CHAPTER 6
COMMENTS AND RESPONSES

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6.0 INTRODUCTION

Chapter 6 contains the substantive public comments received on the Draft Supplemental EIS and the agencies' responses to those comments. BLM and DEQ considered and responded to all substantive comments in preparing the Final SEIS. A substantive comment requests clarification or more discussion, gives new information, questions analytical techniques, or suggests new alternatives. We did not respond to comments that simply expressed a preference, such as *I support Alternative L3*, but we did consider those comments when preparing the Final SEIS.

Due to the repetition of some comments, similar comments have been grouped together, where possible, to create comment statements that capture the substance of two or more commenters. Therefore, comment statements may not be exact quotes of any one person or organization. Comments have also been edited for brevity, clarity, and grammar. Comments are grouped under similar subject matter, following the SEIS organization where possible. Subsection headings have been made where there are comments that focus on a certain aspect of the resource category. For example, under water resources there is a subcategory for comments related to the biological treatment system.

The following index is a list of commenters and their corresponding letter and/or oral comment designation number. This number is shown at the end of the comment statement to identify the individual(s) who made the comment.

Table 6-1. Log of Comment Letters

Letter No.	Name
1	York, Richard and Carol
2	Duvall, Peg
3	Shimko, Claudia and Samuel Jr.
4	Duvall, Charles (Ace) and Arv
5	Savage, J. C.
6	Bureau of Indian Affairs, Rocky Mountain Regional Office
7	Smith, Vernon
8	Savage, J. C.
9	Diekman, Duane

Letter No.	Name
10	Center for Science in Public Participation (Chambers, David)
11	Montana State University Northern (Reifschneider, Carol)
12	Marble, Donald for Island Mtn Protectors
13	Anonymous (American Indian, Fort Belknap Reservation)
14	PhillCo Economic Growth Council (Boothe, Anne)
15	Malta Chamber of Commerce
16	Mineral Policy Center (Gestring, Bonnie)
17	Harrison, Sylvia (for Buchanan, Kelvin, ZMI bankruptcy trustee)
18	Marble, Donald for Island Mtn Protectors (request for extension)
19	Mineral Policy Center (Gestring, Bonnie) (request for extension)
20	Fort Belknap Indian Community (request for extension)
21	Mineral Policy Center and Montana Environmental Information Center (Gestring, Bonnie)
22	National Wildlife Federation (France, Thomas)
23	U.S. Environmental Protection Agency (Dodson, Max)
24	Fort Belknap Indian Community (McConnell, Joseph)
25	Fort Belknap Indian Community (Snow, Kermit Jr.)
26	Montana State University Northern (Reifschneider, Carol) [Duplicate of Letter No. 11]
27	Indian Law Resource Center (Huff, Andy)
28	Savage, J.C.
29	Fort Belknap Indian Community (Bell, William)
30	Fort Belknap Indian Community (Belgard, Morris)
31	Savage, Joseph
32	Young, Donna

Letter No.	Name
33	Doney, Anna
34	Doney, Anna
35	Fort Belknap College (McClain, Dr. Elizabeth)
36	Fort Belknap College (McClain, Dr. Elizabeth)
37	Fort Belknap College (McClain, Dr. Elizabeth)
38	Center for Science in Public Participation (Chambers, David) [Duplicate of Letter No. 10]
39	Fort Belknap Indian Community (Longknife, Dennis)
40	Young, Donna
41	Morsette, Russell
42	Snow, Scott
43	Fort Belknap Indian Community (Nez Perce, Ina)
44	Fort Belknap Indian Community (McConnell, Joseph)
45	Fort Belknap Indian Community (Arthur Stiffarm)
46	Patric, William
47	Marble, Donald
48	Marble, Donald
49	Mitchell, Winston
50	Marble, Donald (request for extension)
51	Montana Environmental Information Center (Barber, Jeffrey) (request for extension)
52	Marble, Donald (forwarding 3 affidavits supporting req. for ext.)
53	BLM, Lewistown (comment on draft MPDES permits)

Table 6-2. Log of Speakers at Public Meetings

Speaker No.	Name	Speaker No.	Name
Lodgepole, MT Public Meeting, June 5, 2001		*Hays, MT Public Meeting, June 6, 2001*	
LO-1	Halver, Catherine	HA-1	Savage, Joe
LO-2	Marble, Don	HA-2	Boulanger, Aimee
LO-3	Main, Harold	HA-3	Patric, Will
LO-4	Main, James Sr.	HA-4	McConnell, Virgil
LO-5	Bell, Phil	HA-5	Crasco, Wanda
LO-6	Helgeson, Ken Gus	*Landusky, MT Public Meeting, June 7, 2001*	
LO-7	Boulanger, Aimee	LA-1	Kienenberger, Carol
LO-8	Shields, Leroy	LA-2	McClain, Elizabeth
LO-9	Ereaux, Lazure	LA-3	Kolczak, Darlene
LO-10	Belgard, Davy	LA-4	Smith, Vernon
LO-11	Patric, Will	LA-5	Young, Donna
LO-12	Helgeson, Gene	LA-6	Pankratz, Leann
		LA-7	Robinson, Eva

6.1 PROCESS

This section includes comments related to the scope of the SEIS; the consultation process with the Fort Belknap government; and other process, procedural or legal questions that may be related to mine reclamation and the agencies' authority.

1. **Comment:** How much input have you requested from the citizens or the government of Phillips County about this? It just doesn't seem like the residents of Phillips County have had a whole lot to say about it, and this is running over into our land and affects our way of life. Are we being represented? Did you have a meeting in Phillips County besides here where some of the rest of the residents of Phillips County could come and didn't have to drive a hundred miles to get here? We need to get a little dialogue going here with the rest of the residents because most everybody I know and talk to feels kind of left out. (LA-7)

   Response: As part of the SEIS process a public scoping meeting was conducted in Phillips County, in the community of Landusky, in September of 2000. The scoping meeting was conducted to explain the various reclamation alternatives and identify public concerns. In addition, a presentation was made to the Malta Chamber of Commerce and briefings have been given to the County Commissioners during preparation of the Draft SEIS. Public meetings for both scoping and to collect comments on the Draft SEIS have been advertised in the newspaper and announced on the local radio stations.

2. **Comment:** Was water quality weighted as the most important in the EIS? Please clarify how everything in the weighted system came out till you got your number at the end. (LA-3)

   Response: Water quality is a sub-account (or issue) within the Environmental Account of the Multiple Accounts Analysis which was used to prepare the SEIS. Water quality is given the highest weight value of '5' on a scale of 1 to 5. Water quality was treated separately for surface waters and groundwaters, which were given weights of '4' and '5' respectively. Indicator weights were also assigned for each drainage to allow for discrimination between drainages with lesser or greater relative importance as a resource. This discrimination was assessed on a number of factors including whether or not a capture system exists in a specific drainage, what mined material was removed or placed within a specific drainage, what the geochemical characteristics of the disturbed area and existing water quality are in a specific drainage, etc. Those drainages upstream of the Fort Belknap Reservation were weighted higher due to their potential resource value to Fort Belknap.

   The weightings are shown in Appendix A, in the columns marked 'account weight,' 'sub-account weight' and 'indicator weight.' The weights used for water quality in specific drainages are as follows:

Near the Zortman Mine:

Surface water quality protection value (weight = 4)

Alder Spur	subweight = 1
Carter Spur	subweight = 1
Ruby Gulch	subweight = 4
Lodgepole Creek	subweight = 5

Groundwater quality protection value (weight = 5)

Alder Spur	subweight = 1
Carter Spur	subweight = 1
Ruby Gulch	subweight = 3
Lodgepole Creek	subweight = 5

Near the Landusky Mine:

Surface water quality protection value (weight = 4)

Upper Swift Gulch	subweight = 5
King Creek	subweight = 5
Sullivan Gulch	subweight = 2
Mill Gulch	subweight = 4
Montana Gulch	subweight = 5

Groundwater quality protection value (weight = 5)

Upper Swift Gulch	subweight = 5
King Creek	subweight = 5
Sullivan Gulch	subweight = 2
Mill Gulch	subweight = 4
Montana Gulch	subweight = 4

Note that those drainages with lower subweight values are those with little to no evidence of existing impacts, low flow, or those with no anticipated future impacts or risk of impacts, and low to negligible consequences as a result of impacts due to past mining and/or potential reclamation measures proposed in some alternatives. Those drainages given higher subweight values are those that either do not currently have capture systems installed or where there would be a potentially higher risk to downstream users (human, wildlife or aquatic) or trust resources as a result of certain reclamation measures proposed in some alternatives.

3. **Comment:** We ask that this investment be protected by permanently withdrawing all public lands in the Little Rocky Mountains from future mineral entry. Private claims should be closed out through purchase or trade. (16, 21)

Response: Decisions regarding long-term management of the Little Rocky Mountains are outside the scope of this action, which is to develop reclamation plans for the Zortman and Landusky Mines (See Section 1.3, Purpose of and Need for Action). The 1992 Judith-Valley-Phillips Resource Management Plan/EIS determined that the Little Rocky Mountains would remain open to mineral exploration and development. Any change in long-term management would require amendment of this resource management plan. Presently, public lands in and around the mining areas are closed to the location of new mining claims until September 2005 to provide for completion of reclamation activities.

4. **Comment:** The SEIS states that the ZMI trustee is the legal holder of the Operating Permits and Plans of Operations for the mines (page 1-7) and that BLM will issue the approved reclamation plans to the trustee (page 1-9). The trustee has previously requested clarification from the land management agencies as to their position whether he is the "holder" of the permits, but has received no response. (17)

   Response: The ZMI trustee is legally still the operator for the State Operating Permits and the Federal Plans of Operations. The agencies are performing the reclamation work and water treatment using funding from the various bonds because the operator is unable to meet these obligations.

5. **Comment:** The trustee was not notified of any of the scoping meetings referenced in the SEIS, has not participated in such meetings, and neither the trustee nor ZMI received a copy of the SEIS. The copy reviewed by the trustee was obtained in July from Spectrum Engineering. (17)

   Response: ZMI is on the mailing list and should have received copies of both the scoping notice and the Draft SEIS. Neither document was returned as undeliverable according to our records. ZMI's participation, or non-participation, in scoping meetings is totally at their discretion.

6. **Comment:** After the operator of these mines declared bankruptcy in 1996, both BLM and DEQ have been managing the interim reclamation using funds provided by this bond default. This has meant that your staff have had to make quick, on-site decisions that have always resulted in appropriate protection for the environment. The water treatment plants at these mines have been operating under your combined directions, since 1999, and have complied with all applicable water quality criteria. Your staff is complimented for their personal attention to these matters and their highest regard for assuring continued operation of these water treatment plants. We also compliment your staff for their ability to define and implement interim reclamation that would be common to all reclamation options, to obtain the consent and agreement from your neighbors at the Fort Belknap Agency on these interim reclamation measures, and undertaking interim reclamation that was of superior design and at a reasonable cost. This work was effectively tied into this EIS process by providing the basis for all the parties to agree that such interim reclamation would be needed regardless of the final reclamation decision to be made by your agencies. (23)

Response: One clarification; the operator declared bankruptcy in 1998. The agencies believe that the interim reclamation work done to date has been valuable in reducing environmental impacts and welcome EPA's concurrence on this matter.

7. **Comment:** EPA has participated extensively in the preparation of this Draft SEIS along with your staff, staff and consultants from the Fort Belknap Indian Community Council (FBICC), and the State's engineering consultants. EPA signed a Memorandum of Understanding along with the FBICC to act as participating agencies in this regard. This effort involved a technical team made up of representatives from BLM, DEQ, EPA and Fort Belknap in a collaborative process to collectively design and evaluate alternatives; rather than the more typical process of our agency staff commenting on designs and evaluations after being prepared by the lead agency staff or consultant. Staff from EPA met frequently and contributed through the Multiple Account Analysis (MAA) interdisciplinary process to both develop these alternatives and then estimate the environmental benefits and risks as well as the capitol and long-term financial implications for each element of the six different alternatives designed to reclaim each mine to applicable environmental standards. I hope you agree that this interdisciplinary approach led to a superior design product; one that will withstand the test in the future of satisfactory environmental performance. (23)

   Response: The agencies believe that the preferred reclamation alternatives developed through the above-described process will achieve the optimal environmental performance and wish to thank EPA for their contribution to this effort.

8. **Comment:** A transcript of my comments was incomplete and somewhat inaccurate. Hopefully you will transcribe writing better than verbal reproductions on tape. (28)

   Response: A review of the audio tape from the meeting and the transcript does not reveal any substantive difference in comments. If we did not get some of your comments from the public meeting on tape then hopefully they were presented in your written comments.

9. **Comment:** I asked technical questions at the Hays community meeting. I was told by BLM that although my questions could not be answered at that meeting, they would provide answers at a later time. So far, no one has contacted me with any information. I must conclude, therefore, that the answers are not forthcoming and I am left to draw my own conclusions. (31)

   Response: The way the EIS process works is that this comment-response section, and the text of the Final SEIS, are the responses to any substantive questions raised at the Hays meeting or throughout the comment period.

10. **Comment:** As for the Biological Treatment Circuit proposed for the leach pad water – It appears that these systems are already being installed. Why has construction of this system already

commenced without an official Record of Decision in place? I think it would be good to have information on this whole process of how it goes into the approval stages and then is actually applied to these kinds of systems. What parameters do you use to judge, and what criterion, or what criteria do you use to really say okay, this would work here. (HA-1, 31, 32, 35, 36)

Response: Construction of a separate biotreatment system for nitrate and cyanide removal was required by the 1996 Consent Decree signed by EPA, DEQ, Fort Belknap, Island Mountain Protectors, and ZMI. A bond was posted by ZMI to ensure the treatment system would be constructed as part of the settlement agreement. Since the system is located on already disturbed lands within the leach pad area itself, no additional approval for surface disturbance was required. While the SEIS analyzes the treatment system as part of the overall reclamation plan for disposing of leach pad water, it was required to be built independent of the EIS-process in order to comply with State and Federal water quality laws as part of an enforcement action; a separate Record of Decision is not required. The approval of the biological treatment system went through a detailed review. The technical working group requested proposals from various qualified firms for the design of the biological treatment system. The proposals addressed a very wide range of treatment technologies. These were each reviewed using a scoring sheet developed by the review committee. The two most qualified firms were asked to submit a more detailed proposal. These were then reviewed again and Applied Biosciences was selected by the review committee for their proven track record and qualifications. A successful pilot-scale treatment system was required prior to approving implementation of full-scale treatment.

11. **Comment:** Although there is some new information in this "Draft" document, for the most part it is word for word taken from Volume 1 and 2 of the [1996] Final Environmental Impact Statement, Zortman and Landusky Mines, Reclamation Plan Modifications and Mine Life Extensions! (35)

Response: There is a considerable amount of new material in the SEIS. The main reason for any duplication or overlap is that the SEIS is a "supplement" to the 1996 Final EIS you referenced. So of course many segments of the SEIS that have not changed since 1996 would be worded the same or similar to the 1996 text. The SEIS incorporates by reference or summation much of the information presented in the 1996 FEIS. However, part of the duplication is due to the fact that the SEIS has been written so the reader can follow the analysis without necessarily having to view both documents. The SEIS has been prepared to analyze additional reclamation alternatives from those presented in the FEIS. The SEIS considers 5 new reclamation alternatives for each mine in addition to Alternative 3, for a total of 12 alternatives. Each of the alternatives are analyzed and evaluated in the Draft SEIS. Therefore, 10 of the alternatives and information associated with them constitute new information that was not included in the FEIS. In addition, any data and studies that have been completed since 1996 are incorporated or referenced in the SEIS.

12. **Comment:** DEQ and BLM approved the extension of the mine(s) and are now involved in the reclamation i.e. the said document for review. One can't help but wonder if there is not a conflict

of interest, after all a paradigm designed for extension of mining is totally different in "mind set" from one involving real reclamation. I do not think the agencies (BLM and DEQ) who issued the permits for the mining operations should be involved in the reclamation of this mine. (32, 35)

Response: Both the State Metal Mine Reclamation Act and Federal surface management regulations contain reclamation requirements as part of their respective mine permitting regulations. The DEQ and BLM are charged with simultaneously approving mine plans and approving their associated reclamation plans. Mining and reclamation are integral parts of the same regulations and approved under the same permit. The two activities cannot be separated because how the mining is conducted often determines what reclamation is performed and vice versa. All mining approvals issued by DEQ or BLM include reclamation requirements. The purpose of this SEIS is to determine what changes should be made to the pre-existing reclamation plans that were approved as part of the last mine expansion permits issued for the Zortman and Landusky Mines over ten years ago.

13. **Comment:** The whole issue surrounding the Zortman/Landusky Mine reclamation project has become an economic concern rather than an environmental one as it should be. The agencies involved in the decision making process are more concerned with doing a minimum of work so as to leave the mine readily accessible to future mining and have no concern whatsoever for righting a terrible environmental wrong. The prevailing attitude should be one of returning the mountains as close as possible to their original condition and to ensure that any future mining considerations be deterred as much as possible. Since the agencies involved are responsible for allowing the devastation to happen in the first place, the financial burden for restoring the mountains to their original condition should be theirs to bear. (42)

Response: The development and evaluation of the various reclamation alternatives in the Draft SEIS includes evaluating both environmental and economic considerations. The process is not driven by economics, although economic factors are considered. Several of the evaluations "zero out" the economic factor and just consider the environmental performance of the alternatives. Two of the alternatives, Z5 and L6, consider reclamation plans that would provide for reconstruction of the pre-mine topography. Final reclamation decisions will be based upon a consideration of the environmental performance of the various alternatives along with any anticipated costs to the taxpayers. However, the decisions would not be made in whole or in part for the purpose of preventing future mining. Future mining decisions are made either on a case-by-case basis should plans be submitted, or at the planning level as part of the regional land use management plan.

14. **Comment:** Section 1.2.1, Reclamation Plan Development History. In 1992, why after reviewing water resources monitoring information did DEQ and BLM approve the Zortman/Landusky mine expansion after finding out how widespread the acid rock drainage was at both mine sites? (44)

Response: Many, if not a majority of metal mines are constructed in rock with acid generating potential. Operating procedures, reclamation plans and treatment methods are available and in use at a variety of mine sites around the country to mitigate impacts from mining in these types of materials. When the agencies determined that ARD was causing environmental degradation, they required ZMI to revise the Zortman and Landusky reclamation plans. The agencies did not approve ZMI's expansion and revised reclamation plan as proposed, but instead, required a mitigated alternative with many ARD control measures and considerably less disturbance than was originally proposed by ZMI. Included in these mitigating measures were the requirements of the water quality compliance plan that had been developed under the Consent Decree. This plan was determined by the participants in the Clean Water Act-Montana Water Quality Act lawsuits (DEQ, EPA, FBICC, and IMP) as likely to result in compliance with the water quality requirements. Once the water quality litigation was resolved, and the mitigated mine operating and reclamation plans were developed, the BLM and DEQ had no basis for withholding approval of mine expansion in 1996. For further explanation of the decision rationale, see the October 1996 Record of Decision.

15. **Comment:** Now during the SEIS process Fort Belknap Indian Community Council is hearing that the water needs to be treated into perpetuity, and the water treatment bond is insufficient in the amount of $11.0 million. (44)

Response: The need for long-term/perpetual water treatment is not new and was clearly stated and discussed in the 1996 Final EIS. Long-term water treatment was required as part of the Consent Decree, of which Fort Belknap is a signatory. The water treatment bonds required under the Consent Decree anticipated water treatment in perpetuity. However, the bond calculations conducted at that time made some assumptions regarding future costs which may have underestimated the costs. More conservative assumptions made for preparation of the Draft SEIS indicate the long-term treatment trust fund needs to be funded with an additional $11 million.

16. **Comment:** Section 1.4.2, Bureau of Land Management. Since the Federal Government has been managing the federal lands in the Little Rocky Mountains since 1896, there has been very little management administered by the BLM in protecting natural resources. (44)

Response: BLM became the land managing agency in the Little Rocky Mountains in the 1960's when that function was transferred from the Forest Service to the BLM. Since then, BLM has developed campgrounds, designated Areas of Critical Environmental Concern, limited grazing and not leased the area for oil and gas development, to name a few management actions. The 1992 Judith-Valley-Phillips Resource Management Plan/EIS considered a variety of management options for the mountains. Presently BLM is preparing a management plan for the Little Rocky Mountains. You are encouraged to provide input to the BLM office in Malta regarding suggestions for management actions in the mountains.

