamation plans, Fort Belknap has been involved as a participating agency and has been provided the opportunity to review working drafts of SEIS text and to participate in the actual evaluation of the reclamation performance through the Multiple Accounts Analysis (MAA) process. A MOU was signed by all parties that defines the Fort Belknap government’s participation in the SEIS process. The BLM provided Fort Belknap with a $30,000 technical assistance grant to partially fund their participation in the SEIS review and MAA processes. The EPA provided additional monies under an environmental justice grant to help pay for technical consultants to work on Fort Belknap’s behalf.

3) Equitable Distribution of Project Benefits and Risks

> *Concern:* The inequitable distribution of project benefits, primarily economic, with project impacts such as increased pollution or perceived risk of pollution.

Any formula to establish what would constitute an *equitable distribution* of project risks and benefits would be highly subjective. However, there do not appear to have been any overwhelming imbalances either way.

The residents of Fort Belknap in Hays and Lodgepole are at less risk than non-Fort Belknap residents in the communities of Zortman or Landusky from the possible release of environmental contaminants at the mines. Water contamination from existing mine facilities has been greatest in those drainages that flow away from the Reservation through the non-Reservation communities of Landusky and Zortman. The drainages most impacted have been Ruby Gulch, Alder Gulch, Mill Gulch, Sullivan Gulch and Montana Gulch, all of which flow to the south, away from the Reservation. Streams emanating from the mining areas leading onto the Reservation continue to be monitored for potential contaminants. Swift Gulch is a priority for continued monitoring and possible construction of a treatment system. Monitoring results to date show these streams do not pose a human health risk to the Fort Belknap Indian Reservation. This has been verified in a variety of studies conducted by: The Council of Energy Resource Tribes, ATSDR, BIA, BLM, DEQ, EPA, and the USGS. In its 1998 Public Health Assessment, the ATSDR concluded that, " . . . *the gold mining operations are no apparent public health hazard to the residents of Fort Belknap.*"

Individual American Indian traditionalist practitioners in the Little Rocky Mountains are susceptible to impacts that other individuals or populations would not experience. Disruptions related to mining or reclamation, such as noise, dust, and landscape alteration may affect religious practitioners in certain portions of the mountains. These impacts to spiritual practices are unique to certain members of the American Indian community. While reclamation using the selected alternatives will reduce many components of the existing mine impacts on the Little Rocky Mountains, the spiritual impacts from past mining cannot be undone through reclamation.

The majority of economic benefits associated with mining have occurred outside of the Fort Belknap Indian Reservation, as have the majority of environmental impacts. Of the benefits associated with past mining, most of the jobs were held by individuals who did not live on the Reservation. Conversely, the mine jobs held by those who live on the Reservation may have had a proportionally higher beneficial economic and social impact due to the low average income on the Reservation. In conducting the ongoing interim reclamation and water treatment, jobs have been offered to qualified applicants without preference. At present, about one-third of the workers running the water treatment plants or reclamation equipment are American Indians. As the reclamation and water treatment bonds are expended under the selected alternatives, employment will continue to be offered to qualified applicants without preference, in accordance with State of Montana contracting procedures.

In conclusion, there are no environmental justice issues relative to the Zortman and Landusky Mines that violate or are inconsistent with the intent of Executive Order 12898. A primary mine facility

siting criteria has been to avoid even the perception of creating environmental impacts to the Reservation. Reclamation actions will continue this approach by seeking to avoid or minimize impact to northern-flowing drainages. Although the selected alternatives will repair most of the physical damage, reclamation cannot undo the impacts to spiritual values and beliefs. The regulatory agencies have actively pursued environmental enforcement actions at this site and have involved Fort Belknap in development of the reclamation plans, while non-Reservation communities have experienced economic slowdown from the discontinuation of mining activities. Employment opportunities have been presented to Fort Belknap residents during the interim reclamation work and will continue to be offered as the selected alternatives are implemented.

National Mineral Policy Conformance

The Mining and Minerals Policy Act of 1970, the Federal Land Policy and Management Act of 1976, and the Natural Materials and Minerals Policy, Research and Development Act of 1980 direct that the public lands be managed in a manner which recognizes the nation's need for domestic sources of mineral production to be obtained in an environmentally responsible manner. Under the Mining Law of 1872 claimants have a statutory obligation to perfect their claims and a right to develop their mineral deposits consistent with applicable environmental laws.

The selected alternatives provide for the reclamation and closure activities needed to comply with applicable environmental laws regarding water quality and reclamation. The selected alternatives do not preclude future mining in the area. All reclamation alternatives are in compliance with the mineral policy acts. Future mineral operations could occur in the reclaimed area, provided the operator developed a Plan of Operations that will maintain compliance with applicable environmental laws and posted a reclamation bond to cover the cost of reclamation as detailed in the Federal and State mining regulations.

Montana Metal Mine Reclamation Act

The Metal Mine Reclamation Act (MMRA) sets environmental performance standards for metal mines. To this end, the Act provides that reclamation plans must achieve a post-mining land use of comparable stability and utility as that of the pre-mining landscape, except for open pits and rock faces. For those open pits and rock faces at the Zortman and Landusky mines, the Act requires that the reclamation plan must achieve structural stability sufficient to withstand geologic and climatic conditions without significant failure that would threaten public health or the environment. The MMRA also requires the DEQ to consider site specific conditions in developing a reclamation plan.

The post-mining land use for the Zortman and Landusky Mines is wildlife habitat. This is compatible with existing uses in the area surrounding the mine. Wildlife use has been previously addressed in the SEIS and this ROD. The reclamation plans in Alternatives Z3 or Z6, and L3 or L4, will achieve this land use as described below.

Heap leach pads will be reclaimed. This includes the completion of cyanide detoxification of the heap effluent to 0.22 mg/L weak acid dissociable. Some access roads will remain in place to provide access to monitoring sites. These will be reclaimed within 2 years of the determination that

monitoring sites on specific access routes are no longer needed. Similarly, the water treatment plants will also be reclaimed within 2 years of the determination that they are no longer needed.

Erosion control during reclamation will be achieved consistent with the stormwater management plan included as Appendix B of the Consent Decree. The contours of final reclamation will effectively reduce long-term erosion to background levels. For the short term, monitoring of reclamation, repair of areas of excess erosion, and modification of reclamation techniques as necessary to achieve long-term stability will be performed by the agencies' contractors using a portion of the reclamation bonds.

The postmining contour plan includes partial backfill of pits. This will prevent accumulations of stagnant water in the area of the pits. However, complete backfill is not part of the selected reclamation alternatives. Partial backfill will provide a condition that is structurally competent to withstand geologic and climatic conditions without significant failure that would be a threat to public safety and the environment, and affords utility to the extent feasible. Additional discussion of pit reclamation is presented later in this section.

The reclamation plans adopted under the selected alternatives provide for capping of potentially acid-producing materials with subsoils and neutral waste rock. This is in compliance with the MMRA standard requiring a final surface of non-noxious, nonflammable, noncombustible solids.

Capping and reclamation plans for heap leach pads, waste rock repositories and other areas exceed the requirement to insulate problem materials with a minimum 2-foot covering of non-acid generating, non-polluting material. Coverings will be constructed with subsoils and neutral waste rock which are not susceptible to the generation of objectionable effluent. Total capping depths will limit the generation of objectionable effluent over the long term. However, at least in the short term, collection and treatment of objectionable effluent will be necessary to ensure that it is not discharged from the reclaimed mine facilities.

The revegetation plans include native, perennial grasses, forbs, and shrubs which will support postmining wildlife use and restore a dynamic ecosystem capable of ecologic succession Noxious weeds will be controlled until revegetated species are established. Thus, disturbed sites, excepting pits which are described below, will be returned to a level of stability and utility comparable to adjacent areas. Reclamation plans for the pit area include a commitment to mitigate or eliminate any public nuisance that may exist at closure.

Some areas in the pits which might create objectionable effluent would still be exposed under the selected alternatives. While the pit floors and benches would be covered with the required two feet of reclamation material, areas such as the near-vertical rock faces between the benches would be left exposed. In addition, some of the older bench areas might not be safely accessible for cover placement. However, provisions have been included in the reclamation plans for capture and treatment, if necessary, of objectionable runoff from these areas.

Since 1991, pit benches have been reclaimed concurrent with mining using 12 inches of NAG material overlain by 12 inches of soil. A grass seed mix will be used to revegetate the benches to

provide wildlife habitat and to increase evapotranspiration. Pits will be partially backfilled to reduce potential acid drainage, to prevent the accumulation of stagnant water, to provide for drainage of runoff, and to increase the utility of the reclaimed pits.

Pit benches will also be reclaimed to withstand climatic and geologic conditions comparable to those currently existing in the area. If a bench or portion of pit wall slumps, it would create a localized angle-of-repose slope approximating one of the many talus slopes commonly seen in the Little Rocky Mountains and thus not pose a threat to public safety and the environment. Remaining pit walls and benches would replicate many of the naturally occurring cliff-forming rock outcrops in the area. The pit walls and benches would be subject to the same environmental conditions and processes as that of the surrounding undisturbed areas. Rates of natural degradation for both disturbed and undisturbed areas are not expected to differ appreciably in the long term. Recontouring and revegetation plans for pit benches are designed to blend with the surrounding area to the extent feasible. Revegetation will prevent air pollution. Potential water pollution and degradation of adjacent lands will be prevented by backfilling and capping of all materials and surfaces, other than the upper pit walls, which are potentially acid generating. Water capture and treatment will prevent water pollution and degradation of adjacent lands until postmining water quality returns to background levels.

Heap leaches and waste rock dumps will be recontoured to minimize infiltration of precipitation beyond that necessary for successful revegetation of the specified plant communities. Heap leaching facilities are lined to prevent objectionable groundwater discharges. Waste rock repositories and heap leaches will also be capped to prevent objectionable postmining groundwater discharges.

This decision complies with the Metal Mine Reclamation Act. This decision also provides measures and plans to comply with the Montana Water Quality Act and the Montana Air Quality Act, both of which must be complied with in order to obtain approval under the MMRA.

Montana Water Quality Act

The selected reclamation and water management plans under Alternatives Z3, Z6, L3, and L4, in combination with the water management plans previously required under the Consent Decree, and now adopted via the selected alternatives and MPDES permits, will effectively prevent the discharge of pollutants. These plans limit the generation of objectionable effluent and provide for capture and treatment of any objectionable effluent that does develop.