17. **Comment:** The Fort Belknap Indian Community Council is requesting interim management of BLM controlled Federal lands in the Little Rocky Mountains in accordance to PL-638 Federal Contracts. (44)

Response: A transfer of management authority for public lands in the Little Rocky Mountains is outside the scope of a Supplemental EIS on reclamation of the mines.

18. **Comment:** Section 1.4.2, the Fort Belknap Indian Community Council is requesting a guarantee of water quality protection and sovereignty over future decisions regarding mining, since it has become apparent BLM has no regards for the trust responsibilities of the natural resources of the sovereign nation of the Fort Belknap Indian Reservation. (44)

Response: BLM made every effort within its discretion to require that the mine operator locate potentially contaminating mine facilities, such as leach pads and waste rock dumps, in drainages that flow away from the Fort Belknap Reservation. A review of a mine facilities map shows this effort was successful with the exception of the mines pit locations, which are mostly on private land and where there was little option of alternate location. As a result, water quality monitoring data does not show that the modern mining has degraded the quality of water on the Fort Belknap Reservation. While BLM is unable to provide a guarantee regarding water quality protection, the SEIS analysis is a prediction of both short-term and long-term impacts to resources, including Tribal resources. BLM is also unable to transfer its decisionmaking authority over public lands to Fort Belknap. BLM is committed to continued consultation with Fort Belknap on a government-to-government basis regarding the reclamation measures necessary to protect Tribal water resources and future land use in the Little Rocky Mountains.

19. **Comment:** Section 4.8 Land Use, Impacts Common to All Alternatives. The BLM Resource Management Plan (BLM 1992), needs to be updated as the management plan is 9 years old. Why would BLM upon completion of the reclamation and expiration of the locatable mineral withdrawal open the area under the Mining Law of 1872? Didn't BLM learn their lesson regarding mining sulfide bearing ore which generates ARD which the DEQ and BLM will be held liable for the long-term water treatment cost? (44)

Response: The typical working life of a resource management plan is 20 years, although there is no set timeframe and the plan can be amended as needed. Changing the long-term management in the Little Rocky Mountains and the need for a locatable mineral withdrawal would have to be addressed through the plan amendment process. However, such decisions and analysis are outside the scope of the current effort to develop a reclamation plan for the Zortman and Landusky Mines. It should be noted that the potential mining of sulfide-bearing ore is not an automatic reason to withdraw lands from future mineral development. Mineral deposits containing sulfides are mined at many locations throughout the world using many of the mitigating techniques presently applied at the Zortman and Landusky Mines to protect the environment.

20. **Comment:** More accountability and an explanation of how we arrived at the current state of affairs with Montana's flagship gold mine should be part of the public record in the SEIS process. Why are we now scratching our heads over the matter of where to find many millions more dollars to clean up an environmental mess created by an operation which was repeatedly permitted after only cursory analyses? Have we learned anything from Zortman-Landusky, or should we expect similar problems in the future? Zortman-Landusky, and its present very daunting reclamation challenges, did not occur in a vacuum. The SEIS should fully explain how it came about, and steps that are being taken institutionally to reduce the likelihood of similar occurrences. I don't see enough in there that's making me comfortable that we're not going to be repeating these mistakes again. Accountability is important, and just learning from where we've been and how we got here now. (LO-11, 46)

Response: The "current state of affairs" at the mines is the perception that the bond is short the amount needed to reclaim the mines. However, this is true only under some of the reclamation alternatives, including the preferred alternatives. There are "within bond" alternatives that meet minimum regulatory and environmental standards. Shortfalls in certain reclamation scenarios exist largely due to an assumption made during bond calculation that the mine configuration would be different at closure than actually existed when the operator filed for bankruptcy. As a result, more material has to be moved than was planned for in the bond calculations. This problem has been corrected in the new 3809 regulations, and in the State's bonding procedures, which specify that the bond amount should be adequate to cover the point of maximum reclamation liability, and not necessarily the conditions that would exist at the "anticipated" end of mine life.

The other reclamation component which contributes to the perception of a major program failure is that the preferred alternatives in the SEIS increases the amount of pit backfilling required for final reclamation. When the last permit amendments were issued for mining at Zortman and Landusky in 1988 and 1991, respectively, the reclamation plans approved at that time did not require pit backfilling. The existing bond actually would have been adequate to implement the reclamation plans that were approved in 1988 and 1991. However, in 1993 the agencies decided those plans needed to be changed due to ARD concerns and have been attempting to get modified reclamation plans in place ever since. Certain alternatives in this SEIS include a considerable amount of backfilling that was not contained in those previously approved plans. Backfilling is generally an expensive proposition and, should those alternatives be selected, the bond will of course be short. If ZMI was still solvent it would have been required to post additional bond to cover the backfilling expense of the selected alternatives. Unfortunately that is not an option at this point in time.

21. **Comment:** For two decades the agencies were clearly advocates for mining interests and a pioneering cyanide heap leach gold operation. The time has come to be true advocates for pioneering reclamation. (46)

Response: The decision that mining is a legitimate use of public land was made a long time ago by Congressional action and not by the DEQ or BLM. The agencies' role has always been and continues to be one that ensures compliance with the laws and regulations related to mining and reclamation. When operations are proposed, the agencies must evaluate the proposals in accordance with the applicable laws, regulations and land use plans.

22. **Comment:** This mine should never have been permitted in the first place since it cannot be easily, properly and fully reclaimed. We ask that the BLM acknowledge the mistakes made at the mines and commit its resources to reclaiming the mines to the fullest extent possible. (12, 16)

Response: BLM and DEQ have been and remain committed to seeing that the mines are reclaimed in a manner that meets the requirements of applicable state and federal regulations. All alternatives analyzed in the SEIS meet those requirements. BLM acknowledges that bonding has not been adequate to cover the costs associated with the preferred alternatives. Thus, BLM, Montana State Office, has requested additional funding to reclaim the mines.

23. **Comment:** The mine irrefutably demonstrates the need for more stringent mining regulations. We ask that the agency heavily weigh the profound and permanent impacts created by Zortman/Landusky when considering policy decisions such as the new 3809 regulations. The mine clearly demonstrates the need for retaining these regulations in their full form. (16)

Response: The more specific bonding requirements in the new 3809 regulations have been developed partially in response to situations like those at the Zortman and Landusky Mines. However, it is not clear that had the new 3809 regulations been in place 20 years ago, there would be no environmental issues at the mines. Problems related to ARD characterization and water treatment issues at Zortman/Landusky were more related to the state of the science in those fields rather than the language in any particular set of regulations.

24. **Comment:** It [the mines] underscores the need for reform of the 1872 Mining Law which says that the highest and best use of places like Spirit Mountain here in the Little Rockies is mineral extraction to the cost of all other uses in the area. (HA-2)

Response: The portion of Spirit Mountain (aka, Gold Bug Butte) that was mined is mostly on private land, where State regulations apply. Changing the 1872 Mining Law is beyond the scope of this SEIS.

25. **Comment:** It underscores the need for adherence by the BLM to the unnecessary and undue degradation clause of the Federal Land Management and Policy Act which says that they are not allowed to permit things which cause unnecessary and undue degradation of public lands, which I think we've seen unnecessary and undue degradation of public lands right here in the Little Rockies. (HA-2)

Response: When approvals were granted to expand mining at the Zortman and Landusky Mines, BLM determined that unnecessary or undue degradation would not occur. When unacceptable levels of ARD were detected in 1993, BLM determined that unnecessary or undue degradation was occurring, and instituted immediate requirements for short-term control of mine drainage problems, while requiring the operator to prepare modified operating and reclamation plans. These plans were considered in the 1996 FEIS, and are again being reviewed in this SEIS as long-term requirements needed to prevent unnecessary or undue degradation of the public lands.

26. **Comment:** Pursuant to a Settlement Agreement entered into on December 4, 1998, and approved by the United States Bankruptcy Court, District of Nevada, among the certain sureties, the United States (BLM, EPA, Forest Service), the State of Montana on behalf of the Department of Environmental Quality, the Gros Ventre Tribe, the Assiniboine Tribe, Fort Belknap Community Council, Island Mountain Protectors Association, Pegasus Gold Corporation, Pegasus Gold, Inc., and Zortman Mining, Inc. ("ZMI"), the obligations of ZMI under the Consent Decree were finally resolved, and the parties to the agreement agreed not to sue or take administrative action against the bankruptcy trustee for any environmental or reclamation responsibilities or obligations with respect to the mines. (17)

Response: That agreement was not retroactive, and did not provide for the ZMI trustee to remove environmental control components that were already in place as required by pre-bankruptcy operating plans, enforcement orders or settlements. Obligations already met under the Consent Decree which included placement of the water treatment plants, capture systems and support facilities such as the backup generators, were not to be undone. These items must be left until no longer required by the agencies.

27. **Comment:** The gentleman here mentioned that when they took Pegasus to court that it was settled. I don't think it's settled yet. There's nothing settled. One of the first things on the agenda was water treatment plants. There's nothing like that yet. So there's nothing settled. (LO-3)

Response: Water treatment plants have been constructed and are in operation at both the Zortman and Landusky Mines to treat mine drainage. Pursuant to a Settlement Agreement entered into between the United States, State of Montana, Gros Ventre Tribe, Assiniboine Tribe, Fort Belknap Indian Community Council, and Island Mountain Protectors Association, the obligations of ZMI under the Consent Decree were resolved regarding construction of a water supply system at Hays and Lodgepole.

28. **Comment:** When Pegasus went bankrupt, did they lose all the claims or do they still have them? (HA-4)

Response: The unpatented mining claims were dropped and the patented mining claims have been sold.

29. **Comment:** Pursuant to an agreement entered into in April 2000, and approved by the bankruptcy court, among the trustee, Montana Department of Environmental Quality ("MDEQ"), the Montana Department of Revenue, and Phillips County, the trustee transferred the water treatment plants and ancillary equipment to MDEQ. MDEQ agreed to accept the responsibility for any permits necessary to operate the water treatment plants in compliance with applicable laws. (17)

Response: DEQ does accept responsibility for the MPDES permits. However, DEQ does not believe it was obligated to purchase the water treatment plants and associated facilities since they were required under pre-bankruptcy enforcement orders and the Consent Decree. Their construction was bonded for and the bond was released once they were built. They were not property of the bankruptcy estate available for liquidation.

30. **Comment:** Them agencies were working with the mining company to cover up things. So that didn't create a good feeling towards the whole process, I guess it would be fair to say. I used to go down and search their files in Helena and find all kinds of interesting stuff until, finally, they quit filing things so I didn't find anything anymore. (LO-2)

Response: All information is placed in the files as soon as practical and is available to the public upon request. If you have a specific complaint regarding the conduct of any agency employee it should be brought to the attention of the appropriate agency head.

31. **Comment:** We put in our comments, everybody, quite awhile back we started this. I think I went to the first meeting here at Hays. At that time we asked the BLM and the mining company what would cyanide do to the human body, and they said well, we actually don't know but if you wait a few years maybe we could tell you. We're still waiting for an answer. We've never got it. This is the way they treat the Indian people. We've been lied to. We've been cheated with everything that's happened. (HA-4)

Response: In the dozens of public meetings conducted over the years the agencies have provided a large amount of technical information, particularly on cyanide. The affects of cyanide on the human body are well known and have been discussed at length with the people of Fort Belknap. Fort Belknap residents have not been subjected to any mining-related exposure of cyanide. All information requested has been provided to Fort Belknap without deception or concealment.

32. **Comment:** I would like to comment on this whole process as someone who has served on the tribal council in the past and been involved in various meetings, including mining meetings and other meetings of importance around Fort Belknap. I kind of feel a little intimidated coming to a meeting like this where we're supposed to be commenting on this thing right here. You open it up and you read some of this stuff in here, and I don't understand. I could pick any paragraph in here and probably half of it I don't have the understanding of what it means. (LO-3)

Response: Several additional meetings were conducted during the SEIS process to explain the technical aspects of mine reclamation, acid rock drainage, the multiple accounts analysis and the contents of the SEIS. The technical consultant hired by Fort Belknap, as well as agency personnel and engineering contractor personnel, were available to discuss the reclamation issues and alternatives. Unfortunately, attendance at those sessions was extremely limited.

33. **Comment:** All you guys are going to do is after you leave here, the way I feel about it and my experience with this process, is you're going to go and it's going to be written down somewhere in something you present to the government or to Congress or somebody and say here, we've met with these people. These are the guys that were signed up here. You're going to submit that signup sheet. These are the guys who commented here. There was no substantial objections to the things presented to them. (LO-3)

Response: Who was at the meeting and what they said is part of the administrative record available to anyone interested. Comments that are made at these meetings are evaluated and responded to when preparing the Final SEIS. All comments will be considered when a decision is made on the reclamation plans.

34. **Comment:** Prior to opening up this mine, Hydrometrics Inc. was hired by the State of Montana to divert that water on the Landusky side. We've got documents stating that. So Montana owes us one. (LO-6)

Response: We are unaware of any such work conducted by Hydrometrics. However, an evaluation on the amount of flow that has been diverted from the north to the south at the Landusky Mine is included in SEIS Section 3.3.9.

35. **Comment:** Something this important, I would just think that out of respect to people at this meeting and the ones that are going to be at the future meetings that if there is a decision maker, someone that's going to make a decision on it, I feel they should be present at these public comment meetings that are taking place. I think that's only appropriate. (LO-3)

Response: The BLM decisionmaker (Field Manager) was present at all the public meetings. The DEQ Director was unable to attend but has been provided a copy of the meeting transcript and briefed by DEQ staff that were present at the meetings.

36. **Comment:** The science is complicated but many of the concerns I think the folks have here are about being asked to choose between their water and traditional cultural use of the land, or trying to get the mountains to look more like they looked with natural topography and human health down the road. I think that those are false choices that people are being asked to make. There are some things which are fairly straightforward and pretty simple, despite the complex science. (HA-2)

Response: Over the years one consistent comment regarding mining actions in the Little Rocky Mountains is that no amount of reclamation can undo the desecration that occurs to sacred areas from physical manipulation of the earth. It has been made clear to the agencies, and to the Advisory Council on Historic Preservation during their visit to the Reservation, that Native peoples do not believe that restoration of sacred values is possible through reclamation. What remains possible, though, is a reduction in the visual impact caused by mine pit highwalls by increasing the amounts of mine pit backfill or highwall slope reduction. However, with additional pit backfill comes the very real potential for contaminated groundwater to move north. This would be an unavoidable adverse impact associated with Alternatives L5 and L6 even after applying all mitigating measures. Thus, while complete backfilling won't restore the spiritual and cultural integrity of the land, it will increase the risk of groundwater contamination to northern drainages.

37. **Comment:** It's frustrating that in what, three and a half years, we haven't gotten a lot done and a lot of the bond money I think is gone. So it's important to keep the reclamation going, and like what's talked about before, to rank what's important. I believe what's important is our water quality is being taken care of and the acid rock drainage is handled as well – whether you're capping leach pads or sealing off the rock that allows the acid rock drainage. (LA-1)

Response: Interim reclamation activities in the past three years have been conducted to prevent unnecessary or undue degradation and to preserve the value of the bond. A fair amount of work has been completed to date at less cost than was first anticipated. However, a decision on the final reclamation plans are needed to "keep the reclamation going.".

38. **Comment:** In the book it said that BLM didn't have too much authority on deeded land. I don't know the agencies, how much teeth they have on a person that owns the deeded land. (LA-4)

Response: BLM has no authority to permit, approve, or deny activities on private lands. However, when BLM evaluates the impacts of actions it takes on public lands, BLM must considers the effect on both the public and private lands. DEQ has authority under the Montana Metal Mine Reclamation Act to regulate mining activity on private lands.

39. **Comment:** Loss of historic flow from the headwaters of King Creek should be pursued by the Fort Belknap Indian Community Council and incorporated into the Water Compact. (30)

Response: The agencies agree that the water compact negotiations would be an appropriate place to resolve any loss of flow due to the mining. Resolution of this issue is beyond the scope of the SEIS. Loss of historic flow due to mining is discussed in the SEIS in Section 3.3.9.

40. **Comment:** It is clear that a new discharge permit for the mine reclamation cannot be issued due to the 21 September 2000 court order Friends of the Wild Swan v. US EPA, et al. It is unclear how the current discharge permit can be renewed or revised since it pertains to a mining operation.

Since mining and reclamation can hopefully be expected to have very different discharges, the revision of a mining permit does not make sense. It appears that in keeping with the court order, no permit should be granted until the total maximum daily loads (TMDLs) have been established on all of the affected streams. The permit should then reflect the TMDLs in establishing the effluent limitations. My suspicion is once the TMDLs have been established, effluent limitations would be lower and more difficult to meet. It would therefore be in the best interest of the agencies involved to set higher (and more polluting) limits. This is not in the best interest of the community. (31)

Response: During mining the leaching circuit operated as a closed system so there would be no major wastewater stream which suddenly ceased discharge after mining. The preferred reclamation plan alternative is not creating any new or increased discharges of pollutants; the reclamation will actually be reducing the discharge of pollutants to the ground water and surface waters. Therefore, the MPDES permits are in compliance with the September 21, 2000 court order. Delaying issuance of the MPDES permits could result in more pollutants entering the environment because the limits in the current Consent Decree are less stringent than in the MPDES permits. MPDES permits, once issued, are revised and updated on a five-year basis so that any new conditions, newly established TMDLs, etc. may be incorporated into revised permit limits. In addition, both permits include a reopener provision (Part IV, Section O.3. of the permits) that allows the permits to be modified at any time if new, more stringent TMDL requirements are developed.

Comment Period Extension

41. **Comment:** Island Mountain Protectors (IMP) previously asked you for a 60 day extension in which to submit comments. You agreed to a 30 day extension which was not enough time in view of the extenuating circumstances (which I referred to in my earlier letters). For these reasons, I will not be able to file the IMP statements before August 30, 2001. Please grant another extension to this time or verify that statements filed on or before 8/20/01 will be accepted in the record. Mineral Policy Center is requesting the comment period be extended until September 9, 2001 due to complexity of the DSEIS. The allotted comment period is simply inadequate to fully digest the document and produce meaningful comments. (18, 19)

Response: The agencies decided not to extend the formal comment period on the Draft SEIS for a second time, beyond the date of August 9, 2001. No additional comments were received after August 13, 2001. All comments received were considered. It was determined that the 90+ day comment period (twice that required by the regulations) was adequate time to provide comments. The longer the agencies wait to make a decision regarding reclamation, the less work can be accomplished by the bond money due to factors such as inflation. Also, the longer the agencies wait to make a reclamation decision the more process water and mine drainage accumulate that require treatment and pose environmental risks.

42. **Comment:** The Fort Belknap Indian Community Council (FBICC) is requesting a 30 day extension due to the government-to-government meetings that have been set for later this month in Billings between BLM and FBICC. This 30 day extension will give FBICC time to provide comments on the draft SEIS after the meetings between the two agencies. (20)

Response: The meeting that was held between BLM and FBICC was for discussions related to settlement of Fort Belknap's lawsuit against the federal government. BLM does not believe Fort Belknap's comments on the Draft SEIS should be determined by progress on settlement of the lawsuits. Each of these actions will have to proceed on their respective timelines which could be quite different. Fort Belknap has been involved throughout preparation of the Draft SEIS, reviewing advance copies of the SEIS text and providing comments to BLM and DEQ. The agencies believe the 90-day comment period along with three public meetings has provided an adequate opportunity for commenting.

43. **Comment:** I have received your letter of August 7, 2001, wherein you reject our reasonable request for extension of the comment period to August 20th. If people submit comments after August 9th, but before a decision is made, I certainly hope the "decision maker" will see them. (48)

Response: The decisionmaker will see all comments submitted on the Draft SEIS regardless of date received prior to making a decision regarding reclamation of the mines.

44. **Comment:** When is the cutoff date? July 9th. Well, I'm asking you to extend that timeframe for another month because right now the traditional people are involved in, the sun dances are real close here now. It's going to happen. The people that are involved in that, in the traditional ways, can't get involved in any kind of controversial or political dealings now. So I'm asking you guys to respect us, the ones that are firm believers in our ways. We practice our ways, and I'm asking you to respect our wishes and extend this timeframe for another month. It's going to be very hard for people to focus on this until they get some of these things over. (LO-1, LO-2)

Response: The comment period was extended by one month until August 9, 2001.

45. **Comment:** The White Clay Society doesn't have the money to hire a technical expert to explain this to us. Maybe you guys will, within that month if you do decide to extend the comments, maybe within that time period you'll take the consideration to take this document to public meetings like this and explain what it is to people and what it means. (LO-3)

Response: The Fort Belknap government sponsored several technical sessions during the extended comment period where their consulting mining engineer was available to explain the technical details of mine reclamation and talk about the SEIS. Unfortunately, attendance at those sessions was reported to be low.

46. **Comment:** If this was in college that would be a year-long course in order to understand this here. You can't sit down and consume this whole thing in the time we are given to understand this because you're not going to take it all in. You can take maybe four or five pages a day and study it and maybe understand part of it. But this thing here, you just as well throw in the river because there ain't none of us can understand that whole thing. You give us till July 9th to look this over, and we cannot do it. I see no reason to say no to an extension, given the fact that there is activity going on at the site to take care of imminent stabilization needs at the site and so we will echo the need to grant a request for an extension. There is no possible way for a lay person to look through this in a month or so. I just skimmed this thing, I found a lot of concerns, and so I think I would like the time to look it over and I am sure a lot of other folks who aren't here tonight will as well. (LO-8, HA-1, HA-2)

Response: The comment period was extended by 30 days and the Tribal government's technical consultant was available to assist with reviewing the document. BLM and DEQ technical specialists were also available to assist with review of the document.

47. **Comment:** Island Mountain Protectors hereby request a sixty day extension of the comment period so that comments may be filed until September 9, 2001. This request is made in part on the following grounds.
(1) The DSEIS is very complex. Thirty days after the hearing is not an adequate amount of time for ordinary people to digest it and then comment.
(2) The Medicine Lodges of the Fort Belknap people will not end until July 8, 2001. The traditional people who participate in these Lodges are urged by their elders and the sponsors to not get involved in controversies until the ceremonies are completed. This being the case, the traditional people can not easily and properly focus on the DSEIS until after July 8th. Since a major issue in this DSEIS involves impacts on traditional and cultural people and values an extension is appropriate.
(3) The DSEIS does not explain in a very concise manner the nature of the surface impacts on the upper Mission Valley and the surrounding areas and more time is needed to make these evaluations by field trips, etc.
(4) The people do want to try to understand the problems and proposed reclamation plans. Environmental justice dictates that these people be given an adequate time and opportunity to participate in the NEPA process. [Several affidavits attached to support the request] (50)

Response: The agencies extended the formal comment period on the Draft SEIS to August 9, 2001. Additional technical meetings and field trips were available to facilitate the review of the Draft SEIS by Fort Belknap residents during the extended comment period. It was determined that the 90+ day comment period (twice that required by the regulations) was adequate time to provide comments. The longer the agencies wait to make a decision regarding reclamation the less work can be accomplished by the bond money due to factors such as inflation. Also, the longer the

agencies wait to make a reclamation decision the more process water and mine drainage accumulate that require treatment.

48. **Comment:** On behalf of the Montana Environmental Information Center, I would like to formally request a sixty day extension to the comment period for the Draft SEIS. This request would extend the comment period for the DSEIS to September 9, 2001. This request is being made because of the inordinate complexity of the DSEIS. The allotted comment period is simply inadequate to fully digest the document and then produce meaningful comments. People must be given an appropriate amount of time to participate in the NEPA process. They want to try and understand the proposed reclamation plans but there is just not enough time. (51)

Response: The agencies extended the formal comment period of the Draft SEIS to August 9, 2001. It was determined that the 90+ day comment period (twice that required by the regulations) was adequate time to provide comments. The longer the agencies wait to make a decision regarding reclamation the less work can be accomplished by the bond money due to factors such as inflation. Also, the longer the agencies wait to make a reclamation decision the more process water and mine drainage accumulate that require treatment.

Consultation with the Fort Belknap Government

49. **Comment:** Section 1.2.1, Reclamation Plan Development History (and globally throughout the SEIS document). Consultation as defined in the SEIS is not what the Fort Belknap Indian Community Council (FBICC) refers to as Consultation. This was discussed a number of times at the Technical Working Group meetings. The Tribes have consistently stated that these meetings of the technical working group were not to be considered as Consultation. Only government-to-government meetings held between the Agencies' State Director and the FBICC President and legal staff are considered as Consultation by the FBICC, and occur only when individuals vested with decision-making authority on behalf of the Tribes are in attendance. A clear distinction exists between the "technical working group" and the consultations ordered by the IBLA. The FBICC would be happy to list the meetings that it considers to be "consultations" if the agencies desire this information. (27, 43, 44)

Response: The SEIS refers to technical working group meetings as consultation because they are consultation as BLM defines it. BLM Handbook H8160 defines consultation as "...the active, affirmative process of: (1) identifying and seeking input from appropriate Native American governing bodies, community groups, and individuals; and (2) considering their interests as a necessary and integral part of the BLM's decision making process. The aim of consultation is to involve affected Native Americans in the identification of issues and the definition of the range of acceptable management options." Since the working group includes representatives of Fort Belknap, the interests of Fort Belknap are reflected in the discussions and products of the technical

working group. Clearly, this is "consultation" according to both BLM's definition as well as common usage of the word.

BLM believes that the technical working group meetings are part of the "consultation" process. There is no other basis for such meetings to occur if not conducted as part of government-to-government consultation. While we recognize that products of the technical working group are not considered as "final decisions" until accepted by the members' respective management or government, the working group was, in fact, established by the consulting parties as the primary mechanism for sorting through the technically complex issues associated with mine reclamation that need to be considered in consultation with Fort Belknap. This is further demonstrated by the decisionmaker meetings where the agenda consisted mostly of reviewing reports and recommendation from the technical working group, or providing direction back to the technical working group. If there was no technical working group there would be no actions ripe for consultation. Likewise, if there was no consultation occurring with Fort Belknap, there would be no reason for the technical working group to exist.

50. **Comment:** How much input did Fort Belknap, either the Tribal Council or the Environmental Department, have on the alternatives you prefer? Did you have any input on the 1996 EIS that was prepared for the expansion of the mine? (LA-2)

Response: Considerable input was received from the Fort Belknap Tribal Council and the Environmental Department during preparation of both the 1996 EIS and the Draft SEIS. The Fort Belknap Council wrote a letter urging selection of Alternative 3 from the 1996 EIS. (They withdrew this endorsement a few years later.) At one point during consultation in preparation of the Draft SEIS the council concurred with the *identification* of the preferred alternatives (though not necessarily their selection). Staff from the Fort Belknap Environmental Department serve on the technical working group and were part of the MAA process, where consensus was reached on scoring the merits of each alternative. Moreover, the range of alternatives analyzed in the SEIS had the concurrence of the Tribal Council and Environmental Department.

51. **Comment:** SEIS Page 3-12, 3-13: There was no consultation with Fort Belknap during the production of any of the groundwater reports cited in the Draft SEIS. (27)

Response: The agencies do not believe the comment is correct. All of the groundwater reports were prepared with some level of consultation occurring with Fort Belknap. The 1998 Groundwater Investigation, prepared by Water Management Consultants, was required under the 1996 Consent Decree, of which the Fort Belknap government was a party. Preparation of that report involved oversight by hydrologic consultants working for Fort Belknap along with other parties to the Consent Decree. The majority of the reports listed on Draft SEIS pages 3-12 and 3-13 were presented to members of the technical working group for comment or review. Groundwater issues were a focus of discussion at most technical working group meetings. A separate hydrology work

group was established under the technical working group specifically to address water issues. Both tribal government members and /or their consultants participate in these meetings. Other reports, such as the ATSDR report, underwent a review process, which included discussions with Fort Belknap on a draft report.

52. **Comment:** One is very suspect of the intent of both DEQ and BLM by the mere lack of consultation with the parties most affected by the reclamation i.e. the entire Fort Belknap Reservation! (35)

Response: Please review Chapter 5 of the Draft and Final SEIS for a description of the extensive consultation that has occurred with Fort Belknap on the mine reclamation.

53. **Comment:** The Final Report on the Landusky Mine's Hydrologic Impacts to King Creek and Swift Gulch should not also be cited as reference to the Draft SEIS as the Fort Belknap Indian Community Council has never given concurrence with the study as we have a water specialist investigating this information. (44)

Response: This document is referenced as it is the most detailed study available of hydrologic changes to this area. The study was conducted by a professional hydrologist using standard hydrogeologic analysis techniques. Fort Belknap was provided an opportunity to review and comment on a draft of this document in November 2000.

Grinnell Lands

54. **Comment:** Draft SEIS Section 1.2, Project Location and History. Why has the U.S. Federal Government allowed illegal mining on the Fort Belknap Indian Reservation in the Little Rocky Mountains since the 1860's? (44)

Response: The Fort Belknap Indian Reservation was established in 1888. In the 1890's when miners were trespassing on the Reservation in search of gold the U.S. Government purchased the land in question from the Reservation in order to settle the trespass issue. The purchased land was made part of the public domain and left open to mineral entry under the General Mining Law. This purchase occurred in 1895 and is known as the Grinnell Treaty or Grinnell Agreement. It was not until the late 1970's that the modern day Zortman and Landusky Mines came into being. The mines are located on a mixture of private lands and public lands, none of which lie within the Fort Belknap Indian Reservation.

55. **Comment:** I want some clarification on how the Grinnell Agreement fits into this and clarification on how it all comes together. Did I misunderstand that the tribe is trying to take over both the lands in Landusky and Zortman? Do the rules hold, if you get surrounded by either BLM land or BIA land, if your land is in the middle of that, then you still have to go by BIA rules or BLM rules. That

exists today. You get landlocked inside there, which is going to happen to some of these lands, certainly on this side and I'm sure on Zortman side. Does that also play a factor? I mean, I think we need to be honest and tell people up front. (LA-3)

Response: The Fort Belknap government has expressed interest in regaining control of the lands ceded from the Reservation by the Grinnell Treaty. Such an action is separate from the reclamation of the Zortman and Landusky Mines. Private inholdings, surrounded by BLM lands, are not subject to BLM regulations, although there can be problems associated with access across BLM lands to an inholding that have to be addressed on a case-by-case basis.

56. **Comment:** All Grinnell lands should be returned to the Fort Belknap Tribes. (16, 21, 46)

Response: Consideration of a land transfer is outside the scope of the SEIS, which is addressing only reclamation of the Zortman and Landusky Mines.

Montana Constitution

57. **Comment:** The Montana Constitution says that all Montana residents have a right to a clean and healthful environment. The preferred alternatives in this document are not going to get that sort of assurance for this community. That Constitution does not say that you have a right to the cleanest environment for the cheapest costs that can be invested. None of the proposed alternatives meet the requirements of:
1. Art. IX sec. 2 of the Montana Constitution which requires that "all lands disturbed by the taking of natural resources be reclaimed."
2. Art. II sec. 3 of the Montana Constitution which guarantees every Montana citizen the "right to a clean and healthy environment."
3. 82-4-336(8) MCA which states that reclamation plans must provide sufficient measures to "prevent the pollution of air or water and the degradation of adjacent lands." and;
4. 82-4-336(12) MCA which states that the reclamation plan must provide measures to prevent objectionable postmining ground water discharges.
Reclamation decisions regarding Zortman-Landusky must be consistent with the Montana constitution and Montanans' right to a clean and healthy environment. (HA-2, 16, 21, 46)

Response: The constitutional provisions cited direct the Montana Legislature to implement these provisions by enacting legislation. The Legislature has done so by adopting various acts, including the air quality, water quality, and mine reclamation acts. Implementation of any of the reclamation alternatives described in the Draft SEIS will comply with these statutes, including prevention of air and water pollution, prevention of degradation of adjacent lands, and, to the degree that is technologically feasible, prevention of objectionable post-mining groundwater discharges.

58. **Comment:** Water pollution treatment in perpetuity does not meet the reclamation requirements of the constitution, nor the requirements for preventing pollution of water under the Metal Mine Reclamation Act 82-4-336(8) and (12) MCA. (16, 21)

Response: Water treatment in perpetuity will prevent water pollution. Furthermore, given the conditions existing at the site, water treatment in perpetuity is the only means of ensuring that water pollution does not occur.

59. **Comment:** Page 1-7: The Constitution of the State of Montana must be listed as a legal authority to which the DEQ must adhere regarding mine reclamation. (27, 44)

Response: Article IX, Section 1, of the Montana Constitution directs the Montana Legislature to provide for the administration and enforcement of the duty to maintain and improve a clean healthful environment. It further directs the Legislature to provide adequate remedies for the protection of the environmental life support system. Article IX, Section 2, directs the Legislature to provide effective requirements and standards for the reclamation of mined lands. The Legislature has implemented these provisions by adopting various regulatory and remedial acts, including the air quality, water quality, and reclamation acts. The DEQ therefore, adheres to the constitutional provisions by implementing the statutes adopted by the Legislature.

60. **Comment:** The Montana Constitution guarantees us a clean and healthful environment. Saying we're going to clean up the water doesn't necessarily meet the expectations of a clean and healthful environment. (LO-11)

Response: All preferred alternatives presented in the SEIS comply with all requirements of the statutes administered by DEQ. The constitutional provisions cited direct the Montana Legislature to implement these provisions by enacting legislation. The Legislature has done so by adopting various acts, including the air quality, water quality, and mine reclamation acts. Implementation of any of the alternatives described in the Draft SEIS will comply with these statutes, including prevention of air and water pollution, prevention of degradation of adjacent lands, and, to the degree that is technologically feasible, prevention of objectionable post-mining groundwater discharges.

61. **Comment:** SEIS Page 5-6: The draft SEIS statement summarizing the current litigation in federal court concerning the BLM's violations of its trust obligations to the Tribes misstates the relief requested by the Tribes. 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. (27, 44)

Response: The text in Chapter 5 has been changed to reflect the language from the complaint.

6.2 ALTERNATIVES

This section addresses comments on the development of the alternatives and the identification of the preferred alternatives. Included are comments on the Multiple Accounts Analysis (MAA) and scoring of the alternatives.

62. **Comment:** One of the alternatives said that it would take 376,000 truckloads of backfill to properly cover that mountain. It'd take 63 years. Is that a firm figure? And then they would go through the town of Hays. Is there any consideration of constructing their own road and not go through a community with that much traffic? (LO-6)

    Response: In January 2001, the technical working group asked Spectrum Engineering consider the possibility of modifying Alternative L5 by bringing in clean fill from a source on the Fort Belknap Reservation north of Hays. This options turned out not to be practical. The cost for hauling in clean fill added $103,900,000 to the cost of Alternative L5 and would have taken 63 years to complete, assuming 6 trucks hauling one 8-hour shift per day. This 63 year timeline could be changed by adding more trucks and doubling the number of shifts. However, it would still take decades to complete. Alternate road routing and design for offsite import of backfill was also discussed but never conducted as this was a feasibility review rather than an engineering study. Creating a new mine to reclaim an existing mine offered no net environmental benefit, and would have created a huge amount of impact from excavation and hauling alone, no matter where the road was located.

63. **Comment:** SEIS Page 2-9: Further explanation is required regarding the agencies refusal to consider in detail the proposed modifications to Alternative L5. Although using clean fill to backfill the pits may take considerably longer, it may be that most Fort Belknap residents would much prefer such an option. Also, it does not appear that developing a hauling route that did not go through any communities was considered as part of such a plan. (27)

    Response: The agencies did not refuse to consider modifications to Alternative L5, just the opposite. Possible modifications to Alternative L5 were considered and presented to members of the Fort Belknap Indian Community Council, their attorneys, and agency management during a consultation meeting on February 12, 2001. After discussing the potential benefits and impacts of a modified Alternative L5, which brought in clean fill from Fort Belknap, none of the parties expressed support that such an alternative was feasible due to the timeframe involved and the additional environmental impacts that would be created. This modification was then presented in the SEIS as an alternative considered but eliminated from detailed analysis, since a variety of factors, the time involved (decades), the safety hazard, and the associated noise and dust would render this alternative impractical. Regardless of where the haul route could be located with respect to the community of Hays, it would destroy the character of the Mission Canyon recreation area.

64. **Comment:** I don't think that the supplemental draft EIS right now is giving us an alternative that shows us what the best case scenario would be. That's simply not being offered, in my opinion, and I think it should be there so we can compare some of these other alternatives with it. (LO-11)

Response: The alternatives were developed and refined over many years going back to preparation of the Landusky Mine ARD EA in 1993. Alternatives were further refined in the past several years during numerous meetings with representatives from DEQ, BLM, FBICC, EPA, and various parties' consultants. It is believed that the alternatives presented in the SEIS provide the full range of possible reclamation options for both mine sites. Specific suggestions as to what else should be in a "best case" scenario alternative would be welcome; and have been solicited during scoping and through the Draft SEIS comment period.

65. **Comment:** The preferred alternatives are predicated on the idea that full reclamation, or the closest we can get to full reclamation, trying to put the mountains back to some degree and trying to clean up the water, are incompatible. I'm not a scientist and I don't fully understand that. But that's asking a lot of faith in us to buy that. (LO-11)

Response: The preferred alternatives were identified with the intention that risks to water quality should be minimized, especially in the northern drainages, while also accomplishing reclamation and revegetation consistent with the applicable mining laws. The geochemical characterization and water quality monitoring of the material that would be available to backfill the mine pits (in particular spent ore from the L87/91 leach pad) to restore the topography show that the backfill material would present a serious risk to water quality. The reader is also referred to the water quality and quantity discussion in Chapter 4 of the Final SEIS). The bottom line is that to achieve the backfill as described for Alternatives L5 and L6 would require the use of mined material that would generate undesirable leachate. No matter what engineering controls are used, the movement of this material from the south side of the drainage divide to the north side would inherently increase the risk of impacts to water quality in the northern drainages. The preferred alternative (L4) for the Landusky Mine is therefore predicated on taking only the available material with a low risk of acid generation and using it for pit backfill.

66. **Comment:** If the only reason is economic, Alternative L5 should be chosen over Alternative L4. (HA-1)

Response: The reasons for identification of the preferred alternatives are primarily environmental, not economic. The reader is referred to SEIS Tables A-1a and A-2a for a listing of the issues considered; and to Tables A-1b and A-2b for the weights, or relative importance, applied to each of the issues, especially the quality of flow in northern drainages that enter the Reservation. Alternative L5 presents a substantial risk of negatively impacting tribal water resources and therefore was not identified as the preferred alternative even though its environmental performance in other categories may have been slightly better than Alternative L4.

67. **Comment:** There is more research that is needed into further alternatives. At scoping we had an opportunity to look at a whole range of alternatives which involve more money spent, yes, but a more true reclamation of what could happen in those mountains in terms of trying to actually restore closer to what natural topography and natural systems were up there. I don't think that those alternatives were truly considered here. (HA-2)

Response: Alternatives Z5 and L6 would restore the mine pit areas back to near original topography and are considered in detail in the SEIS. Other alternatives return many of the mine features to a more natural, though not original, topography. The alternatives were developed and refined over many years and provide the full range of possible reclamation options for both mine sites. Specific suggestions for other alternatives is one type of comment we were soliciting at the scoping meetings.

68. **Comment:** With the present alternatives some of the considerations that go beyond water quality are definitely being forsaken. I understand, to some degree, that there's technical reasons that make doing more difficult if we want to try to ensure good water quality, and I also understand, as Aimee has pointed out already, that it's very costly to do more. But I think that's asking us to have an enormous leap of faith to completely buy into that, and I think the bottom line is we're not doing enough to try to put the mountains back to some degree. (HA-3)

Response: All of the alternatives were designed to reduce the visual impact of the highwalls to some degree. However, alternatives which result in substantially greater risks to water quality (such as those involving substantial amounts of backfilling) are less desirable than those that protect water quality but may not look as nice to some people.

69. **Comment:** It appears to be a major conflict of interest for those same agencies who approved the mines to begin with, and who allowed mining in areas that exposed large amounts of acid generating rock formations, now are the ones who decide the reclamation alternatives. For instance, their justification for leaving large areas of acid generating rock exposed after the reclamation appears very biased. Could these agencies want to approve less costly options in order to trivialize the effects of their earlier neglect? (8, 31)

Response: State and Federal laws require that the DEQ and BLM approve a reclamation plan as part of the overall mine plan approval process. A complete range of alternatives was developed with the active participation of the Fort Belknap government and their consultants. A comparison of the analyses for Alternatives L3 and L4 versus Alternatives L5 and L6 shows that leaving acid generating solid rock highwalls exposed creates considerably fewer environmental problems than would occur from spreading crushed acid generating rock over that same area.