Effluent limits in the MPDES permits have been set so that compliance with Montana water quality standards is required at the actual points where discharges from mine facilities enter surface waters, without the need for dilution. The MPDES permits also require compliance with groundwater standards outside of designated mixing zones. The mixing zones allow for the initial dilution of contaminants derived from infiltration of precipitation through the mine reclamation covers and pit walls, or from contact between groundwater and underground mine workings or waste rock disposal facilities. The groundwater mixing zones specified in the MPDES permits are source-specific, based upon individual surficial drainage basins and the mining facilities contained in each drainage, and are generally restricted to the igneous rock (syenite porphyry) in the core of the mountain range

where most of the mining facilities are located. The mixing zones do not extend downstream into the surrounding Paleozoic rock aquifers, which may be subject to beneficial uses.

Continued water management and treatment as specified in the selected alternatives, including the MPDES permit conditions, will result in compliance with the Montana Water Quality Act both during and after reclamation of the Zortman and Landusky Mines.

Montana and Federal Clean Air Acts

The Department of Environmental Quality has reviewed the proposed activities and determined that the emissions associated with these projects would not trigger any additional air quality permitting requirements for the facility. In addition, the emissions are not expected to exceed any federal or state ambient air quality standard. Therefore, this activity can be undertaken in accordance with the Montana and Federal Clean Air Acts.

Montana Hard Rock Impact Act

Mining at the Zortman and Landusky Mines was permitted in 1979, which predates the passage of the Hard Rock Impact Act in 1981. Therefore the project is grandfathered from the need for a specific Hard Rock Impact Plan, consistent with Title 90, Chapter 6, Parts 3-4, MCA.

Summary Tables of Management Rationale by Alternative

The following tables compare and contrast how each alternative meets the agencies' major legal, regulatory, policy and management requirements or objectives.

Table R7. Likelihood of the Zortman Mine Reclamation Alternatives Meeting the Agencies' Major Legal, Regulatory, Policy and Management Requirements or Objectives.

Applicable Requirement	Alternative Z1	Alternative Z2	Alternative Z3 (Reserve Selected)	Alternative Z4	Alternative Z5	Alternative Z6 (Selected)
NEPA & MEPA Analysis	High	High	High	High	High	High
	MEPA and NEPA analysis requirements completed with release of the Final SEIS.					
FLPMA-3809 Regulations	High	High	High	High	Moderate	High
	All alternatives will prevent unnecessary or undue degradation. Alternative Z5 impacts may present increased risk to public lands and resources such as water quality.					
FLPMA-Land Use Plan Conformance	High	High	High	High	High	High
	All of the alternatives will achieve reclamation consistent with the Judith-Valley-Phillips RMP/EIS. None of the alternatives will change the long-term management plans for the area.					
American Indian Trust Responsibilities	High	High	High	High	Moderate	High
	All alternatives will protect American Indian trust resources. Alternative Z5 presents an increased risk of impacts to downstream water quality, though probably not significant.					
National Historic Preservation Act	High	High	High	High	High	High
	Consultation under Section 106 of the NHPA has been completed for all alternatives. Under the Programmatic Agreement none of the reclamation alternatives require the implementation of "treatment programs."					
American Indian Religious Freedom Act	High	High	High	High	High	High
	None of the alternatives will restrict access to areas of traditional cultural use after reclamation is completed.					
Endangered Species Act	High	High	High	High	High	High
	No threatened or Endangered Species in the project area will be affected.					
Environmental Justice EO 12898	High	High	High	High	High	High
	None of the alternatives will result in disproportionate impacts to minority or low income communities.					

Applicable Requirement	Alternative Z1	Alternative Z2	Alternative Z3 (Reserve Selected)	Alternative Z4	Alternative Z5	Alternative Z6 (Selected)
National Mineral Policies	High	High	High	High	Moderate	High
	Backfill amount under Alternative Z5 is a slight detriment to future mineral development.					
Montana Metal Mine Reclamation Act	High	High	High	High	Moderate	High
	All alternatives will meet the reclamation requirements of the MMRA.					
Montana Water Quality Act	High	High	High	High	Moderate	High
	All alternatives will meet the requirements of the water quality act through use of the capture and treatment systems. Alternative Z5 presents an increased risk of exceeding the water quality standards.					
Montana & Federal Clean Air Acts	High	High	High	High	High	High
	All alternatives will comply with the Montana Air Quality Act during reclamation construction activities through the use of best management practices.					
Montana Hard Rock Impact Act	High	High	High	High	High	High
	The Zortman Mine predates the Hard Rock Impact Act and is exempt from the Act's requirements.					
Responsible Use of Reclamation Funds (MAA cost benefit score)	Low, (7.1)	Moderate, (8.3)	Moderate, (8.0)	Low, (6.8)	Low, (6.7)	High, (10.9)
	Through the MAA process expenditures under Alternative Z1, such as the widespread use of barrier covers and excavation of the Alder Gulch Waste Rock dump, are not cost effective in promoting revegetation or protecting water quality. Movement of the Water Treatment Plan to Goslin Flats under Alternative Z2 will cost a significant portion of the reclamation budget but will not result in a significant reduction in treatment costs. Alternative Z4 and Alternative Z5 involve pit backfill greater than what is necessary to meet environmental laws. Alternative Z6 is the most efficient use of reclamation funds.					

Table R8. Likelihood of the Landusky Mine Reclamation Alternatives Meeting the Agencies' Major Legal, Regulatory, Policy and Management Requirements or Objectives.

Applicable Requirement	Alternative L1	Alternative L2	Alternative L3 (Reserve Selected)	Alternative L4 (Selected)	Alternative L5	Alternative L6
NEPA & MEPA Analysis	High	High	High	High	High	High
	MEPA and NEPA analysis requirements completed with release of the Final SEIS.					
FLPMA-3809 Regulations	Moderate	Moderate	High	High	Low	Very Low
	All alternatives will prevent unnecessary or undue degradation although Alternative L6 impacts could present increased risk to public lands and resources such as water quality and might not meet the requirements of the regulations					
FLPMA-Land Use Plan Conformance	High	High	High	High	High	High
	All of the alternatives will achieve reclamation consistent with the Judith-Valley-Phillips RMP/EIS. None of the alternatives will change the long-term management plans for the area.					
American Indian Trust Responsibilities	High	High	High	High	Moderate	Very Low
	All of the alternatives will protect American Indian trust resources except Alternative L6 which presents a significant increased risk of impacts to downstream Tribal water quality.					
National Historic Preservation Act	High	High	High	High	High	High
	Consultation under Section 106 of the NHPA has been completed for all alternatives. Under the Programmatic Agreement none of the reclamation alternatives require the implementation of "treatment programs."					
American Indian Religious Freedom Act	High	High	High	High	High	High
	None of the alternatives will restrict access to areas of traditional cultural use after reclamation is completed.					
Endangered Species Act	High	High	High	High	High	High
	No threatened or Endangered Species in the project area will be affected.					
Environmental Justice EO 12898	High	High	High	High	High	High
	None of the alternatives will result in disproportionate impacts to minority or low income communities.					

Applicable Requirement	Alternative L1	Alternative L2	Alternative L3 (Reserve Selected)	Alternative L4 (Selected)	Alternative L5	Alternative L6
National Mineral Policies	High	High	High	High	Moderate	Low
	Backfill amounts under Alternative L5 are a slight detriment to future mineral development. Backfill amounts under Alternative L6 would considerably decrease the potential for future open pit mining.					
Montana Metal Mine Reclamation Act	Moderate	High	High	High	Moderate	Very Low
	All alternatives will meet the reclamation requirements of the MMRA. Alternative L6 backfilling may actually cause water pollution in presently unaffected streams.					
Montana Water Quality Act	Moderate	High	High	High	Low	Very Low
	All alternatives will meet the requirements of the water quality act through use of the capture and treatment systems. Alternatives L5 and L6 increase the risk of exceeding the water quality standards. An exceedance of the water quality standards is likely in King Creek, Swift Gulch, and Montana Gulch under Alternative L6 until such time as remedial measures could be implemented.					
Montana & Federal Clean Air Acts	High	High	High	High	High	Moderate
	All alternatives will comply with the Montana Air Quality Act during reclamation construction activities through the use of best management practices. The large volume of material to be moved in Alternative L6 increases the likelihood of exceeding the particulate emission standards during implementation.					
Montana Hard Rock Impact Act	High	High	High	High	High	High
	The Landusky Mine predates the Hard Rock Impact Act and is exempt from the Act's requirements.					
Responsible Use of Reclamation Funds (MAA cost benefit score)	Low, (3.4)	High, (5.3)	High, (5.0)	Moderate, (4.2)	Low, (3.2)	Very Low, (1.6)
	Expenditures under Alternative L1 for barrier covers and excavation of the pit drainage notch are not cost effective in promoting revegetation or protecting water quality. Increasing the amounts of pit backfill under Alternatives L4 through L6 over the amount needed to achieve positive pit drainage are expensive reclamation components with mostly aesthetic benefits and some negative impacts to water quality where acid-forming backfill is used. Alternatives L2 and L3 are the most cost effective reclamation, though there are some residual impacts to visual and cultural resources that are better addressed by Alternative L4.					

Monitoring and Compliance

This section describes the project monitoring that will be conducted during and after implementation of the selected alternatives. The purpose of the monitoring is to assure compliance with the approved reclamation plans, detect problems or unanticipated events early, provide a basis for directing remediation of problems and to verify the reclamation performance predicted in the Final SEIS.

Reclamation will be performed by contractors under the supervision of Spectrum Engineering, which was retained by the agencies to oversee the engineering designs and contracting. Staff from DEQ and BLM will conduct inspections at the Zortman and Landusky Mines under the authority of the Metal Mine Reclamation Act and the Federal Land Policy and Management Act. Comprehensive mine-wide inspections will consist of physical onsite examination of disturbance areas, verification sampling at water quality monitoring points, and geochemical sampling of mine products, construction materials and reclamation materials. Inspections will be conducted at least four times per year and may be conducted more frequently during periods of intense activity, or where problems have been noted and corrective measures are being implemented.