70. **Comment:** When cost is not factored into the evaluation criteria, Alternatives Z4, Z5, L5 and L6 are clearly ranked higher in terms of Technical, Environmental, and Socio-Economic

considerations. (See Draft SEIS Appendix A, Table A-1e and Table A-1f.) Only when Project Economic account scores are entered do the preferred alternatives of Z6 and L4 rate higher. (See Appendix A, Table A-2e and Table A-2f.) It must be recognized that economic considerations played the most important role in determining the selection of the preferred alternatives. Even the MAA ranking in the SEIS, which includes Project Economics, gives the highest multiple account score to Alternative L5. (See Appendix A, Table A-2e.) This should be a strong recommendation for considering L5 as the preferred alternative. If L5, the highest rated alternative, is not chosen as the preferred alternative, then appropriate explanation/justification should be given. Selection of Alternative L5 would be based on the other positive effects that will be realized - i.e. a higher Technical and Socio-Economic rating than Alternative L4. Selection of Alternative L5 would also follow the same sort of logic that was used in creating and selecting Alternative Z6 at Zortman. Z6 was not the most cost effective alternative, but made the most sense in terms of attempting to maximize a number of preferential features. When reviewing the Tables that reflect the MAA scores for Zortman and Landusky (Tables A-1e and A-2e respectively), the alternative with the highest MAA score was chosen for Zortman. The same reasoning should be used when scoring Landusky. L5 should be the Preferred Alternative. (10, 27, 38, 43)

Response: Economic considerations did not play the most important role in identification of the preferred alternatives. The agencies identified alternatives that can be accomplished within the existing bond amounts as well as alternatives for which sufficient bond does not exist. The agencies identified as preferred, alternatives which will cost some $22.5 million more than is available, but which are predicted to increase long-term reclamation success. Under MAA scoring, considering the margin of error in the system, Alternative L4 and L5 score virtually the same in overall environmental performance, with Alternative L5 costing almost twice as much as Alternative L4. More importantly, the MAA does not include all the factors that affect the final decision. As noted in Section 4.13.1, the MAA score does not include such factors as legal requirements or management constraints that may affect the agencies' ultimate decision. In this case the increase in risk to water resources on the Fort Belknap Reservation that would be posed by implementation of Alternative L5 or L6 precludes identification of these alternatives as preferred. Even if these alternatives could be accomplished within the bond amount they would have to be opposed by the agencies charged with protection of trust resources. Section 2.6 in the Final SEIS has been revised to better explain the rationale for identification of Alternative L4 as the preferred alternative over Alternative L5.

71. **Comment:** The Fort Belknap Indian Community Council, after reviewing the Draft SEIS is requesting the DEQ and BLM reconsider your decisions regarding the Agencies' preferred alternative selections for the Zortman/Landusky Mines. The FBICC would like the Agencies to reconsider L5 versus L4 alternative. When reviewing the tables that reflect the MAA scores for Zortman/Landusky (Tables A-1e and A-2e respectively), the alternative with the highest MAA score was chosen for Zortman. The same reasoning should be used when scoring Landusky. Alternative L5 should be the Agencies' Preferred Alternative. (44)

Response: The agencies have not yet "selected" a preferred alternative. The preferred alternatives have only been "identified" at this point in the evaluation. Alternatives will not be selected for implementation until issuance of the Record of Decision. In response to Fort Belknap's request, the agencies have looked closely at the question of Alternative L4 versus Alternative L5 for reclamation of the Landusky Mine. First, we should note that the margin of error in the MAA system is such that the difference in *overall* score between Alternative L4 and L5 is not significant, they score virtually the same in overall environmental performance. Second, the MAA does not include all the factors that affect the final decision. As noted in Section 4.13.1, the MAA score does not include such factors as legal requirements or management constraints that may affect the agencies' ultimate decision. What is not evident from the *overall* MAA score is the considerable difference in the *individual* groundwater quality protection values for Swift Gulch. Appendix A of the Draft SEIS shows a protection value of 9 under Alternative L4 and a protection value of only 5 under Alternative L5 (on a scale of 1 to 9). Since Swift Gulch flows onto the Reservation, there is a high likelihood that trust resources would be degraded from reclamation conducted under Alternative L5. This potential impact to trust resources is the primary reason the agencies have not identified Alternative L5 or L6 as preferred alternatives. Section 2.6 in the Final SEIS has been revised to better explain the rationale for identification of Alternative L4 as the preferred alternative over Alternative L5. The MAA scores have also been adjusted in Appendix A to reflect changes made in Alternative L4 reclamation to improve its performance.

72. **Comment:** It would also be appropriate to include some modifications to Alternative L5 that could lessen the cost and further mitigate the potential for water quality impacts. The following changes might be considered:
(1) Placement of as much non-acid generating material as possible in the part of the pit draining to Swift Gulch, so that a minimum of mobilized oxidation products would report to Swift Gulch, and a maximum could be collected and treated in the Landusky water treatment plant. (The SEIS states, "With WS-3 flowing, the (groundwater) divide zone shifted to the north, beyond the Suprise and Queen Rose pits." See p. 3-43, and Figures 3.3-10 and 3.3-11.) Much of the material from the L85/86 Leach Pad could be placed in the Queen Rose and northern end of the Suprise pits. This could minimize the possibility of groundwater contamination in the northern drainages.
(2) It is not clear if the bottom of the Queen Rose Pit is to be lined. (The SEIS states "The regraded floor would be covered with a geosynthetic liner and the backfilled ..." See p. 2-117.) If it were to be lined with an impermeable liner, this could further decrease the amount of potentially contaminated water migrating north.
(3) Complete removal of the August #2 Waste Dump, both East and West Lobes, for backfill in the Queen Rose or Suprise pits. This would provide additional NAG backfill, and remove a source of minor contamination from the King Creek drainage. (10, 38)

Response: None of these suggestions would lessen the cost. However, placement of additional material is planned for both the Suprise and Queen Rose pits to make them free-draining. In the Draft SEIS preferred Alternative L4, the floor of the Suprise pit would be covered with a liner, but

the floor of the Queen Rose pit was not going to be lined. Alternative L4 has been modified in the Final SEIS to include placement of a liner over the Queen Rose pit floor, as you suggested. Under Alternative L5, both pit floors would be covered with a liner (Draft SEIS, 2-117). Under Alternative L4, the exposed sulfide highwalls in the Suprise and Queen Rose pits are to be covered with material from the oxide material in the east lobe of the August #2 waste rock dump (599,000 cubic yards) . Under Alternative L4, the L85/86 leach pad material is hauled out of the Montana Gulch drainage and placed in the bottom of the August-Little Ben pit complex by end-dumping off the highwall at the southwest corner of the pit. This material, while assumed to be fairly good, is not the same oxide quality as the August #2 waste rock dump. Placing this material at the northern end of the pits (Suprise and Queen Rose) may place some questionable material in the northern water flowpath. The west lobe of the August #2 waste rock dump (254,000 cubic yards) has already been fully reclaimed and has a healthy stand of trees growing on it and does not appear to release any contamination. It may have been a repository for unmineralized rock. This is the primary reason that the west lobe was not considered for backfill material. If the west lobe is considered to be a minor source of contamination for King Creek, then removal only places this source into a different northern drainage. The amount of vegetation currently growing on the west lobe prevents virtually all runoff and infiltration of surface water.

73. **Comment:** We are told that if the Landusky Mine is "fully reclaimed" contaminated waters may tend to flow on to the Reservation. Island Mountain Protectors demands full reclamation and complete proper resolution of the water quality issues, whatever it takes, whatever it costs! Since none of the preferred alternatives says anything about full reclamation, where do the people go with what they want? Can I truly pick an alternative that I am not happy with. The mountains should be returned as closely as possible to their natural state. (12, 29)

Response: By using the term "fully reclaimed" or "full reclamation" we assume you are referring to alternatives which would completely backfill the mine pits. It should be noted that the various state and federal regulations for mine reclamation do not require backfilling of mine pits for a site to be considered fully reclaimed. Resolution of water quality issues through a combination of water treatment and surface reclamation is a major emphasis in this reclamation effort. Backfilling of the mine pits with acid generating material would require construction of additional capture systems and would increase the risk to Tribal water resources.

74. **Comment:** Review of the SEIS and alternatives for the Landusky Mine leads to the conclusion that Alternative L5 is more suitable than the preferred Alternative L4. In fact, Appendix A, Table A-2e supports this contention, and should be given due consideration in choosing the reclamation for the Landusky Mine. The Department chose the highest MAA-rated alternative for the Zortman Mine, and the record demonstrates no logic for failing to do the same for the Landusky Mine. The Department failed to select the alternative that rated highest on its own system. Absent reasoning for the selection of L4, the preferred alternative appears to be an arbitrary and capricious abuse of discretion. While L5 may not be the most cost-effective alternative, it clearly surpasses L4 with

higher Technical and Socio-Economic ratings, which will result in future benefits that far outweigh the initial cost difference between the two alternatives. Alternative L5 clearly maximizes the number of preferential features, providing the most realistic and effective reclamation of all of the provided alternatives. (22)

Response: It must be noted that it is not at all clear from the MAA scores that Alternative L5 "clearly surpasses" Alternative L4. It must also be pointed out that the results of the MAA do not automatically determine the best alternative. First, the margin of error in the system is such that the difference in score between Alternative L4 and L5 is not significant, they score virtually the same in overall environmental performance, with Alternative L5 costing almost twice as much as Alternative L4. Second, the MAA does not include all the factors that affect the final decision. As noted in Section 4.13.1, the MAA score does not include such factors as legal requirements or management constraints that may affect the agencies' ultimate decision. In this case the increase in risk to water resources on the Fort Belknap Reservation that would be posed by implementation of Alternative L5 or L6 precludes identification of these alternatives as preferred. Even if these alternatives could be accomplished within the bond amount they would have to be opposed by the agencies charged with protection of trust resources. The MAA scores and alternative costs have been updated and included in the Final SEIS. A more detailed explanation of the preference for Alternative L4 over Alternative L5 has been added to Section 2.6 of the Final SEIS.

75. **Comment:** EPA has determined that the Draft SEIS is exemplary in the analysis of effectiveness of each alternative and in the detail in which your staff and their consultants were able to both understand and control each source of contaminated water flowing from these now-abandoned facilities. The mine feature-by-feature acid rock drainage potential obtained by the field pH paste and TSS tests were extremely valuable in identifying the portions of each waste rock pile, each part of the pit, and each portion of every leach pad and dike that contribute to metal contaminant loads. That work effort by the State's consultant will help establish improved criteria for hard rock mine reclamation procedures at other similar sites. The mass balance work and drainage-specific estimates of uncaptured flow have been useful in designing suggested improvements needed for both source control and capture in each and every affected drainage on the mountain. When the MAA process showed that improved performance and less risk of non-compliance with water quality requirements would result from the higher costing Alternatives Z6 and L4; your agencies provided support for this technical result even though the estimated cost of $51.6 million for these options would exceed the available bond amount by approximately $22 million. As a result, EPA rates this Draft SEIS and its selection of the preferred alternative (Alternatives Z6 and L4) in one of our best rating categories. EPA will note in the Federal Register that the Draft Supplemental EIS receives our category LO rating. This means EPA Lacks Objection to the selection and implementation of the preferred alternative. (23)

Response: BLM and DEQ appreciate the assistance provided by the EPA in facilitating consultation with the Fort Belknap government and in the development and review of the various

reclamation alternatives. The main determining factor for the ability of the reclamation alternatives to protect water quality is the continued successful functioning of the seepage capture and treatment systems, and not any particular reclamation feature. In fact, some of the alternatives with higher costs due to large amounts of pit backfill (Alternatives Z4, Z5, L5, and L6) have increased risk of non-compliance with water quality requirements. Preferred Alternatives Z6 and L4 represent the optimization of water quality and pit backfill consideration. However, successful reclamation that protects water quality can be achieved under Alternatives Z3 and L3.

76. **Comment:** EPA understands that Alternatives L3 and Z3 may become the backup preferred alternatives for the lead agencies if additional funding is not provided. Alternatives L3 and Z3 have reclamation features that result in a higher risk of assuring whether water quality criteria can be met in the long-term. Not isolating and covering much of the acid generating waste rock in the backfilled pits, which are features of these within bond alternatives, would increase the risk of operational and environmental problems in the long-term. These within bond alternatives do not include the use of engineered reclamation covers nor are they designed, as the preferred alternatives are, to achieve a water balance in these covers. This would limit the effectiveness of the cover material so that substantial more leachate generation would occur within such facilities. Pit backfill is substantially less for these within-bond alternatives particularly on the Landusky side where the North Alabama pit, August-Little Ben pit, the Surprise pit, and the Goldbug pit would not receive additional backfill material to cover acid generating portions of these pits. As a result the source of acid generation on these pit highwalls would contribute more contaminated leachate for generations to come. If we were to not cover these sources of acid generation portions of these pits, as proposed for these within-bond options, there would be a substantial risk that environmental and water quality criteria may not be obtained with such limited reclamation features. For these reasons, if EPA were to rate these within-bond alternatives; EPA would rate them in category EO meaning EPA would have Environmental Objections to the selection of either L3 or Z3 alternatives that are within the current bond fund limitations. (23)

Response: BLM and DEQ maintain that the anticipated difference in reclamation performance between Alternative Z3 versus Z6, and Alternative L3 versus L4 is not as great as indicated by the comment. The function of the seepage capture and treatment systems to protect water quality is the same under both sets of alternatives. It is the successful functioning of these systems which is most responsible for the protection of water quality. Likewise surface reclamation has more similarity than differences within this set of alternatives. While the agencies agree that long term reclamation performance may be lower for the within-bond Alternatives Z3 and L3, we do not agree that the result would be "substantial more leachate generation" or "a substantial risk that environmental and water quality criteria may not be obtained."

The primary difference between Alternatives L3 and L4 is the removal of the L85/86 leach pad under Alternative L4, which, as EPA pointed out in a previous comment, has its own increased risk for selenium and arsenic loading. At the Zortman Mine the primary difference is partial removal of the Alder Gulch rock dump for backfill under Alternative Z6. However, seepage from this rock

dump is presently being captured anyway and its placement in the North Alabama pit would not greatly change the amount of exposed sulfide wall rock.

Because there is only a minor difference in the predicted performance of Alternatives Z3 versus Z6, and Alternatives L3 versus L4, when it comes to meeting water quality requirements, the agencies believe the within-bond reclamation alternatives should not be rated two steps below the rating given to the preferred alternatives. Indeed, the EO rating is the same rating EPA gave to the plans for mine expansion in 1996. It's difficult to understand how mine reclamation under Alternatives Z3 and L3 can warrant the same rating as the 1996 expansion plans to mine an additional 150 million tons of acid generating ore and waste rock.

77. **Comment:** EPA suggests the Final EIS better clarify the environmental risk reduction of the preferred alternatives over the other, within-bond alternatives, to augment the technical record thus far provided. Rather than EPA staff independently attempting to clarify such environmental benefits, we suggest it would be appropriate for the lead agencies to convene the technical work group to cooperatively identify the key advantages that the preferred alternatives have over the other within-bond alternatives. (23)

Response: Advantages of the preferred alternatives compared to the other alternatives can be seen in the impact summary comparison Tables 2.8-1 and 2.8-2. Quantitative estimates of infiltration and contaminant loading can also be compared across alternatives by reviewing SEIS Tables 4.3-1 through 4.3-3. It is not clear what additional information is requested. However, the technical working group reconvened in September of 2001; and an updated analysis of the impacts of each alternative, with a revised MAA score, is included in the Final SEIS.

78. **Comment:** EPA suggests another brief evaluation of the differences in expected performance that Alternative L5 has over L4 in order that possible pit backfill variations might be considered that would improve the expected performance of the L4 Alternative. (23)

Response: This suggested evaluation has been completed and Alternative L4 has been modified to include placement of a synthetic liner over the floor of the Queen Rose Pit.

79. **Comment:** I have reviewed the Preferred Alternatives, Z6 & L4, and believe the agencies should review Alternative L5 as our best recourse in protecting human health, environment, and trust resources. I have also looked at Alternatives Z3 and L3, and while acceptable, in the interest of all involved parties, I believe we should proceed with Z6 and L5. In these two alternatives, we are looking at revegetation, controlling toxic or harmful materials, and cover all sulfide portions of the mine pit highwalls with backfill. This would not only protect the drainages going north into the reservation, but would also remove the L85/86 leach pad obstructing the Montana Gulch drainage and reduce visual impact of mine pit highwalls. (25)

Response: The DEQ and BLM have reviewed Alternative L5 and remain concerned that it would increase the risk of water quality contamination in drainages (Swift Gulch) flowing to the north. This is due to the addition of large amounts of acid generating waste into the area upgradient of Swift Gulch. This would increase the risk of impacts to trust resources on the Fort Belknap Reservation.

80. **Comment:** Draft SEIS Page 1-10, 1-11: The following two sentences are objectionable: "Some of the reclamation plans considered as alternatives in the SEIS were developed by Fort Belknap's technical consultants, in consultation with the agencies, to address Fort Belknap's concern with impacts to trust resources." And, "Some of the reclamation plans considered as alternatives in the SEIS were primarily developed by Fort Belknap and their consultants." Both of these sentences are gross overstatements and are misleading. Some sections of the alternatives in the draft SEIS which recommend complete backfilling and return of the Little Rockies to their pre-mining contours may be based in part on the Tribes' Alternative Reclamation Plan (parts of Z4 & Z5, and parts of L5 & L6). Fort Belknap is happy to identify exactly which sections of which alternatives represent the work of the Tribes' engineer. To imply, however, that the Fort Belknap Indian Community Council drafted some of the reclamation alternatives in their entirety is not accurate. Attorneys for Fort Belknap have questioned this language on several previous occasions, both verbally and in written comments. This language must be deleted or rewritten to reflect the facts. (27)

Response: At a meeting with Tribal Council members, and the Tribes' attorneys and consulting engineer held in Helena, Montana on February 12, 2001, it was agreed that the subject language used to describe Fort Belknap's participation in the alternatives development under SEIS Section 1.4.2 would read: *"Some of the reclamation plans considered as alternatives in the SEIS were developed by Fort Belknap's technical specialists, in consultation with the agencies, to address Fort Belknap's concern with impacts to trust resources."* At the same meeting a similar sentence in SEIS Section 1.4.3 was edited to read: *"Some of the reclamation plans in the SEIS alternatives were primarily developed by Fort Belknap and their consultants."* We have edited the Final SEIS to make sure these two sentences are used exactly as was agreed to at that meeting. Obviously the phrasing for the alternatives description in Chapter 2 of the SEIS is the responsibility of DEQ and BLM. However, the reclamation concepts behind Alternatives Z4, Z5, L5, and L6 were provided by Fort Belknap's consultant based on his adaptation of the Tribes' Alternative Reclamation Plan that was previously submitted to BLM by the Tribe on March 9, 1999. These alternatives would not have been developed without his subsequent input and the Tribes' insistence that full backfill alternatives be considered in the SEIS.

81. **Comment:** Draft SEIS Sections 1.4.1 and 1.4.2. Statements are made saying that some of the reclamation plans considered as alternatives were "developed by Fort Belknap's technical specialists" and "developed by Fort Belknap and their consultants." These statements seem to be over generalizations. The alternatives were developed collectively and collaboratively between all parties of the "Technical Working Group." I don't believe Fort Belknap's specialists or consultants developed these alternatives by themselves, although the Tribes' consultants did produce their own

"Alternative Reclamation Plan," which is included in part in the alternatives that have been developed. (43)

Response: The agencies agree that the alternatives, "were developed collectively and collaboratively between all parties." However, the key concepts in Alternatives Z4, Z5, L5, and L6 were put forth by the Tribes' engineering consultant.

82. **Comment:** There is also no adequate explanation as to why the agencies believe that liming the backfill would "probably fail to adequately protect water quality." (27)

Response: An explanation for dismissing massive liming of the backfill is provided in the Draft SEIS at the bottom of page 2-9. Liming is a preventative measure which may provide adequate water quality protection when the materials involved are near neutral or need to be buffered where in contact with a growth medium. However, liming does not carry the same level of protection as not placing the material in the pits to begin with. Nor does liming function well to protect water quality when it is used to treat materials that are strongly acid generating. This is because while neutralization 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. Nor would lime neutralization remove the contaminants know to be present in the backfill that are more mobile at a high pH such as arsenic and selenium, in fact it could actually promote their release. 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 untreated. In addition, placement of the amount of lime that would be needed, 431,500 tons, creates new problems. Approximately 21,600 truckloads of lime would have to be hauled through the town of Landusky, thus generating dust and air quality problems and safety concerns for this residential area. This was considered impractical for similar reasons that making 378,750 truck trips up King Creek was considered impractical.