The following is a list of monitoring activities that will be completed. All monitoring reports will be available to the public.

Water Resources Monitoring

Water resources monitoring will be conducted in accordance with the water monitoring plan prepared by the water monitoring subgroup of the technical working group. Monitoring reports will include results from surface water and groundwater stations as well as outfalls that are monitored under the MPDES permits.

LAD Area Use and Monitoring

Monitoring reports will be prepared during and after use of the land application areas. Reports will include results of treated water volume, reagent usage, application rates, soil tests, testing of soil pore water, vegetation condition, and volume of runoff from the LAD area.

Surface Reclamation Performance

Monitoring of revegetation conditions will be conducted concurrent with reclamation. Monitoring of revegetation will occur every two years for ten years following completion of reclamation; or until vegetation on a specific mine facility meets the full performance requirement of at least 55% canopy coverage of perennials and up to 5% of annuals plus biennials, with no noxious weeds.

Final "As Built" Engineering Reports

Surveys of the final reclamation topography will be required to document that reclamation has been conducted as approved in the selected alternatives and to document construction of the stormwater runoff controls.

Appeal Processes

Appeals of the BLM Decision

The BLM decision to approve modified reclamation plans to the Plans of Operations is limited to the public land under BLM administration. BLM makes no decision with regard to reclamation activities that are required to occur on the private lands within or adjacent to the mine disturbance areas. The decision to approve the modified Plans of Operations for reclamation of public lands at the Zortman and Landusky Mines may be appealed by either the mine operator or by the public. The following appeals process applies:

Within 30 days of receipt of this decision, any party adversely affected by the decision of the BLM authorized officer may request a BLM State Director review of the decision or may bypass State Director review and appeal directly to the Interior Board of Land Appeals (IBLA), Office of Hearings and Appeals, in accordance with the appeals procedures at 43 CFR 3809.800. Appeals to IBLA must be filed within 30 days with the BLM Malta Field Office, HC65 Box 5000, Malta MT, 59538. Requests for BLM State Director review must be sent to the BLM Montana State Office, PO Box 36800, Billings, MT 59107. The appellant has the burden of showing that the decision appealed is in error.

Under the regulations in 43 CFR 3809.803, this decision is in effect immediately and remains in effect while appeals are pending before IBLA unless IBLA grants a stay under 43 CFR 4.21(b). Similarly, under 43 CFR 3809.808, the original BLM authorized officer's decision remains in effect while the State Director review is pending, unless the State Director stays the decision during the pendency of the review.

Appeals of the DEQ Decision

The Operating Permits will be modified by the Department under 82-4-337(3), MCA, and A.R.M. 17.24.122, subject to the permittee’s right to request a hearing within 30 days of notice of the modification.

Approvals

This Record of Decision is effective for each agency upon signature of the respective agency official.

Approved by:

Jan P. Sensibaugh, Director
Montana Department of Environmental Quality

May 4, 2002
Date

Bruce W. Reed, Field Manager
Malta Field Office, Bureau of Land Management

05/01/2002
Date

Appendix R - Consultation Chronology

The following is a chronology of key events and meetings that have been part of BLM's consultation process with the Fort Belknap government on reclamation of the Zortman and Landusky Mines. More detailed documentation of the meetings or events listed below is available from the BLM files.

06/01/98 The DEQ and BLM issue a Record of Decision selecting reclamation under Alternative 3 of the 1996 Final EIS, *Zortman and Landusky Mines Reclamation Plan Modifications and Mine Life Extensions.*

11/20/98 The IBLA issues an Order that sets aside the BLM Record of Decision of June 1, 1998 and directs that, "...BLM must separately analyze, and consult with the Tribes about, potential effects on Tribal water resources and report on its actions in its decision."

02/01/99 The BLM Field Manager Rick Hotaling sends a letter to Joseph McConnell, President, Fort Belknap Indian Community Council, requesting initiation of consultation discussions in reference to the IBLA Order.

02/05/99 A meeting is held in Billings with BLM, DEQ, BIA, Fort Belknap, CSP^2, and EPA to discuss adequacy of the Groundwater Investigation conducted under the Consent Decree and its applicability to final reclamation.

03/09/99 The Fort Belknap government responds to Mr. Hotaling's letter of February 1, 1999. Fort Belknap requests consultation begin immediately, and provides Fort Belknap's alternative reclamation plan prepared by Jim Kuipers, Mining Engineer with CSP^2, for the BLM to consider.

03/17/99 The BLM provides all parties a draft report prepared by BLM consulting hydrogeologist Kathy Gallagher that compares and evaluates the groundwater information from the Final Zortman-Landusky EIS, the Groundwater Investigation, and the Public Health Assessment.

03/24/99 A meeting is held in Helena. Attendance includes the Fort Belknap government, BLM, DEQ, and EPA technical staff, management, and legal counsel. Concludes to arrange for meeting of the technical staffs at the mine site to develop reclamation issues.

04/14/99 A meeting of the various parties' technical specialists is held at the mine site from 4/14/ to 4/16. Issues covered range from water monitoring to agency support for supplemental funding from Congress. The group agrees to continue discussions on possible immediate reclamation needs.

05/11/99 The BLM provides a technical completeness review of the Fort Belknap government's alternative reclamation plan and requests additional information on a variety of components.

05/22/99 Interior Secretary Babbitt and BLM State Director Larry Hamilton visit Fort Belknap and hear concerns regarding the mines and reclamation.

05/24/99 The EPA Regional Administrator, Bill Yellowtail, meets with the Fort Belknap government to discuss the situation with the mines.

05/25/99 A meeting is held in Billings with Bill Yellowtail and Larry Hamilton (plus staffs) to discuss Mr. Yellowtail's recent trip to Fort Belknap. It is agreed to conduct a 30-day working period for the technical people to address the reclamation problem and identify reclamation work that can go forward without conflict while other reclamation aspects are discussed.

06/02/99 The BLM management and staff, plus DEQ staff, meet with the Fort Belknap government on reclamation options and how to best achieve consultation. Council President Joseph McConnell asks that the technical people be allowed to develop this as much as possible.

06/23/99 The technical working group holds a brief meeting at the mine site. Spectrum Engineering personnel, hired by the agencies to develop the reclamation plans, are introduced to the working group members.

07/20/99 A technical working group meeting occurs at the mine site from 7/20 to 7/21. The group discusses use of the Multiple Accounts Analysis (MAA) and various processes for getting some reclamation work done this year.

08/24/99 A technical working group meeting occurs at the mine site from 8/24 to 8/25. The group discusses with EPA the King Creek tailing removal project and integration with Landusky Mine reclamation. A tour of the mines and, specifically, the 1999 reclamation work areas, is held for Fort Belknap Indian Community Council members and others.

09/01/99 A letter is sent from the BLM Field Manager Rick Hotaling to the Fort Belknap government requesting concurrence on phase 1 interim reclamation for 1999.

09/10/99 The final comparison report on groundwater conditions by Kathy Gallagher is distributed to the technical working group. The comparison report generally confirms that the FEIS description of groundwater conditions was correct.

09/14/99 A letter is received from the Fort Belknap government in general agreement with phase 1 interim reclamation efforts for 1999.

09/20/99 The technical working group holds a conference call. The group discusses the Montana Consensus Council contract, work plans, and conduct of the MAA.

10/18/99 The technical working group meets at the mine site from 10/18 to 10/19. Facilitation is provided by the Montana Consensus Council. The group discusses MAA development.

12/08/99 The technical working group meets in Billings from 12/8 to 12/10. The group discusses the mass balance reports and MAA format, and overall schedule for 2000 reclamation work. The Montana Consensus Council facilitates the meeting on 12/10.

01/06/00 A conference call is held among the decisionmakers and their staffs. Included in the call are Joseph McConnell, Larry Hamilton, Bill Yellowtail, and DEQ Director Mark Simonich. The main issue discussed is the Fort Belknap government's demand that the agencies prepare a Supplemental EIS on reclamation of the mines.

01/21/00 Bill Yellowtail meets with the Fort Belknap government to discuss mine reclamation and the possible need for a Supplemental EIS.

01/24/00 A subgroup of the technical working group, which includes DEQ, BLM, EPA, and Fort Belknap representatives, meets at Zortman to discuss the regulatory triggers that might require preparation of a Supplemental EIS.

01/25/00 The technical working group meets in Zortman. Development starts on the MAA for the Zortman Mine reclamation.

02/09/00 A major meeting of the technical working group is held in Billings from 2/9 to 2/11 to score the MAA on Zortman Mine reclamation alternatives. The agency decisionmakers also hold a meeting on 2/9 that includes Bill Yellowtail, Larry Hamilton, Joseph McConnell and Mark Simonich. EPA announces it is stepping back from the consultation process and only responding to specific requests for technical assistance. The technical working group holds an expanded meeting on 2/11 that includes individuals and traditionalists from Fort Belknap to provide input for the MAA on cultural and social issues and their relative importance.

02/17/00 A letter is sent from the BLM State Director and the DEQ Director to the EPA Regional Administrator confirming that EPA is pulling out of the consultation process and only responding to requests for technical assistance. The BLM and DEQ letter requests assistance in several key technical areas from EPA specialists.

02/25/00 The Fort Belknap government and their attorneys meet with Interior Secretary Babbitt in Washington D.C. and visit Congressional offices. The Secretary discusses trust issues and the Grinnell lands issue with the Fort Belknap government.

03/08/00 The Fort Belknap government holds a public meeting at Hays to explain the MAA process to residents and receive their input. The BLM and DEQ attend.

03/09/00 The Fort Belknap government holds a public meeting at Lodgepole to explain the MAA process to residents and receive their input. The BLM and DEQ attend.

03/10/00 Stanley Jaynes (Acting BLM Field Manager), Scott Haight (BLM) and Wayne Jepson (DEQ) meet with the Fort Belknap Indian Community Council to discuss the MAA results and the success of the technical working group. They confirm with the Council an agenda for the 3/24 decisionmakers' meeting.

03/20/00 The EPA responds to the BLM-DEQ letter of 2/17/00 requesting technical assistance by saying staff may not be available due to other work priorities and EPA will advise if the situation changes.

03/23/00 The technical working group meets in Zortman to discuss MAA development, monitoring, and land application disposal issues.