83. **Comment:** The Draft SEIS does not adequately demonstrate how the various alternatives, especially those developed to be within current bond amounts, will meet the requirements of state and federal laws. Alternative L6 is the only one that would be considered any sort of reclamation. (27, 33, 45)

Response: All alternatives were designed by the technical working group to meet the minimum performance standards for mine reclamation, though some pose a greater risk of failure than others, or require more intensive long-term management.

The applicable 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, adequate soil cover to support revegetation, minimize erosion, support revegetation, achieve a beneficial use, etc. In this regard, all the alternatives presented in the SEIS would meet these requirements to varying

degrees. Some would certainly meet the requirements better or quicker than others, but all would likely be nominally successful.

Where quantitative performance requirements are most evident is 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 would continue to operate. Right now, the effluent discharged from the water treatment plants is meeting the legal numeric requirements. This would continue under the various reclamation alternatives, although some reclamation alternatives would increase the risk of not meeting water quality requirements, such as those involving extensive backfilling of the pits with acid generating spent ore, while other reclamation alternatives would 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. The difference in alternative performance is the degree of difficulty in maintaining compliance with the effluent limits and the impacts of an accidental solution release or from inefficient seepage capture. However, all alternatives are still feasible in that compliance could theoretically be achieved should the alternative be selected for implementation.

Rationale explaining the basis for the identification of the preferred alternatives has been included in Section 2.6 of this Final SEIS. Additional discussion of how the selected alternatives would satisfy the legal and regulatory requirements will be provided in the Record of Decision.

84. **Comment:** Do not backfill the mine pit any more than is necessary to keep the surface water moving in a southerly direction. Water draining to the south end of the pit is controlled and then treated. This cannot be done at the north end of the pit. Filling the pit would make controlling the water an unknown factor, be very costly and serve no real function. (9)

Response: All alternatives include enough backfilling and grading to route runoff toward the south ends of the mine pit. The difficulty in controlling water flow out the north end of the pit, especially at the Landusky Mine, is one of the reasons for not identifying Alternatives L5 or L6 as preferred.

85. **Comment:** One can't help but be struck by the absolute necessity for a well thought out reclamation plan to be put into place for these mines. Without such I'm afraid the ARD, accumulated pollution, current and potential environmental damage will be irreversible! None of the alternatives come anywhere near addressing a true reclamation plan for these mines. (35)

Response: The alternatives were developed and refined during numerous sessions with technical specialists from DEQ, BLM, FBICC, EPA, and their consultants. The alternatives were designed by the group with the intent of meeting the minimum performance standards for mine reclamation, though some pose a greater risk of failure than others, or require more intensive long-term management. Specific suggestions for changes in the reclamation alternatives were solicited over the past year from the beginning of the scoping session to the close of the public comment period

and have been incorporated into the analysis. The agencies believe the alternatives presented in the Draft and Final SEIS provide the full range of possible reclamation options for both mine sites.

86. **Comment:** SEIS Page 2-106, 2-117: Why are wells being drilled for monitoring and interception of degraded water in the Suprise Pit under Alternative L5, but not under Alternative L4? The need for the wells and for capturing degraded water for treatment appears to be the same under both alternatives. The draft SEIS also states that groundwater flows toward Swift Gulch, making such monitoring even more vital. (See page 3-42). (27)

Response: Monitoring of groundwater in the Swift Gulch area is common to all alternatives. However, the need for recovery wells is not at all the same between Alternatives L4 and L5 or L6. The recovery wells were included in Alternatives L5 and L6 to at least partially mitigate the impact from the large amounts of acid generating material that would be placed as backfill in the mine pit areas north of the drainage groundwater divide. The purpose of the interception wells is to capture the increased contaminant load that would migrate to the north as a result of infiltration through the backfill. Contrast this with Alternative L4 which is predicted to reduce even the existing amount of contaminated seepage migrating north from the pit area such that recovery wells would not be needed. As a contingency, should monitoring detect contamination likely to cause exceedance of standards at the MPDES permit compliance locations, under any alternative, recovery wells could be constructed as needed.

87. **Comment:** After reviewing the draft MPDES permit and comparing it to the Hydrology Support Document (HydroSolutions) it is revealed that many of the limits established are exceeded on a regular basis for Swift Gulch and King Creek. How can reclamation alternatives be planned knowing that the permit limits will be exceeded? Basically, the Hydrology Support Document does not provide the data to form the basis of any of the alternatives in the SEIS. (28)

Response: The only water quality standard presently exceeded on an occasional basis in King Creek at the Reservation boundary (L-39) is the chronic aquatic life criterion for selenium. The proposed MPDES outfall location, #590, is located a considerable distance upstream of this location near the bottom of the August #2 waste rock dump. This is also near the former monitoring site L-5. Although not routinely sampled at this time, recent samples from #590 indicate that selenium and nitrate limits specified in the MPDES permit would regularly be exceeded at that location. The source of these contaminants is probably the unreclaimed southeast-facing slope (facing into the Landusky pit) of the August #2 waste rock dump's eastern portion. In order to achieve compliance with future MPDES limits, this portion of the August #2 dump will be removed and backfilled into the Landusky pit under all alternatives. After removal of the waste rock, soil will be placed over the underlying natural land surface. Monitoring of outfall #590 will continue, and should that indicate that compliance with MPDES standards still will not be achieved, bond money is being retained so that a treatment system can be constructed in upper King Creek for the effluent from outfall #590.

Monitoring of Swift Gulch station L-19 does show that the proposed MPDES limits for iron, arsenic, zinc, and nickel have recently (2000 - 2001) begun to be exceeded at this location. The primary source of these contaminants is probably the unreclaimed backfill placed into the Suprise pit, and possibly the Queen Rose pit, by Pegasus Gold Corporation during 1995-1996. Because this backfill material has not yet been covered as part of reclamation, most precipitation which falls into these pits, as well as stormwater runoff which enters the pits, infiltrates into the backfill and subsequently enters the underlying groundwater system which drains toward Swift Gulch. While in contact with the sulfide backfill, this water flushes metals from the waste rock and transports them to Swift Gulch. As part of reclamation under all alternatives the backfill in these pits will be recontoured and capped to restrict infiltration. This will greatly reduce the amount of precipitation which comes in contact with this acid generating, metal releasing waste rock backfill, and keep contaminants from entering the groundwater system which drains toward Swift Gulch. Continued monitoring of Swift Gulch in accordance with the proposed MPDES permits will determine the effectiveness of these reclamation measures at reducing contaminant levels to within the standards set forth in the permit.

Current exceedances are occurring due to the lack of reclamation. That is one reason reclamation decisions must not be unnecessarily delayed. The alternatives have been designed with the goal of controlling the release of pollutants so that permit limits can be achieved once a reclamation alternative is implemented. The reclamation plans for the Landusky Mine are designed to minimize the discharges that are causing elevated pollutant concentrations in Swift Gulch and King Creek. After the reclamation work is completed the pollutant concentrations in the water bodies will meet the MPDES permit limits.

88. **Comment:** After taking a tour of the mines, attending public meetings, and reading the Draft SEIS, I am left with the distinct feeling that Alternative L4 was chosen over Alternative L5 primarily for financial reasons. It appears to me that Alternative L4 was chosen first and the justification was arranged afterward. Is it possible that the BLM and Montana DEQ are proposing to leave so much of the Landusky Mine area uncovered so that it would be easier for future mining interests? You owe it to the people who have to live here in this polluted hazardous waste dump to do Alternative L6 or at the least Alternative L5 reclamation for the Landusky Mine and Alternative Z5 for the Zortman Mine. We would never want mining activity to happen up there again and by the looks of your preferred alternatives you're leaving it open for future mining. So Alternatives L6 and Z5 are the way to go. (31, 41)

Response: The preferred alternatives were identified because they minimize risks to water quality while accomplishing the goal of reclamation and revegetation consistent with applicable regulations on reclamation. The added risks to water quality from implementing Alternative L5 was a major factor in the identification of Alternative L4 as the preferred alternative. Identification of the preferred alternative cannot be based on conducting reclamation in such a way as to preclude future mining. Other processes, such as withdrawal of the lands from operation of the General Mining Law, are used to close areas to future mining.

89. **Comment:** Where is the environmental justice in all of this? There is no environmental justice evident in the Preferred Alternatives Z6 and L4. Alternatives Z5 and L6 should be the chosen alternatives. Leaving acid-generating rock exposed to the elements is just another disaster waiting to occur. (32, 33)

Response: Acid generating rock is often exposed to the elements in undisturbed mountainous settings. The relatively small areas of ARD rock that would be exposed under the preferred alternatives, and Alternatives Z3 and L3 are not anticipated to result in significant environmental impacts. However, these areas will be monitored to document actual conditions and to determine if further remediation may be required. Environmental justice considerations are inherent in the preferential consideration process used to address impacts that might occur to the people and resources of the Fort Belknap Reservation. The potential effects to stream drainages that flow toward Fort Belknap have been given a higher weight in the process used to evaluate the alternatives than the potential effects to drainages that flow away from Fort Belknap. Thus, the agencies have identified preferred alternatives which provide the greatest level of protection to Fort Belknap when compared with other alternatives.

90. **Comment:** None of these alternatives has even remotely addressed the cultural and spiritual damage done to a peoples who "Life-way" was irreparably damaged by the mine. (35)

Response: Over the years American Indian traditional groups and individuals have stated clearly that certain impacts cannot be successfully mitigated regardless of the extent or intensity of reclamation. By definition there would not be any alternatives capable of addressing "irreparably damaged" traditional cultural and spiritual values. However, consideration of aesthetic impacts has played a significant role in the development of the reclamation alternatives.

91. **Comment:** None of the Alternatives incorporate the input from the Tribal Environmental Office, representing the Tribes of the Fort Belknap Reservation. (35)

Response: The agencies must strongly disagree with this comment. Members of the Fort Belknap Environmental Protection Office are part of the technical working group and participated in development of all the reclamation alternatives. Fort Belknap representatives and their consultants were primarily responsible for the reclamation concepts behind Alternatives Z4, Z5, L5, and L6.

92. **Comment:** Alternative L5 (pit backfill to cover sulfide highwalls) would have to be minimum for any reclamation plan. However, an alternative, Alternative L7, which currently does not exist, should be considered by all parties as a true reflection at an attempt of restitution for the environmental damage that has occurred. Alternative Z6 (optimize grading for source control) would have to be minimum for any reclamation plan. However, an alternative, Alternative Z7, which currently does not exist, should be considered by all parties as a true reflection at an attempt of restitution for the environmental damage that has occurred. (35)

Response: The alternatives were developed for the purpose of mitigating the environmental impacts of mining to meet the applicable regulatory requirements, not as a means of "restitution." The opportunity provided during public involvement associated with preparation of the MAA and the scoping process for preparation of this SEIS did not result in any suggestions for additional alternatives. Nor does the comment provide any concept as to what would be included in an Alternative Z7 or L7. Without specific suggestions consideration of additional alternatives cannot be performed. The agencies, and the technical working group, believe that the full range of alternatives has been considered.

93. **Comment:** The Zortman-Landusky Mine site should be reclaimed to the fullest extent possible relative to both appearance, in terms of landscaping, and environmental integrity, particularly with regard to surface and groundwater quality. Neither of the proposed agency preferred alternatives for either the Zortman or Landusky portions of the mine do this adequately. While Alternative Z6 may be a step in the right direction, this is especially glaring relative to Alternative L4, which does little in the way of landscape reclamation yet, ironically, is most impacting to the adjacent Fort Belknap community. Alternative L4 is woefully inadequate. (46)

Response: The alternatives evaluation completed for the selection of the preferred alternatives on both the Zortman and Landusky Mine sites assessed the relative benefits and impacts on many resource conditions, including appearance (landscaping) and environmental integrity (surface and groundwater quality). These two issues were identified early in the process as being of extreme importance and therefore were given high weightings. However, because much of the material that would be required to backfill the pits and restore the topography is potentially acid generating, or otherwise deleterious to the water quality, it is believed that maximizing the aesthetic aspect of reclamation will decrease environmental protection to surface and groundwater, particularly at the Landusky Mine. The preferred alternatives were identified as Alternatives Z6 and L4 due to the potential for these alternatives to minimize risks to water quality, while also accomplishing the goal of reclamation and revegetation consistent with applicable reclamation regulations. Alternatives Z3 and L3 would also minimize risks to water quality while reclaiming the disturbed areas consistent with the regulations. The added risks to water quality from implementing Alternative L5, in comparison to the marginal gain in aesthetics, was a major factor in the identification of Alternative L4 as the preferred alternative.

94. **Comment:** As numerous Fort Belknap residents have testified, the Little Rockies are an extremely significant traditional cultural landscape. And as so many Indian people have said, the mountains can never be put back the way they were. But let's at least try, from the outset, to give it our best shot. Full reclamation should include complete backfilling of pits, capping, revegetation, and reshaping of the landscape to something like its original form. Water quality concerns must also be met and maintained in perpetuity. (46)

Response: The reclamation alternatives include a great deal of grading and reshaping to simulate a natural topography. However, careful consideration was given to whether putting water resources at risk is warranted to more fully reconstruct a landscape that still will not have its original cultural integrity. The agencies determined that water quality objectives may not be "met and maintained in perpetuity" if more backfilling is done to reconstruct the original landscape.

95. **Comment:** Summitville down in Colorado is spending, it includes spiritual lands, I heard the figure of $170 million has been spent there, somewhere thereabouts. If they are spending $170 million down there on something that isn't even really spiritual mountains to those particular Native American people, they can spend $170 million up here as far as I'm concerned. (LO-2)

Response: The amount of money spent is determined by the reclamation plans that are ultimately selected. There are considerable difference between the reclamation actions required at the Summitville Mine in Colorado and those proposed for reclamation at the Zortman and Landusky Mines. Most of the money spent at the Summitville Mine is for water treatment.

96. **Comment:** I don't think the document is adequate to explain to the decision maker down the line or to us, really, why full reclamation isn't just as good. It's going to cost more obviously, $150 million more, but I don't think that's covered in here and I think if that in fact is true, then that needs to be fleshed out in this thing a little more because I don't think it's there. It's been not only the White Clay Society but the tribal council's position that we wanted full reclamation up there, the best possible way it can be done to return it to the way it originally was up there. However that may be and whatever it costs. (LO-2, LO-3)

Response: Text has been added to Section 2.6 to better explain the potential problems associated with increased pit backfilling, especially at the Landusky Mine. The basic explanation is that completely backfilling the pits would require moving cyanidated and acid-generating materials off the lined leach pads that drain away from the 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 that cannot be mitigated below significance.

97. **Comment:** I've been reading some of your alternatives here, and to me it's like you're setting it up for, well here's the low end of the alternatives and here's the high end and here's the middle. We'll consider that what the bond will cover. These ones out here are lower, the bond's good enough to cover them, and the ones up here the bond will cover this one, and then up here it goes a little bit higher. But we ain't going to go all the way to the top to what everybody knows should be done. We're going to go just a little bit higher to say that we went above what the bond was. To try to satisfy that under some kind of a NEPA requirement or something, whatever it is. It should be the alternatives that addressed full reclamation. (LO-3)

Response: All of the alternatives meet the requirements for reclamation. The preferred alternatives would cost almost twice as much as the available reclamation bond, not "just a little bit higher."

98. **Comment:** I think to use money right now as the sole hindrance to what needs to be done and what's going to be done on that site is a real mistake. I think that what we need to decide is what's the best thing to do up there, and then we'll find the money. I think that that's what is due to the tribes here and now today. (LO-7)

Response: Money is not the sole hindrance, or even a significant factor, in the identification of the preferred alternatives. If money was truly the limiting factor the agencies would not have identified preferred alternatives costing nearly double the available reclamation bond. The main limiting factor for aesthetic reclamation work is the availability of relatively clean material that can be placed as backfill in the mine pits without creating water quality problems. The preferred alternatives were identified to optimize the amount of pit backfill with available relatively clean waste rock. Pit backfill under Alternatives Z3 and L3 is also sufficient in protecting water resources, but the landscape would be less natural.

99. **Comment:** The money that has been invested up till now has been to the public detriment, and I think that it's time that the government agencies who oversaw the destruction that happened in these mountains now advocate for money to be spent for true public interest at that site. (HA-2)

Response: As described in Draft and Final SEIS Section 2.6, by identifying Alternatives Z6 and L4 as preferred alternatives, the agencies have determined that an additional $22.5 million for earthwork and $11 million to support water treatment will be needed to implement these alternatives. Reclamation that meets all statutory and regulatory requirements can be accomplished, however, with available bond monies. "Public interest" is in the eye of the beholder. Some would say that reclaiming the site without additional taxpayer money is in the public interest, while others advocate spending additional monies to return the mountains to a more natural state. The agencies must weigh these considerations and strike a balance.

6.3 GEOLOGY and MINERALS

100. **Comment:** People don't want future mining in these mountains by anybody. If you fully reclaim those mountains, then that's going to be awful doggone hard to have any future mining. But if you just cover them part way, dig it out and away you go again. If the gold price goes up to $700, $800 an ounce, there's going to be pressure to start mining again. (LO-2)

Response: The ore deposit beneath the Landusky pits is virtually mined out at current gold prices. At the Zortman Mine approximately 80 million tons of ore, reportedly containing a million ounces of gold, would have been mined under the mine expansion plans approved in 1996. These plans were dropped in 1998 due to low gold prices. Reclamation decisions cannot be based on conducting reclamation in such a way as to either enhance or preclude future mining. Instead the decisions have to be made based on what's necessary to meet the various state and federal reclamation performance requirements. Assuming "full reclamation" refers to complete pit backfilling, that action may actually facilitate mining by exposing ore deposits currently buried under leach pads and waste piles adjacent to the pits. Other processes, such as withdrawal of the lands from operation of the Mining Law, are used to close areas to future mining.

101. **Comment:** To compare mining impacts to natural conditions, a comparative analysis with a similar mountain range; Judith Mountains, Sweet Grass Hills, which have similar metamorphic and are hydrologically connected can be used as reference or comparison. New Classification System, pg. 3-56. (30)

Response: In June 1997, a report on analog ranges was completed for the draft MPDES permit (Gallagher, 1997). The Judith Mountains, North and South Mocassin Mountains, and the Sweet Grass Hills were identified as potential analogs to the Little Rocky Mountains. However, only Collar Gulch, located in the Judith Mountains, was found to have both similar mineralization (albeit on a smaller scale) to the Zortman and Landusky Mines, and adequate water chemistry data.

Collar Gulch was reported to contain outcrops of pyrite-bearing material. It is anticipated that the upgradient waters in Collar Gulch would be comparable to the Type 1 (headwaters) and Type 2M (mineralized) categories in the classification system for the Little Rocky Mountains. A review of four mainstem Collar Gulch stations (11, 12, 24, and 25) and four tributaries (7W, 8E, 9E, and 10W) showed that many of the parameters for Type 1 and Type 2M waters do fall within the ranges determined for the Little Rocky Mountains. Notable exceptions include pH, copper, sulfate and iron. The pH values for the headwaters stations are in the 4 to 5 s.u. range, lower than the 6 to 8 s.u. range for Type 1 waters. With the exception of one station (9E with pH 5.52 s.u.), samples from the other tributary stations fall within the Type 1 range. Copper concentrations in samples from the mainstem samples were also higher than the Type 1 (<0.05 mg/l), but tributaries fell within the Type 1 range. Sulfate values were below 100 mg/l at all stations, but generally did not conform with the limits determined for the Little Rockies. Iron values ranged from less than detection to 8.33 mg/l, with both mainstem and tributary stations showing non-detect to elevated values. The

lower values (<0.5 mg/l) conform to the Type 1 classification and the higher values conform to the Type 2M classification.

Should Collar Gulch data be included in the classification, the effect would be to lower the background pH range and increase copper values. Collar Gulch headwaters also contained elevated lead and zinc. While an analogous range with respect to mineralization types, Collar Gulch headwaters appear to be more mineralized than headwaters in the Little Rocky Mountains.