03/24/00 Larry Hamilton and Mark Simonich (plus staffs) meet with the Fort Belknap Indian Community Council. A review of the MAA progress is presented. The BLM and DEQ announce they have decided to prepare a SEIS on the final reclamation plan. The agencies ask Fort Belknap if they want to be a cooperating agency on the SEIS. The Fort Belknap government endorses the agency decision to prepare the SEIS and expresses the desire to continue working with the agencies, even during the lawsuit they intend to file in Federal Court on trust issues. The technical working group presents a plan for interim reclamation in 2000 and 2001.

03/28/00 The Fort Belknap government requests EPA to provide technical assistance on both the MAA and the SEIS process.

03/29/00 A conference call is held between Bill Yellowtail, Mark Simonich and Larry Hamilton (plus staffs). The callers discuss the recent decisions to prepare the SEIS and EPA providing funding assistance.

04/07/00 A phone conversation is held between Scott Haight (BLM) and Jim Kuipers (CSP^2-Fort Belknap). Mr. Kuipers states that the Fort Belknap government is not interested in being a cooperating agency on the SEIS, but will be providing input through the consultation process instead.

04/12/00 The Fort Belknap government makes a public announcement that they are suing the BLM, BIA and Public Health Service over trust responsibility issues associated with the mines.

04/17/00 The agencies receive written concurrence from the Fort Belknap government on interim reclamation plans for the years 2000 and 2001.

04/18/00 The technical working group meets in Polson, MT on 4/18 and 4/19. The meeting focuses on the development of the Landusky Mine reclamation MAA and revegetation study needs.

04/25/00 The Fort Belknap government files a complaint against the United States in Federal District Court alleging that the BLM, BIA and IHS have violated trust responsibilities by allowing operation of the Zortman and Landusky Mines. The Complaint seeks, amongst other things, a writ of mandamus compelling the BLM to reclaim the

mining sites in compliance with the Montana Constitution and the United States' procedural and substantive trust obligations regarding Tribal interests and resources.

04/26/00 A letter is received from EPA by DEQ and BLM which says EPA will provide the technical input requested by the agencies. The letter lists people assigned to a team to assist the agencies and says it is awaiting clarification on the role DEQ and BLM want EPA to play in the SEIS.

07/25/00 The technical working group meets in Zortman from 7/25 to 7/26. The group works on a consensus scoring for the Landusky Mine MAA and on other items. A tour of the mine site is provided for several Fort Belknap Indian Community Council members.

08/02/00 A management meeting is held in Billings. Participants include the BLM Deputy State Director, DEQ Director, EPA Acting Regional Administrator, Fort Belknap Indian Community Council President, and respective staffs. The main topic of discussion is funding sources and status of the SEIS.

08/03/00 The EPA Acting Regional Administrator Rebecca Hamner tours the mines with Fort Belknap Indian Community Council members and some Congressional staff.

08/28/00 The technical working group meets in Bozeman. The meeting includes management and legal staff. Two simultaneous group meetings are held, one to discuss SEIS preparation and one to discuss MPDES permit development and the water resources monitoring program.

09/07/00 A management meeting is held at Fort Belknap. Participants include the BLM Deputy State Director, DEQ Director, EPA Acting Regional Administrator, Fort Belknap Indian Community Council, and respective staffs. The agenda covers the MAA process, interim reclamation and concurrence on its continuance, funding sources, jobs training and development of an interagency memorandum of understanding (MOU) on preparation of the SEIS.

09/19/00 The technical working group meets in Zortman from 9/19 to 9/20. The group reviews the MAA scores on both the Zortman and Landusky Mines. A SEIS team meeting is held on 9/21 with all parties in attendance to discuss SEIS preparation and assignments.

10/01/00 The BLM amends its Fort Belknap Technical Assistance Agreement to provide another $15,000 to fund the Fort Belknap government's participation in the technical working group and SEIS efforts. The cumulative award to Fort Belknap from the BLM is at $30,000.

10/17/00 A SEIS team meeting is held in Billings. Attendance at the meeting includes members of the technical working group from all the parties.

11/02/00 The technical working group meets in Billings to discuss finalizing the MAA and the continued role of the working group in the SEIS preparation.

11/03/00 A management meeting is held in Billings. Attendees include the BLM Deputy State Director, DEQ Director, EPA Deputy Regional Administrator, Fort Belknap Indian Community Council President, and respective staffs. The group discusses the status and schedule of the SEIS, funding, function of the technical working group, and the preferred alternative identification process.

11/07/00 The MOU between the BLM, DEQ, EPA, and the Fort Belknap government on preparation of the SEIS is signed by all parties.

11/08/00 A meeting is held in Helena between the BLM, DEQ, EPA staff and Jim Kuipers, representing the Fort Belknap government, to discuss the SEIS content regarding analysis of compliance with applicable laws and regulations.

11/27/00 The technical working group meets in Billings to make final revisions to the MAA. The group reviews the loading calculations prepared by Robertson GeoConsultants and discusses the need to provide for the upgrade of water capture facilities across all alternatives.

11/30/00 Working drafts of the SEIS text are provided to all MOU parties for their review and comment.

12/14/00 A SEIS team meeting is held in Billings. Attendance includes legal and technical representatives from the Fort Belknap government. Fort Belknap's comments on the working drafts of the SEIS are discussed. A revision and review schedule for completion of the Draft SEIS is established.

01/04/01 A management meeting is held in Helena to discuss the preferred alternative identification. The Fort Belknap Indian Community Council President is unable to attend, so the preferred alternative discussion is postponed. Remaining managers, staff and legal counsel discuss the range of alternatives in the SEIS. The range is considered adequate, but development by the technical working group of a mid-range reclamation alternative for the Zortman Mine is recommended.

01/10/01 The technical working group meets in Bozeman. Alternative Z6 is developed and scored using the MAA process. The group also discusses the SEIS analysis, scheduling and funding.

01/22/01 A management meeting is held in Helena to discuss the preferred alternative identification. The technical working group presents the results of the MAA, including new Zortman Mine Alternative Z6. The agencies identify Alternative Z6 as their preferred alternative for the Draft SEIS. Fort Belknap says they can concur with the identification of Z6. The group then discusses the Landusky Mine reclamation alternatives. The agencies identify Alternative L4 as their preferred alternative. Fort Belknap expresses interest in Alternative L5. The technical working group is directed to look at possible changes to Alternatives L4 and L5 which might either improve L4 performance or address concerns with L5 impacts.

01/25/01 A meeting of some technical working group members is held in Helena to discuss Landusky Mine alternative adjustments. No major changes are identified for Alternatives L4 or L5.

01/30/01 A meeting of some technical working group members is held in Billings to hear the results of the pilot test on biological treatment of nitrates and selenium in the leach pad waters.

02/06/01 The technical working group meets in Bozeman to discuss some changes to Alternative L4, rescore the Landusky Mine MAA, and discuss additional interim reclamation measures.

02/12/01 A management meeting is held in Helena to discuss the preferred alternative identification, additional interim reclamation, and comments on the SEIS working drafts. It is agreed that the preferred alternatives identified in the Draft SEIS will be Alternatives Z6 and L4.

02/22/01 The second round of working draft SEIS chapters is provided to all parties for their review and comment.

03/12/01 A management meeting is held in Helena to discuss final concerns prior to publication of the Draft SEIS.

03/16/01 Members of the Fort Belknap Indian Community Council meet with BLM State Director Mat Millenbach to discuss the reclamation status, Grinnell lands transfer, and contacts in the Washington offices of the Department of the Interior and BLM.

05/03/01 A management meeting is held at Fort Belknap with discussion between agency heads and the Fort Belknap Indian Community Council on release of draft SEIS and funding of the preferred alternatives.

05/16/01 A letter is sent to Joe McConnell, Fort Belknap President, from Mat Millenbach, BLM State Director, expressing support for the agencies' preferred alternatives.

09/25/01 On September 25-26, 2001, the technical working group meets in Zortman to discuss Alternatives L4 versus L5, MAA scoring, biological treatment system, and land application.

09/27/01 Wayne Jepson, Scott Haight, and Bill Maehl meet with Fort Belknap Councilmen Gene Helgesen, Joe Fox and Curtis Horn on the next interim reclamation proposal. The councilman were agreeable with most items presented with the exception of some regrading which would be inconsistent with Alternative L5 and some pit floor reclamation which would be inconsistent with Alternative Z5.

12/17/01 A mine tour is conducted for newly elected Tribal Council members by BLM staff. Viewed interim reclamation progress and discuss preferred reclamation alternatives and considerations.

01/09/02 A meeting is held between the new Tribal Council members and BLM State Director. The Council voiced concern over the mines and past impacts from mining. Copies of the Final SEIS are distributed.

02/22/02 The BLM Field Manager, Bruce Reed, sends the draft ROD to the Fort Belknap Indian Community Council for review along with a request to meet and discuss any comments the Council may have on the draft ROD.

03/13/02 BLM and DEQ management meet with Fort Belknap Indian Community Council to discuss the draft ROD. The Council passes a resolution objecting to the ROD. The Council did not provide specific suggestions for changes to the selected reclamation plans in the draft ROD. The Council expresses concern with reclamation management, transfer of the Grinnell lands to Tribal control and need for additional funding for reclamation.

03/15/02 BLM sends a letter to the Fort Belknap Indian Community Council to verify that the Council will not be providing any written comments on the draft ROD, but offers to accept such comments until March 22nd.

03/29/02 Joint DEQ and BLM letter to Council President, Ben Speakthunder, offering Fort Belknap a final opportunity to provide written comments on what would constitute a preferred reclamation decision from the Fort Belknap Indian Community Council perspective. Requests response by April 12th.

04/05/02 Mine tour conducted for Council President, two Council members and lobbying consultant hired by the Fort Belknap Indian Community Council.

04/12/02 Fort Belknap Council President responds to the letter of April 12th. States that Fort Belknap supports a reclamation decision that includes Alternatives Z6 and L4 along with six environmental projects.

04/26/02 Joint DEQ and BLM letter to Fort Belknap Council President. The letter advises President Speakthunder that the agencies will be signing the Record of Decision shortly and selecting Alternatives Z6 and L4. The letter also notes that the six projects listed by Fort Belknap may have potential merit, but are outside the scope of the reclamation decisions before the agencies and offers to discuss these projects as part of the settlement discussions with BLM.