102. **Comment:** I heard that it is illegal to allow mining at sites where acid-generating rock is present. Acid-generating rock is exposed at many sites throughout the Zortman/Landusky reclamation area. Could you please send information regarding the mining laws concerning acid-generating rock. (40)

Response: There is no prohibition on mining material with acid generating character. A lot of, if not the majority of, metal mines are excavated in rock with at least some acid generating potential. Mining in such areas requires particular operating procedures, reclamation plans and treatment methods. This technology is readily available and in use at a variety of mine sites around the country to mitigate impacts from mining in these types of materials. These mines must also be operated in a manner that does not violate water quality laws. Occasionally, compliance with water quality requirements would be so difficult or expensive that some mines proposed in acid generating rock may not get permitted. The Montana Metal Mine Reclamation Act and the new BLM Surface Management Regulations list some of the requirements that must be followed to permit mining in areas with acid generating rock types. Copies of these regulations have been forwarded to the commenter.

103. **Comment:** Section 3.3.2, Existing Conditions. At the initiation of open pit mining at the Zortman and Landusky Mines in 1979, it was determined that ARD would not be a significant issue (DSL 1979b, pp. 75-76). This should be a sign to both DEQ and BLM that any future mining in the Little Rocky Mountains should be denied due to the amount of ARD material that has been identified at both mine sites. We the people of Fort Belknap Indian Reservation have to live with the consequences of decisions that were made without any consultation of the possible environmental impact to our natural resources. (44)

Response: There is currently no application for a mining permit in the Little Rockies. The area around the mines has been closed to the location of mining claims until 2005. Should an application be received it would be closely evaluated to determine if the mining and reclamation plans are adequate to ensure that water pollution resulting from ARD will not occur and that reclamation will be successful. If the such plans do not meet these requirements, they would not be approved.

6.4 GEOCHEMISTRY

104. **Comment:** Why is Alternative L4 the preferred alternative, as opposed to Alternative L5? Alternative L4 leaves quite a large amount of acid generating rock exposed. (HA-1)

Response: Alternative L4 does not leave a large amount of acid generating rock exposed. All of the exposed sulfides in the Suprise pit would be covered. Approximately 90 to 95% of the sulfides in the August-Little Ben pit are covered. Approximately 85 to 90% of the sulfides in the Queen Rose pit are covered and approximately 80 to 85% of the Gold Bug pit sulfides are covered. Overall 15% or less of the sulfide-rich highwalls would remain exposed upon reclamation under Alternative L4 with most of it located south of the groundwater drainage divide between Swift Gulch and Montana Gulch. The highwalls are near vertical and would not pond or accumulate water. The amount of acid generated from sulfidic material is dependent on the surface area that is exposed to water and oxygen. This is why one can see weathering and alteration along fractures in rock much more prevalently than in the bulk of the rock itself. The surface area, and therefore the amount of acid potentially generated, from material in a pit wall compared to material in broken rock (such as on the leach pads or in the waste dumps) is much less. The amount of acid that could be generated from the acid generating backfill that would be required in Alternative L5 would be much greater than the amount of acid that could be generated from the remaining exposed sulfides in the pit walls in Alternative L4. That is why Alternative L4 is preferred over Alternative L5.

105. **Comment:** If there is a concern about acid leaching into the groundwater or surface water from this point, if the argument is used on the other side of the mine that this plastic barrier is going to stop it, then it should over here as well. (HA-1)

Response: There is a concern on both the Zortman and Landusky Mine sites about acid leaching into the groundwater. That is why the Suprise and Queen Rose pits are being lined as part of interim reclamation at the Landusky Mine. The water that drains from the August-Little Ben pit ends up coming out artesian well WS-3. This water is almost neutral and is fairly good water. Based on the scientific observations from this well, it does not appear that lining the August-Little Ben pit is required. The Landusky Gold Bug pit already has a clay liner underneath the backfill. A liner for the Queen Rose pit floor has been added as part of Alternative L4. Unfortunately, even with liners present there is the potential for seepage or leakage through the material with time and eventual groundwater contamination. Therefore, it can not be concluded that use of liners in the pit floor would totally prevent acidification of groundwater.

106. **Comment:** Draft SEIS, Page 2-69. Within Alternative L4 mention is made of drilling a directional drill hole into Montana Gulch as a backup drainage measure. If this measure is selected would additional sulfides be intercepted which could create future problems? (6)

Response: The directional drill hole into Montana Gulch would intercept sulfide bearing syenite porphyry. The surface area of exposed rock in this drill hole is quite small (much less than the alternative that would construct the drainage notch) and since it would lie below the water table, oxygen (air) would not facilitate the oxidation of pyrite as it would in a pit or rock cut. The drillhole would be cased with polyethylene pipe and cemented around the collar. Any sulfides encountered during drilling would be kept isolated from the borehole and would not create additional water quality problems.

107. **Comment:** While it is correctly stated in the Draft SEIS that moving potentially acid generating material from the leach pads or waste dumps to accomplish the additional fill required by Alternative L5 could lead to degradation of groundwater quality, it should also be noted this conclusion was reached on the basis of professional judgment, not by quantitative analysis. (See the discussion on pp. 4-23, 4-25, 4-40, 4-41.) The relocation of this potentially acid generating material must be balanced by:
(1) the potential for exposed surfaces of potentially acid generating material in the pit walls that would be exposed under L4, but covered under L5, to have the same contaminating effect as that surmised for the waste that would be relocated from the pads to the pits under Alternative L5; and,
(2) the effectiveness of the lines/pumpback system that would be installed under Alternative L5 to mitigate the contaminants to groundwater. (10, 38)

Response: More than professional judgement was used in determining that there would be additional impacts from backfilling the Landusky Mine pits. Quantitative analyses of the amount of acidity and soluble metals generated in the different facilities at the Landusky Mine (including the pit walls and the leach pads) is provided in the report *'Landusky Mine Water Balance and Chemical Mass Loading'* (Spectrum Engineering, HydroSolutions, Robertson GeoConsultants, 2000b). Additional quantitative analysis results are reported in the SEIS Tables 2.8-1 and 2.8-2; and in Tables 4.3-1 through 4.3-4. These were the basis for the MAA evaluations. The small amount of exposed sulfide-rich highwall that would remain under Alternative L4 (estimated at less than 15% the present area) is solid rock where there is less infiltration than broken rock, little potential for water accumulation, and relatively small surface area of reactive sulfides exposed to oxygen and water when compared to the backfill material that would be used under Alternative L5. The Alternative L5 backfill is loose, broken rock laid in at an angle where infiltration would take place and sulfide exposure, and therefore acid generation, would be greater. The angle is too steep to place a PVC or HDPE liner. The backfill slope would be more difficult to revegetate than a flatter slope, meaning additional infiltration through the sulfidic material until some vegetation takes hold. The capture wells proposed under Alternative L5 would help reduce impacts, but there is no guarantee that they would capture all, or even a significant portion of, the contaminated water. The surface area of sulfidic rock exposed to leaching water is very much greater considering the source and amount of backfill proposed in Alternative L5, compared to Alternative L4 which does not use acid-generating rock as backfill. Consequently, there would be much more ARD generation under Alternative L5 that would be off-liner and have a direct path to the groundwater system beneath the pit backfill. While pumpback systems at the Zortman and Landusky Mines have been

shown (SEIS, 3.3.4) to be very effective in controlling off-site migration of groundwater contaminants, these systems have been strategically located to take advantage of the topography and geologic conditions favoring efficient groundwater capture. The feasibility of designing, installing and operating highly efficient capture systems within the shear zone on both ends of the Landusky Mine pit complex is less certain. This, in combination with the precept that it is better to prevent contaminants from entering the groundwater system in the first place, has led to the conclusion that Alternative L4 is much more protective of groundwater quality than Alternative L5.

108. **Comment:** The severity of acid mine drainage at Zortman/Landusky precludes reclamation of the land to an ecologically functioning ecosystem and the scarcity of non-acid generating rock is preventing the reclamation of the Little Rocky Mountains to its traditional cultural landscape. Every effort should be made to return the area to full ecologic function and to its original proximate landform. (16, 21)

Response: The agencies believe the preferred alternatives address this concern. The Metal Mine Reclamation Act recognizes that it is not always feasible to restore an area to its original proximate landform as stated in MCA 82-3-301: *It is not practical to extract minerals or explore for minerals required by our society without disturbing the surface or subsurface of the earth and without producing waste materials, and the very character of many types of mining operations precludes complete restoration of the land to its original condition.*

109. **Comment:** Draft SEIS, Page 2-62/65: About 100 vertical feet of highwall will remain in the North Alabama Pit. Is this wall acid-generating? Similarly, about 200 feet of highwall will be left in the Ross Pit. Is this wall acid-generating? (27)

Response: In Alternative Z6, some portions of various pit highwalls are left exposed. The entire North Alabama pit is in oxides and its highwall would not be acid generating. There are some small zones in the upper highwall of the Ross pit which might be acid generating. The heavy concentrations of sulfide-bearing rocks are in the bottom of the Ross pit and lower pit benches. All of these sulfides would be buried as part of the backfilling operation. The floor of the Ross pit has already been limed and all surface water runoff is currently directed to a ditch draining to the south through the OK/Ruby pit complex area.

110. **Comment:** Throughout the Draft SEIS various predictions for the time it will take acid rock to "mature" at the sites are given. Page 3-105 states that the acid generation process could last from 10 to 100 years. Page 3-106 states that 150 years will be required for water treatment due to ARD. Page 4-60 states that it could take tens to hundreds of years for the full cycle of oxidation to run its course. The SEIS says, however, that "this reasonably foreseeable adverse impact would be mitigated by provisions for long-term water treatment." (Page 4-60). This assumes of course that the water at the site can be treated in perpetuity. On page 4-59, the SEIS states that the various liners used in the reclamation to limit water from infiltrating ARD generating materials, will degrade after 30 years and cease functioning after 100 years. On page 4-141 the draft SEIS states

that long-term water treatment will last only until 2080. Fort Belknap has been told by the agencies throughout this process that water treatment would be needed forever. The draft SEIS thus presents reclamation plans in which the liners preventing water infiltration through acid generating materials will be decaying at the precise time that the acid in those materials is reaching its most acidic state, AND at the same time that money will run out for long-term water treatment. This concern needs to be addressed in the draft SEIS. (27, 44)

Response: It is only recently that the study of ARD has recognized the problem it poses for mining. Our understanding of the processes, ability to predict the impacts and development of control measures associated with minimizing impacts due to ARD is still evolving. Therefore, the evolution and, in particular, the future predictions of ARD are still not easily quantified. What you see reflected in the text is the uncertainty inherent in such predictions. However, it is expected that the ARD at the Zortman and Landusky Mines could take 10's to 100's of years to mature (i.e. until all the sulfides that have been exposed are oxidized). This means the need for capture and treatment could start to decline after that time (Draft SEIS, Figures 4.3-1 and 4.3-2). Page 3-106 of the Draft SEIS provided a qualitative discussion of what length of time water treatment would likely be required if reclamation measures existed that could completely stop any future sulfide oxidation. The best estimate is that, due to the past sulfide oxidation and the production of 'stored oxidation products,' it would take approximately 150 years, using the current water capture and treatment system, to treat all the stored acidity. However, the reclamation measures proposed will act to minimize the future sulfide oxidation and water infiltration through the mined material, in effect minimizing future sulfide oxidation and leaching of stored oxidation products to the extent possible. Nevertheless, it is anticipated that water treatment will be required over the long term and, because the time scale is impossible to quantify, it is conservatively assumed to be necessary in perpetuity.

Page 4-59 of the Draft SEIS states that the synthetic liners under Alternatives Z2-Z6 and L2-L6 have a life expectancy of 100 years and will slowly decompose after this point in time, however, the overlying natural material will behave as a water balance cover and become the fundamental cover at such time as the underlying liner become ineffective. The actual liner life is an unknown. None of the liner manufacturers have ever seen any long-term studies of the actual life of liners. The only study is a Bureau of Reclamation review of ditch liners where they evaluated 10 mil PVC ditch liner life. They found that these were intact after 30+ years. This exposed, heavy water flow application is not the same as the mine application. The current manufacturer warranty of a 30 mil PVC is 20 years and 10 years for a HDPE liner, primarily due to increasing liability issues. The installers polled all believe that under the proposed, unstressed, application and proper installation that both the PVC and HDPE should last 100 years. The GCL is only used in Alternatives L1 and Z1 and as part of interim reclamation in the Suprise and Queen Rose pits at the Landusky Mine. The mechanics of deterioration for PVC are that the plasticizers migrate out. The HDPE liner material eventually crystalizes. The GCL clay liners are subject to expansion and shrinkage of the clay within the liner.

Water at the site is currently anticipated to be treated into perpetuity. The liners were never meant to prevent 100% of the water from reaching the acid generating material. The reclamation cover works to reduce the amount of water which can infiltrate. The interim reclamation on the lower Zortman and lower Landusky leach pads has already reduced the infiltration significantly. The reclamation cover consisted of 6 inches of tailings and 18 inches of soil. This cover retained the first 3 inches of rain that fell in June 2001 in the soil profile, preventing it from infiltrating into the leach pads. The addition of vegetation now growing on these lower pads will further restrict infiltration of precipitation into the leach pads. This same water holding reclamation cover would be installed over the pit areas.

Provisions for water treatment in perpetuity, or forever, are part of the long-term plan under all alternatives. The text of Draft SEIS page 4-141 was not intended to be interpreted to mean that, "long-term water treatment will last only until 2080." Long-term water treatment will be conducted as long as necessary. What the discussion was trying to convey is that due to the inherent uncertainty in calculating the present value of money 80 years into the future, calculations beyond 2080 are not meaningful and have not been used. The text in the Final SEIS, Section 4.12 has been revised to better explain factors affecting long-term trust fund estimates.

6.5 WATER RESOURCES

111. **Comment:** What is the exact capacity of the capture systems? Depending on the drainage that's above it, it seems that these things might go beyond their capacity at certain times. Will it contain a hundred year flood which appears to happen about every three years?. It's a concern that if these things do run over quite often, according to the draft supplemental EIS, then it seems like it's after that you go in and try to correct it. But then you're going to be over your limits every three years. I'm just trying to get a feel for what kind of flood they will stop and what is going to go splashing on. All of the reclamation alternatives are dependent upon a steady supply of power to run the capture and treat systems. The draft SEIS states that some of these capture systems can overtop within hours during a storm event in which the power supply is interrupted. This suggests that the capacity of the capture systems needs to be greatly increased, in order to ensure the containment of contaminants. Are there back-up capture ponds in the event of overtopping or other plans to increase capacity of the capture systems? (HA-1, 27)

Response: There are no back-up capture ponds and there are presently no plans to increase the capture system capacities. There is no room in the drainages for "back-up" capture ponds. The capture system in the Mill Gulch drainage has the highest risk of overtopping. In June 2001, Mill Gulch overtopped for three days. Overflow was sampled each day and there were no water quality (standard) exceedances. This shows that high flow runoff events have better water quality than the captured seepage water. Each capture system will hold varying amounts of water. There are three capture systems for the Zortman Mine (Ruby, Alder Spur, and Carter Gulch). There are five capture systems on the Landusky Mine (Sullivan Gulch, Mill Gulch, Frog Pond, Upper Montana Gulch, and Lower Montana Gulch). The capture systems were designed to handle the 100-year, 24-hour storm event of 6.33-inches. The hundred year event has occurred and only two of the capture systems have overtopped. These are the Landusky Mill Gulch capture system which has overtopped six times since construction, and the Zortman Carter Gulch capture system which has overtopped twice. The Mill Gulch overflow events happened on 6/5, 6/6 and 6/14 of 2001 due to 5.9 inches of rain in June; 5/15/2000 due to 1.6 inches of rain in May; 5/14/1999 due to 1.9 inches of rainfall from 5/8-13/1999; and 6/27/1998 due to 7.5 inches of rainfall in June. The Carter Gulch overflow happened on 6/5/2001 when the level indicator malfunctioned. The third pump was manually started and the overflow stopped. The second overtopping happened on 6/30/1998 due to 8.2 inches of rain in June. Water quality samples were collected during each overflow except the Carter Gulch overflow on 6/5/2001 which stopped immediately. No water quality standards were ever exceeded. Under all alternatives, improvements will be made to the vegetative cover of the Mill Gulch waste rock dump that will limit storm water runoff. Water quality monitoring of the capture systems and in ponds, wells and stream stations downgradient of the capture systems is ongoing and will continue. If monitoring results indicate exceedances of water quality standards, improvements will be made to the capture systems to bring the discharges into compliance with applicable standards. The upgrade cost for Mill Gulch is estimated at $100,000 to bring more power into the capture system, add a 100 horsepower pump, and run additional piping to handle an additional 500-600

gpm. The upgrade cost for Carter Gulch is estimated at $80,000 to add a transformer at the top of the Alder Gulch waste rock dump and new electrical line into the capture system. Line losses now prevent all of the available pumps from running simultaneously.

112. **Comment:** I went up to the bottom of the hill, right opposite King Springs, just above it a little ways. I was looking at this creek where they done the reclamation on that creek, or where they supposedly cleaned it. One of the ponds up there, right in the middle of where they done the work, is full of real murky water. The creek above and below it is clean. Just one pool is filling up with that murky water. I'd like to see somebody come out and test that to see what it is, because that's the same kind of water that came down when they had spills. (HA-4)

Response: The comment was forwarded to the Fort Belknap Environmental Protection Office which examined the area in June 2001. They reported back that the runoff was coming from erosion of a steep segment of road on the flank of Mission Peak, unrelated to any of the mining activity.

113. **Comment:** A few years ago (1993) we had a flood up here in Mission Canyon. The water coming down was kind of red, and it was soapy and bubbly. We made our way up toward the mines on the reservation side and found the same kind of water over on the mine side coming down from the flood, from above the beaver dams and down into the canyon area. Was it caused from cyanide? (HA-5)

Response: In 1993 the stormwater settling pond near the head of King Creek discharged runoff over its spillway as the result of an extreme precipitation event. Monitoring in this drainage has not shown there to be elevated levels of cyanide. Detections of cyanide would be unlikely as the mine facilities that used cyanide are located in drainages that, if there was a liner failure, would flow to the south, away from King Creek. The foam that was observed may have been from nitrates or phosphates associated with fertilizers used in reclamation.

114. **Comment:** I'd like to see more contingencies made for the suppositions in here, for water quality in particular, but long-term reclamation in general are inaccurate. What if our plans for water treatment fail over the long term? (HA-2)

Response: The water treatment conducted to date has been successful and the amount of water requiring treatment should only decrease with performance of surface reclamation. Estimates of the reclamation and water treatment costs have be made with conservative assumptions, and plans include provisions for holding a portion of the bond in reserve to deal with unanticipated requirements (see Tables 4.12-1 and 4.12-2, process water management and reclamation cover repair categories).

115. **Comment:** I don't think the document adequately explains why full reclamation is going to be a more serious problem for water treatment, water pollution, than partial reclamation. I'm not sure

I see in this document enough information to make Mineral Policy Center feel rest assured that by not filling the pits we're protecting water quality. I'm also not convinced that even if that were the case, that the information in this document shows us what happens if this plan for protecting water quality fails. (LO-2, LO-7)

Response: Draft SEIS section 3.3.4 discusses the chemical mass loading from the various mine facilities. As shown in Figure 3.3-14, the amount of sulfate that would report to groundwater from the material on the L87 and L91 leach pads is over 1.5 million pound of sulfate per year if this material were not on liner. If this material was moved off the leach pad liners and used as pit backfill the contaminant load would report to groundwater beneath the Landusky pits and enter the northern drainages. That is why complete pit backfill, or "full reclamation", would create a more serious water treatment-water pollution problem than "partial reclamation."

116. **Comment:** Do you test for mercury? Did they use mercury in the mining, in the old? Could that leach through the groundwater system? (LA-6)

Response: Mercury was first tested from 1987 through 1990 as part of monitoring the Alder Gulch land application at the Zortman Mine. In 1991, mercury was added as part of the regular sampling program for all sites. This practice was continued until October 19, 1999 when the technical working group concluded that this was an unnecessary expenditure since mercury has not been detected at levels of concern. Mercury was never used in the mining or milling process in the early days of mining nor during the ZMI mining era. There have been a total of 2,136 samples tested for mercury over 20+ years. Of these samples, the breakdown is 1,011 surface water samples with 6 mercury samples above non-detect, 864 groundwater samples with 5 samples above non-detection, 3 capture effectiveness well samples with all non-detect, 7 capture overflow samples with all non-detect, 45 Landusky water treatment plant discharge samples with all non-detect, 14 Zortman water treatment plant samples with all non-detect, 120 humidity cell samples with all non-detect, 43 unclassified samples with all non-detect, and 29 leach pad samples with 10 above detection. Of the 21 samples above the detection limit, 7 are 0.0020 Mg/L or less (treated water effluent discharge limits defined in the Consent Decree), 8 are between 0.0020 and 0.0050 Mg/L, and 6 fall between 0.0060 and 0.0112 Mg/L. These 21 above detection samples appear to be naturally occurring mercury at extremely low levels.

117. **Comment:** Is anybody testing that water now with all this runoff? Who gets those test results? The people on the reservation deserve to know these things. Is there more contamination? Are you curbing the contamination? We don't know anything. (LO-1)

Response: Water quality continues to be tested on a daily, monthly, quarterly and yearly basis, depending upon the monitoring station. All water quality monitoring data are sent monthly to Island Mountain Protectors and the Fort Belknap Environmental Protection Office, as agreed to in the Consent Decree.

118. **Comment:** Water quality of the aquifers and watersheds surrounding the Zortman and Landusky mines is of utmost importance. The community has been told by officials during the mine tours that water samples were analyzed by laboratories owned by Pegasus and now samples for Spectrum are analyzed by Montana Tunnel Labs, a subsidiary of Apollo Mining. This appears to enter a bias into the results. Water samples require a certain level of quality control and quality assurance to be considered valid. The community needs to review the water sample results along with the field and laboratory quality control and the overall quality assurance. The community needs to see their Quality Assurance Project Plan, their Field Sampling Plan, Standard Operating Procedures, data validation results, and quality assurance audits before these results can be trusted. This is the only way the samples will have any validity and the only way the community can trust the results. Please provide the QC/QA data for both the Spectrum and DEQ samples. If external audits of these data have been done, please provide the results of the audits as well. (8, 31)

Response: Field sampling at the site is currently conducted under the 1996 Sampling and Analysis Plan (SAP) for Water Quality Monitoring of Water Management Facilities and Practices at the Zortman and Landusky Mine Sites (Harvey, 1996) and the Interim Groundwater Monitoring Plan (ZMI, 1997). The SAPs, which were approved by the Tribe for the Consent Decree, outline proper field sample collection protocols, frequencies of QA/QC samples, and contain Standard Operating Procedures for equipment used by the site. The Montana Tunnels laboratory is state certified (their certification number is CERT0072). They are licensed to analyze Montana's Public Drinking Water Supplies (highest qualifications issued by the Montana Department of Public Health and Human Services Environmental Laboratory). Their Quality Control/Quality Assurance Plan is available for review from the DEQ in Helena, the BLM in Lewistown, and at Spectrum Engineering's offices in Billings and Zortman. Spectrum Engineering also has a Field Sampling Plan and Standard Operating Procedures which are written and are followed in sample collection. These plans are also available for review at the previously mentioned offices. Spectrum Engineering has Montana Tunnels run quality control reports on a monthly basis and all samples are handled with a chain of custody record. All quality control reports are included with the monthly mine drainage reports and the quarterly water monitoring reports submitted to the Montana DEQ in Helena, BLM in Lewistown, EPA in Denver, Dean Stiffarm at the Fort Belknap Indian Reservation, Dave Chambers in Bozeman for Island Mountain Protectors, and the ZMI bankruptcy trustee in Reno. These parties have copies of all of the data, including the quality control reports.

The Montana Tunnels laboratory is closing the end of November 2001. Future analysis will be done at a certified laboratory selected through competitive bid.

119. **Comment:** We have land right below where the sprinklers are on Goslin Flats. What is running into the creek and the springs under that? (LA-7)

Response: A discussion of past impacts to Goslin Gulch from the Goslin Flats LAD operation was included on Page 3-72 of the Draft SEIS. This section has been updated in the Final SEIS with the latest water quality data available. Water quality impacts from LAD operations to Goslin Gulch

and to Ruby Creek below Goslin Gulch have included elevated total dissolved solids, nitrate, selenium, and occasionally slightly elevated cyanide. Since expansion of the LAD in 2000, Goslin Gulch has been dry most of the time. It has flowed at times in late summer-fall of 2001, however, most of this water is lost to evaporation and infiltration before traveling very far. In recognition of the potential for contaminants reaching Goslin Gulch, a biological treatment plant now under construction at the Landusky Mine is scheduled to become operational in spring 2002. It is designed to remove nitrate, selenium and cyanide from the leach pad waters potentially destined for the LAD. Consequently, beginning next year, water application to the LAD will likely contain only relatively small concentrations of these substances.

120. **Comment:** Provide sample data from King and Lodgepole Creeks as well as groundwater wells on the reservation and between the reservation and the mine sites. (6)

Response: Surface and Ground water monitoring results are available in the annual monitoring reports. This information is also presented in the hydrology support document (HSI and Gallagher 2001). These documents are available from the Fort Belknap Environmental Protection Office. Basically, monitoring shows that there are no water quality impacts from the mining activity extending downstream onto the Fort Belknap Indian Reservation.

121. **Comment:** List uses of King and Lodgepole Creeks downstream of the mines. (6)

Response: The uses of King and Lodgepole Creek, as defined by the Water Quality Act, are stated on page 6 in the draft MPDES permits Statement of Basis, located in Appendix C of the SEIS. King and Lodgepole Creeks are classified as "B-1" which means they are suitable for drinking, culinary, and food-processing purposes, after conventional treatment; bathing, swimming, and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl, and furbearers; and agricultural and industrial water supply [ARM 17.30.623(1)].

122. **Comment:** Page 2-11. (Water Treatment) Define “passive, semi-passive and semi-active” water treatment systems. (6)

Response: These terms reflect the increasing degrees of involvement by an operator to maintain the treatment systems. There are no set timeframes that distinguish one from the other. A truly passive system would require no attention after its construction. Such a system would have a short-term functional life. A semi-passive system is one that requires only periodical maintenance such as monthly or yearly. A semi-active water treatment system is one where more frequent attention by the operator is required to insure its function, such as daily or weekly.

123. **Comment:** Page 2-11. (Seepage Capture Systems) What treatment the captured seepage is subjected to could be included in this section. (6)

Response: Other sections of the Draft SEIS also discuss how the treatment systems function. For the Zortman Mine this is explained on page 2-23. For the Landusky Mine this is explained on pages 2-71 and 2-72. Additional explanation of how captured effluent is treated has been provided in the Final SEIS, Section 2.4.2 for the Zortman Mine and Section 2.4.3 for the Landusky Mine.

124. **Comment:** Draft SEIS Page 2-11. (Surface Water Runoff Control) It should be explained that the dispersion points or detention basins will be adequately sized to accommodate 100-year storm events. Detention basins must meet Montana DEQ requirements for pre and post-development flows to prevent downstream erosion. (6)

Response: All dispersion points and detention basins will be adequately sized to accommodate runoff. DEQ has no requirements for a detention basin to be sized to accommodate the 100-year storm event. DEQ does require that permanent detention ponds be designed by a professional engineer licensed in the State of Montana. In addition, DEQ recommends that while conducting land disturbance activities, one should limit the peak rate of runoff for the 2-year, 24-hour storm to 50 percent of the peak discharge release rate, in order to control off-site erosion (Sediment & Erosion Control Manual, 1993).

125. **Comment:** Page 3-41. (Groundwater Divides) Any data on the "seasonal shifts" and how they have affected the quality of the groundwater? (6)

Response: Groundwater potentiometric maps for each mine were prepared from three sets of synoptic measurements in October-November 1999, May 2000, and October-November 2000. Some small differences in the location of contour lines is evident. The resolution of the groundwater level data is not sufficient to see a "shift" in the groundwater divide. The hydrologic evaluation in the Draft SEIS on pages 3-41 to 3-43 has defined groundwater "divide zones," which are shown on Figures 3.3-8 through 3.3-11 in the Draft SEIS. These are the regions within the shear zone at each mine within which the groundwater divide may shift or water in different fractures within the same zone may flow in different directions due to seasonal effects as well as other hydrologic events. At the Zortman Mine, two wells near the groundwater divide zone, ZL-201 and ZL-202, indicate fluctuations in water quality that are probably related to groundwater recharge events. Recharge events generally lead to increased loads of sulfate and dissolved solids, along with decreases in alkalinity and pH. There is not a direct correlation with seasons, but there is a tendency for recharge to occur in the late spring-early summer months. Wells in the vicinity of the Landusky Mine divide (ZL-131, ZL-314 and ZL-315) do not indicate any seasonal trends, but do indicate a general upward trend in sulfate, TDS, and metals, and downward trends in alkalinity and pH. (Please refer to water quality discussions by drainage in Chapter 3 of SEIS).

126. **Comment:** Draft SEIS Page 3-58. Table 3.3.1, We want to suggest that the "or" be deleted in The Water Sample Classification Rule Type 5 under Nitrates where it contains ">1.0 or." (6)

Response: The "or" presented in the table is correct. Classification #5 consists of water that has had detectable concentrations of nitrate or copper or arsenic or cyanide. Often, waters under this classification have only one of the constituents. The table in the Final SEIS has been revised to make it more understandable.

127. **Comment:** Draft SEIS, Page 3-93. 1st paragraph. How often is L-39 monitored? Provide historical data. (6)

Response: Surface sampling site L-39 in the bottom of King Creek on the Reservation boundary is sampled nine times per year (monthly except for December, January, and February due to winter access). Historical data is presented in the 1996 Final EIS and in the Hydrologic Support Document (HSI and Gallagher, 2001). All data and the dates of sampling are contained in a comprehensive database which is available from the Fort Belknap Environmental Protection Office and has been provided to the Bureau of Indian Affairs.

128. **Comment:** Draft SEIS, Page 3-98. (Surface Water Use) Section did not address the uses for surface water. (6)

Response: The uses of all drainages, as defined by the Water Quality Act, are stated in the draft MPDES permits Statement of Basis. This information has been added to the text on Surface Water Use in the Final SEIS.

129. **Comment:** Draft SEIS, Page 3-98. (Surface Water Use) The section notes the loss of water to the reservation headwaters as the existing condition. Elsewhere in the document drainage "ditches" are proposed for the purpose of moving water from one location to another if quality considerations warrant. In Chapter 4 it would be beneficial to describe what quantities would be likely, if post reclamation waters are found to be of good enough quality, in reestablishing flow in King Creek and other reservation-bound headwaters. (6)

Response: Stormwater runoff from some sections of the reclaimed pit areas "could" be routed to the north if its quality could be assured. The amount of stormwater would be minimal in comparison to the recharge received throughout the drainage basin where the mine pits are located. Therefore, at this point in time, none of the preferred alternatives propose to route stormwater this direction. It is mentioned in the text as a future option that would require additional evaluation in order to determine the quantity and quality of runoff and whether it would meet discharge limits.

130. **Comment:** Draft SEIS, Section 3.3 - Water Resources and Geochemistry, Mine Site Hydrology - Landusky Mine. Most of the seepage collection systems at the Landusky Mine appear to be functioning as designed, i.e. capturing approximately 95% of the subsurface drainage from the mine facilities. However, unlike other capture systems, the Sullivan Gulch capture system is allowing 38.2% of the subsurface drainage to escape. (See page 3-24.) Since the drainage from Sullivan Gulch feeds into Rock Creek above the town of Landusky, and is one of the drainages for the

Landusky 87/91 leach pads, further analysis should be done to determine whether additional work as a part of the reclamation effort could intercept more of the subsurface drainage. Its location in relation to the town of Landusky makes the effectiveness of its capture system of the utmost importance. Yet, the system allows an alarming 38.2% of the subsurface drainage to escape. This is unacceptable. I recommend the Department incorporate the necessary measures to address the escape drainage at Sullivan Gulch into the Landusky Mine reclamation plan. (10, 22, 38)

Response: The Landusky Mine Water Balance, upon which this information is based, was prepared on a groundwater basin approach, and included the areas occupied by leach pads. The Sullivan Gulch, Gold Bug and Lower Montana Gulch groundwater basins included significant areas covered by leach pads. The Zortman Mine Water Balance was based on surface watersheds, and did not include leach pads. The 38.2% that is not caught by the Sullivan Gulch seepage capture systems includes precipitation that falls on the L91 leach pad plus stormwater that is intentionally routed around the capture system. This water is not supposed to be caught in the seepage capture system. Water that falls on the leach pad is captured by the liner in the leach pad and treated as process water. Surface runoff that has not infiltrated mine waste rock is routed around the capture system as it is of acceptable quality. The estimate of uncaptured seepage given by the chemical load method provided in Table 4.3-4 of the Draft SEIS was 0.35 gpm. The average rate of seepage capture by the Sullivan Gulch capture system from 9/19/97 through 12/31/99 was 12.54 gpm. This gives a 97.2% capture efficiency with regard to the seepage water the system is supposed to capture. The Final SEIS text has been modified to make this clearer.

131. **Comment:** According to the Draft SEIS (figure 3.3-13) approximately 700,000 pounds of metals and approximately 4 million pounds of sulfates are released each year. Thus 4%, or 28,000 pounds of metals, and 3%, or 120,000 pounds of sulfate are released into area groundwater, untreated, each year. (16, 21)

Response: The total load of sulfate and metals generated by the mine areas presented in Figure 3.3-13 includes the amounts produced by surface mining disturbances, historic underground mining, and the natural background load that would occur in the absence of mining. The assumptions and limitations of the Water Balance and Chemical Mass Load Studies for the mines are discussed in the Hydrology Support Document (HSI and Gallagher, 2001, pages 5-1 to 5-3). Although we cannot quantify the pre-mining natural background loads, we have general and specific indirect evidence that metals were probably present and mobilized in the pre-historic groundwater system of the shear zones of the mines. First, a common prospecting method for economic metal deposits has been sampling and analysis of groundwater quality samples. This indicates that elevated levels of certain trace elements normally are associated with unmined economic metal deposits. Secondly, there are abundant ancient ferricrete deposits (iron-cemented gravel) that are visible in and near the shear zones in Swift Gulch. These deposits demonstrate that groundwater was mobilizing and depositing metals for thousands of years. Based on this, it is believed that uncaptured sulfate and metal loads in the range of 3 to 4% are probably within the background levels for the mine area.

132. **Comment:** Draft SEIS, Page 2-23, Reclamation Common Among Zortman Mine Alternatives, Leach pad (Draindown) Water Land Application Treatment (All Alternatives). EPA has several questions to clarify the current and future use of the Goslin Flats land application disposal (LAD) area. What is the projected time period that the Zortman LAD will be used for water treatment? Will the new owners allow use of the Goslin Flats acreage for LAD purposes for an extended time period? Will this same acreage be sufficient to handle all the future loading that might be treated at this location including the final leach pad drain-down, necessary acidity reduction as well as metal and nitrate reduction? Currently, it is the understanding of EPA that from the Zortman side of the mountain (Landusky if necessary), all heap leach pad waters bearing cyanide currently are pumped to the Zortman pond on the 82 leach pad and are treated with hydrogen peroxide to oxidize cyanide before the effluent is pumped to the Zortman Goslin Flats LAD area.. These waters contain elevated levels of heavy metals, nitrates, cyanide and selenium. It has been advised that most of the water going to the Goslin Flats LAD comes from the L87/91 pads. (23)

Response: Goslin Flats may be needed for land application over the next 5 to 15 years, and any sale of the property would be subject to its continued use as a land application area. The current 364 acres should be sufficient to handle the future requirements. On September 3, 2000 there were 198.75 million gallons of solution stored in the leach pads. On October 14, 2001 there were only 80.51 million gallons in storage out of a total 408 million gallon capacity. Based on field observations, interim reclamation has already led to a reduction in recharge to the leach pads. All water being land applied is first taken through the Zortman 82 pond where hydrogen peroxide is added to oxidize the cyanide. Of the total remaining solution inventory, 65 million gallons are in the L87/91 leach pads. A biological treatment plant is being installed to treat the leach pad waters. This should be fully functional by next spring. The water quality of this treated discharge will not be known until June of 2002. Currently, only 5.4 million gallons of solution are in storage at the Zortman Mine. If the biological treatment plant is successful and the water can be either directly discharged or run through the water treatment plant and discharged, then very little water will be land applied in the future. The LAD area soils, vegetation, and groundwater will be continually monitored to track contaminant trends. The LAD management plan will be adjusted to minimize short- and long-term adverse impacts. The biotreatment facility will remove the nitrate and selenium as limiting factors to LAD use. The water treatment plants are capable of removing the metal loads prior to LAD application. However, the buildup of salinity and sodicity remain as limiting factors to long-term use of the Goslin Flats LAD area. As reclamation progresses, the total amount of water generated within former leach pads will be significantly reduced due to the placement of soil and revegetation. This reduction in infiltration would allow for lower application rates, extending the functional life of the LAD area.

133. **Comment:** Draft SEIS, Page 3-72, Figure 3.3-22 & Appendix C, Page 5. Where can information be found on the groundwater mixing zone for the LAD outfall? What are the conditions under which the groundwater classification may change? What is depicted by the shaded areas (Whitcomb Butte, Saddle Butte, Ball Field, Goslin and Ruby) in Figure 3.3-22? With the exception of monitoring well ZL-217, the monitor wells in the south end of Goslin Flats are in the shaded area

and are assumed to be the LAD area. Will DEQ be able to conclude if the mixing zone is effective (achieves applicable standards) based on the date from a single down gradient compliance well (ZL-217)? This well is located outside and approximately 300 feet to the south of this 410- acre LAD area and must treat 18% of the Zortman Mine annual metal load during a relatively short growing season (Figure 3.3-22) therefore relying upon a single well may prove to be a problem. There is a discrepancy in the reported number of monitoring wells within the LAD boundary since on page 3-72 and located on Figure 3.3-22 there are a total of 15 existing groundwater monitoring wells in the LAD area, while it is noted on page 2-13 that a total of 14 monitoring wells are in the Goslin Gulch area. (23)

Response: Information on the groundwater mixing zone for the LAD outfall can be found in Appendix C, MPDES Permits of the SEIS, the Statement of Basis for Permit No. MT-0024856 (Zortman Mine), Section E, Mixing Zone (page 7). The groundwater mixing zone for the Goslin Flats LAD area is defined as the groundwater contained in the alluvial aquifer beneath the exterior boundaries of the LAD area as shown in Figure 3.3-22 of the SEIS. There are no conditions known at this time under which the groundwater classification at the Goslin Flats LAD area may change. The shaded areas on Figure 3.3-22 depict the Goslin Flats LAD area under sprinkler application as of summer 2001. There were approximately 46 acres removed from the southwest corner of the LAD area due to adverse soil conditions. A revised Figure 3.3-22 has been prepared for the Final SEIS. The selection of groundwater monitoring compliance points for MPDES permit monitoring has been re-evaluated. The LAD expansion drilling and monitoring well program was performed in May 2000, and consisted of 5 new wells (ZL-213 through ZL-217). Subsequent monitoring in these and the other LAD wells demonstrated that the alluvial gravel aquifer at some locations is saturated year round, while at others it is always dry or only intermittently saturated. This is due to subtle undulations in the surface of the Thermopolis Shale bedrock underlying the gravel, where lower areas accumulate more groundwater while bedrock highs are drained. To better assure saturated conditions at the time of sampling, the groundwater compliance points are proposed as ZL-211 and ZL-212. Counting all monitoring wells, including paired wells and upgradient wells not in the current monitoring program, there are a total of 16 in the Goslin Flats LAD area. A surface water compliance point, called Z-22C, has also been added. This station is located approximately 800 feet below the confluence of Goslin Gulch with Ruby Creek, at the crossing with the ranch road (NW SE Section 31, T. 25 N. R. 25 E.). The Final SEIS has been edited accordingly. A map showing the location and dimensions of the ground water mixing zones for the Zortman LAD outfall will be added to the "Zortman/Landusky Project: Groundwater and Surface water Monitoring Plan." Additional information on the mixing zones can be found in Section C.3. of the MPDES Fact Sheets and Part I, B.2.of the Permits. The Fact Sheets have been revised to show that the ground water mixing zones extend downgradient to the compliance monitoring points for each ground water outfall.

134. **Comment:** Why wasn't the LAD final water treatment which was determined to be necessary for near Zortman also finalized as a design for Landusky site? (23)

Response: The Landusky LAD area preliminary design was halted when it became apparent that it would be quicker and more cost effective to continue using the Goslin Flats location near Zortman, while proceeding with development of the biological treatment circuit. The Goslin Flats LAD area had already been studied as part of the 1996 Final EIS; and already had all of the piping and infrastructure in place. Therefore, the Goslin Flats LAD was expanded to handle both the Landusky and Zortman leach pad waters. The 364 acres under land application at Goslin Flats is sufficient to handle all of the leach pad waters at both mines for the foreseeable future.

135. **Comment:** We have some questions regarding the Alternative L4 and the proposed removal and backfill of the L85/86 Leach Pad as described in the Preferred Alternative. As noted on Page 2-106, in the 4th paragraph, it is stated that following L85/86 Pad dumping to a depth average of 85 feet, August/Little Ben drainage would flow by infiltration through fill into the groundwater system controlled by the existing Montana Gulch artesian well. A 24-inch thick NAG-lime soil reclamation cover is designed to be placed over this fill. Since the L85/86 pad contains mineralization bearing selenium and arsenic, non-metallic elements that do not precipitate and therefore are not in the sludge product in the Landusky water treatment plant, then does the artesian well have water quality that would require water treatment for Se and As? If so, how will this water treatment be managed? (23)

Response: The geochemical characterization of Landusky Mine soils and rocks performed by Robertson GeoConsultants in support of reclamation studies included the collection and analysis of 16 samples from the L85/86 leach pad, both surface and drill hole samples. The samples were leached with distilled water acidified to pH 5.5 to simulate rainwater. None of the samples produced soluble selenium above the detection level. Ten of the 16 samples had detectable soluble arsenic, ranging from 0.3 to 1.0 mg/l. Monitoring of L85/86 leach pad sump water has yielded detectable levels of arsenic and selenium since 1998. Arsenic levels in the July 2000 and 2001 samples were 0.594 and 0.513 mg/l, respectively. Selenium levels in July of 2000 and 2001, respectively, were 0.081 and 0.110 mg/l. The pad water is alkaline with a pH of approximately 9. Selenium, although mobile in neutral pH conditions, cannot be mobilized until it is solubilized. The selenium is thought to be present as a sulfur replacement in the sulfides, therefore, it has to oxidize to become mobile. This may be happening in very localized areas of the L85/86 pad, but no evidence of this occurrence has been identified. It is expected that selenium will be less mobile in the more acidic environment of the August pit, which is slightly below neutral pH conditions. Mixing calculations indicate the placement of this material in the mine pit, covering with soil, and revegetating would result in selenium concentrations which, when mixed with groundwater that discharges from WS-3, would meet applicable standards.

Arsenic is present in concentrations above standards in the L85/86 leach pad sump water, and was soluble in approximately half of the leach extractions of rock samples at levels slightly above standards. Arsenic is present at about 0.1 mg/l in the discharge of WS-3, which has been and will continue to be routed to the Landusky water treatment plant. The effect of backfilling the August pit with L85/86 pad material on the resulting arsenic concentration in WS-3 cannot be established

due to the hydrologic and geochemical complexities inherent in the environment of the pit and groundwater system. The chemical state of the syenite aquifer reporting to WS-3 (pH 6 to 7, Eh -100 to +100 mv) indicates that arsenic could be present in either the arsenate (oxidized) or arsenite (reduced) form. The solubility and mobility of arsenic is dependent upon the form of arsenic along with the form and concentration of other chemical compounds such as iron and manganese hydroxides, sulfides, and colloids with which arsenic may be co-precipitated or adsorbed. WS-3 will continue to be routed to the Landusky water treatment plant after reclamation. Significant removal or arsenic is occurring with the existing lime-precipitation process. Since WS-3 has been sent to the Landusky water treatment plant, the arsenic concentration going into the plant is estimated to average 0.15 mg/l, while the discharge to Montana Gulch has typically ranged from 0.03 to 0.06 mg/l. If the applicable arsenic limit cannot be met with the existing treatment plant, additional treatment may be needed to bring arsenic into compliance; or reclassification of Montana Gulch may be done in order to consider the elevated arsenic baseline levels. A number of options exist for treatment or pre-treatment of arsenic. All or a portion of Gold Bug adit or WS-3 water could be routed through the bio-reactor treatment plant modified for arsenic removal. Bio-reactor discharge low in arsenic could be mixed with Landusky water treatment plant discharge prior to discharge to Montana Gulch. A ferric sulfate treatment process could be added to the Landusky water treatment plant, similar to that at the Zortman water treatment plant. Furthermore, reclamation will lead to a decline in total water volume reporting to the Landusky water treatment plant, which could lead to changes in arsenic loads in mine drainage water and overall better arsenic removal efficiency.

136. **Comment:** Based only on the March 2000 L85/86 leach pad sampling results for arsenic and selenium, there would not appear to be a problem with using the L85/86 leach pad material as proposed to backfill a portion of the Little Ben pit. However, we don't understand how the analytical results for arsenic and selenium could have dropped in value by an order-of-magnitude between the sampling events of 1997-1998 and year 2000 as reported. Our concern is that the Landusky WTP is not designed to treat for arsenic and selenium removal. We suggest re-sampling and comparison of the data to determine if the reported low values for year 2000 are correct. In particular, according to data presented in the July 1, 2000 RFQ, the Landusky 85/86 leach pad in 1997-99 had arsenic values which ranged from 2.52 mg/l to 0.400 mg/l, average 1.244 mg/l; and selenium values which ranged from 0.345 mg/l to 0.078 mg/l, average 0.176 mg/l. However, the selenium value reported from the March 2000 sampling event was substantially lower than the 1997-99 data at only 0.028 mg/l. (23)

Response: Additional sampling of the L85/86 sump was conducted during 2000 and 2001. Report selenium and arsenic values by date are:

July 10, 2000:	Se- 0.081 mg/l, As- 0.594 mg/l
July 12, 2000:	Se- 0.110 mg/l, As- 0.513 mg/l
Sept 5, 2001:	Se- 0.114 mg/l, As- 0.286 mg/l.

Based on these data, selenium values appear fairly stable around 0.1 mg/l. Arsenic values fluctuate over a somewhat wider range, but less so than in other leach pads.

137. **Comment:** As proposed in Alternative L6; four wells are to be drilled along the northern edge of the Surprise Pit to monitor and intercept degraded water that surfaces as numerous iron-rich springs down gradient of Swift Gulch, north of the Surprise Pit. How is this degraded water in Swift Gulch to be managed and treated in Preferred Alternative L4? Shouldn't the previously considered four cut-off wells be included into Alternative L4 as a means to control this source since we do agree that the remote and unaccessible Swift Gulch does not present the option of intercepting this source in Swift Gulch. (23)

Response: The rationale for the interception wells in Alternatives L5 and L6 was that placement of the L87/91 leach pad spent ore as backfill would dramatically increase the risk of contaminant release to Swift Gulch. The analysis presented in the SEIS demonstrates that Alternative L4 poses the least risk of contamination to Swift Gulch and King Creek because only non-acid generating backfill would be placed in the pit, acid generating pit highwalls would be almost entirely covered, and infiltration through the Suprise and Queen Rose pit areas would be directed over a liner southward into the August pit where it is captured by WS-3. Based on these very specific measures, interception wells were not considered necessary to protect Swift Gulch. The seeps and spring in Swift Gulch will continue to be monitored. If no improvements in water chemistry are seen, then capture wells may need to be installed on the pit rim.

138. **Comment:** Draft SEIS, Page 2-66: Runoff from the Z85/86 leach pad will be directed towards an "undisturbed draw on the east edge of the site." What draw? Where will the runoff go? (27)

Response: See the map on Draft SEIS page 2-63. The runoff will enter Ruby Gulch below the capture pond. This serves to keep stormwater separate from mine drainage, preventing the seepage capture system capacity from being overloaded.

139. **Comment:** Draft SEIS, Page 3-24: States that Swift Gulch is threatened by ARD through numerous seeps. It is likely that contamination via these seeps will increase in the future, due to ARD maturity and the steady decay of water barrier covers, etc. Swift Gulch should therefore be protected with a capture and treat system which returns the water to the Gulch. This is particularly important because the Draft SEIS also states that groundwater flows towards Swift Gulch. (See page 3-42). Further, "water quality in Swift Gulch shows indications of increasing sulfate and TDS with a distinct upward trend since 1998. There are indications that the primary source of contaminants is seepage from the Suprise Pit." (Page 3-90, 4-52). (27, 30)

Response: As part of surface reclamation a liner will be placed over the floors of the Suprise and Queen Rose pits. The placement of these liners would decrease flows to Swift Gulch and improve water quality. Monitoring will continue to determine the effectiveness of these reclamation measures and whether additional actions, such as capture and treatment, would be necessary in

order to protect water quality. The topography of Swift Gulch does not lend itself to construction of a full-scale capture and treatment system as placed in other drainages.

140. **Comment:** Draft SEIS, Page 3-46: The "details and assumptions" of the Gallagher (2001) Groundwater Study should be summarized in the draft SEIS. Otherwise, it is impossible to judge the validity of the groundwater study results. The conclusions, for example, that "the majority of groundwater from the mine sites flows along shallow and intermediate flowpaths that discharge to capture systems" is very questionable, and needs verification by independent experts. (Page 3-105). (27)

Response: Ms.Gallagher was hired as an independent expert to provide the verification requested. Her conclusion that "the majority of groundwater from the mine sites flows along shallow and intermediate flowpaths that discharge to capture systems," was originally concluded by Water Management Consultants, Inc. Water Management based their results on a several year study of the area which included 19 new wells and 6 piezometers, hydraulic testing, long-term pump testing, synoptic stream surveys, water chemistry monitoring, and trench testing that was conducted in accordance with a study plan approved by all parties to the Consent Decree, including Fort Belknap. The interpretation that shallow and intermediate flowpaths are dominant has been accepted by technical staff members of the DEQ, BLM, and EPA. Additional studies conducted for the Draft SEIS, including the water balance and WS-3 aquifer test, provided additional data to confirm this conclusion. As noted in Gallagher (1999), a small proportion of precipitation recharges the groundwater system. In areas of pronounced local relief, such as mountains, local flow systems are dominant (Freeze and Cherry, 1979). Data from the Groundwater Study verifies this assumption as the majority of groundwater recharge discharges into the upper portions of the drainages. The mine disturbances enhance infiltration, but water from the pits preferentially flows downgradient along the shears (as shown by the WS-3 test). Flowpaths are also significantly influenced by the underground workings, which funnel flow to adit discharge points. Therefore, the amount of water infiltrating vertically to a "deep" flowpath is minimal compared to water discharged through shallow and intermediate flowpaths.

141. **Comment:** Further removal of tailings from upper King Creek; Fort Belknap Reservation boundary to Cumberland Dam would greatly improve aesthetics and chemical integrity to the King Creek Drainage. The Consent Decree also required a capture/treatment system to be implemented into King Creek. During past SEIS meetings comments were made on a Bio-Passive Treatment. Is this still pursued or an option? (30)

Response: No further tailings removal action is planned. EPA and the U.S. Army Corps of Engineers conducted a large-scale tailing removal project in King Creek during 2000, including removal of some tailings between the Cumberland Dam and the Reservation. The removal took place on five of the most heavily impacted sections of King Creek. The removal action included nine work areas typically measuring 500 feet in length along King Creek and ranged from 50-100 feet in width spread along five miles of the creek. The areas of major removal activity were King

Dam area, Active Beaver ponds, Upper Beaver pond, Twin Pines, Lower Beaver pond, Sundance area, and Swimming Hole. EPA determined that further tailings excavation as part of the removal action was not warranted. The Consent Decree allows for construction of a passive treatment system instead of the capture/treatment system. The August #2 waste rock dump is now being removed, which may eliminate the need for a treatment system.

142. **Comment:** The SEIS appears to have no plan for natural occurrences such as heavy rainfall or large or even medium sized wildfires in the area. In that both occurrences will change the runoff in the immediate area, these events must be considered and a plan must be in place prior to their occurrence. The cursory plan for storm water runoff appears to consist of nothing more than monitoring and dealing with the problem after it occurs. This will result in routinely exceeding the maximum limits established in the permit and it is unacceptable. (31)

Response: The plan for storm water control is to separate storm water draining from the roads, the reclaimed areas and the undisturbed areas from the seepage associated with waste rock dumps, leach pad dikes or pit areas. It is only this mine drainage that needs to be collected by the capture systems and treated at the treatment plants. Best management practices (BMPs) such as diverting runoff away from unvegetated areas or roads, using seeding and mulching, silt fencing, straw bales, and check dams to remove sediment are the mechanisms that would be used for storm water management. Monies withheld under each alternative for vegetation maintenance would be used to implement erosion control measure in the event vegetation in a reclaimed area burns.

143. **Comment:** It makes no sense when DEQ personnel say that the levels of cyanide are presently very low, but 70% peroxide is trucked in by the tank car load to neutralize it. What is the concentration of cyanide at the mine? What are the byproducts of these highly hazardous substances, cyanide and peroxide? How are you monitoring these byproducts? Where are the results of this monitoring? (31)

Response: Most of the cyanide originally present in the leach pads has degraded naturally over the past several years, releasing carbon dioxide and forming nitrates (that is one reason for the high nitrate levels in the pad waters). Total cyanide levels in the remaining process water are in fact very low, running at less than 1 milligram per liter (mg/l). Compare this to the approximately 400 mg/l cyanide concentration that was present during the active leaching operation. Weak Acid Dissociable (WAD) cyanide is currently at levels ranging from 0.03 to 0.454 mg/l. DEQ's Hard Rock Program has established guidelines for land application of cyanidated waters recommending that cyanide be reduced to 0.2 mg/l WAD cyanide, or less, prior to land application. Since process waters in some leach pads remain slightly above this level, a small amount of concentrated hydrogen peroxide is added to the process water prior to LAD to oxidize this remaining cyanide. Two possible reactions resulting from the mixing of these compounds are:

$$CN^- + H_2O_2 \rightarrow H_2O + CNO^- \quad \text{or} \quad CN^- + 5H_2O_2 \rightarrow 5H_2O + CO_2 + NO_3^-$$

The by-products of these reactions include water, carbon dioxide, nitrate, and cyanate. Cyanate is a relatively non-toxic compound, which has been tested for at the Zortman and Landusky Mines and found to be present in process waters at very low levels, if at all.

The concentration of peroxide shipped to the mine has nothing to do with the concentration of cyanide in the water to be treated, but rather is a function of the manufacturer's production process and optimal economics for transportation. Once the peroxide arrives at the mine it is added to the leach pad water at a rate appropriate to the volume and cyanide concentration of the water being treated. Treated water is pumped to the land application area where it is monitored during application and at downstream surface and groundwater monitoring stations. Monitoring results are in the quarterly monitoring reports available upon request.

144. **Comment:** Draft SEIS, Page 4-1, Assumptions. The cost involved for both monitoring and maintenance will be long term and will probably exceed the value included in the current estimate of whichever reclamation alternative is chosen. ($8.9 million to $9.4 million) A clear declaration of intent should be included to state that a majority of Fort Belknap Reservation individuals will be involved in the continuing monitoring of the health of the water for the duration of the reclamation period. Furthermore, if the Tribes adopt stricter water standards that these will supercede any compliance by either state or federal agencies. For example, breakdown products of cyanide that are potentially toxic to fish and/or other aquatic organisms are currently not being monitored or regulated by state or federal agencies. Routine analyses of cyanide fail to identify cyanates and thiocyanates just to mention two potentially deleterious breakdown products. Water samples from mining sites where cyanide is used as a process chemical may have WAD and/or total cyanide concentrations that are quite low or undetected but if analyzed specifically for cyanates and thiocyanates these same waters may show tens of milligrams per liter (mg/L) or more of these compounds. (MPC Issue Paper No. 1, 1998). It is suggested that any of the alternatives that might be chosen include the routine monitoring of these products. (35)

Response: The State cannot dictate preferential hiring practices. Should Fort Belknap adopt its own water quality standards such standards would be applicable only to lands within the Fort Belknap Reservation. It should be noted that the mine facilities where cyanide was used are all located where discharges would migrate to the south, away from the Reservation. Cyanide concentrations at levels of concern are not expected to occur in northern drainages. Testing of leach pad waters for cyanates and thiocyanates has not shown levels of concern that would limit disposal of these waters in the land application area.

145. **Comment:** Groundwater sampling of 15 wells was conducted by EPA on June 13-15, 2000. No final report was issued by EPA regarding this sampling event to our knowledge. Data from this event was not compared to previous monitoring data on file to determine if data showed any upward trends. The Fort Belknap Environmental Protection Office Staff was not contacted to have the water quality results we have on file for comparison which some wells show sign of impacts from ARD. (43, 44)

Response: This comment was passed on to EPA for their consideration. EPA responded that they did compare the analytical results from their public water supply and the domestic well testing with previous data from some of the wells and with data from upper Swift Gulch and upper Landusky Mine monitoring wells. EPA's conclusion is that they see no mine-related water quality impacts in the data from the public water supply and domestic well sampling.

The Fort Belknap Environmental Protection Office compiled all of the available information on the wells EPA sampled, including existing water quality data for these wells. Fort Belknap received all of the data from EPA on the sampling event, including the QA/QC and chain of custody information. EPA personnel made a trip to Fort Belknap and presented the results of EPA's sampling to the Tribal Council as well as at public meetings in Hays and Lodge Pole. EPA provided Fort Belknap with GIS plots of selected metals on all wells. EPA's technical specialist advised that the Fort Belknap Environmental Protection Office could do their own analysis on the sampling data if they wished to verify the EPA finding.

146. **Comment:** Bio-Passive Treatment Systems in King Creek and Swift Gulch. IF these systems do not perform over time, there should be a contingency plan in place to capture and treat the water before being released to King Creek and Swift Gulch. In the 1996 Consent Decree, capture systems were required to be constructed in these drainages. A similar statement should be included when these are discussed in the SEIS. (43)

Response: The Consent Decree only required a capture system to be constructed in King Creek. This was amended to allow for a biotreatment system in this drainage. In Swift Gulch, the Consent Decree only required monitoring of BKSS-1 and a study of Swift Gulch. The lower quality seepage in Swift Gulch will continue to be monitored to see if the quality changes as a result of the pit reclamation efforts. If Swift Gulch seepage quality does not improve, a small semi-passive treatment system will be developed to treat the water. Disruption of the drainage by installing a large capture system similar to that used elsewhere is not believed warranted at this time.

147. **Comment:** Protection/Restoration of Water Quality and Quantity. According to Draft SEIS page 2-5, all reclamation alternatives need to protect area water quality and restore the area stream flows and hydrologic balance. Underground mining has affected the groundwater flow to the Fort Belknap Indian Reservation since the early 1860's. FBICC should either be compensated for this loss or water return to the King Creek and Swift Gulch headwater drainage from the Landusky water treatment plant. Water discharge from the Zortman water treatment plant should be return to the Lodgepole Creek headwater drainage. (44)

Response: Drainage adits did not cross under the divide between Montana Gulch and King Creek before the early 1900's. Therefore, groundwater flow towards the Reservation could not have been affected prior to that time. Water loss to the Fort Belknap Reservation is discussed in Section 3.3.9 of the SEIS. The option is available to route discharge from the water treatment plant to either King Creek or Swift Gulch under all alternatives. The specific remedy depends in part upon the results

of the water compact discussion. There is no evidence that mining at the Zortman Mine has resulted in a loss of flow to Lodgepole Creek.

148. **Comment:** Draft SEIS, Section 3.3.3 Mine Site Hydrology, Zortman Mine. Why does Ruby Gulch receive all the treated discharge water from the Zortman water treatment plant? (44)

Response: The discharge location in Ruby Gulch was established under the Consent Decree. Since the majority of the captured water routed through the treatment plant is derived from Ruby Gulch, a single discharge location in Ruby Gulch was established. The Zortman water treatment plant was not designed to return water to Alder Spur and Carter Spur, as these tributaries contribute only a minor amount of flow to the Alder Gulch drainage basin which, in any event, joins with Ruby Gulch downstream of the mine.

149. **Comment:** Draft SEIS, Section 3.3.3 Mine Site Hydrology, Landusky Mine. No seepage collection systems have been constructed in the King Creek or Swift Gulch headwater drainage. Impacts from the ARD generated in the Queen Rose pit to the Swift Gulch drainage have escalated in the past year. Presently the only remedy is to collect water samples and let Mother Nature dilute the ARD impacted Swift Gulch water with water from the South Big Horn Creek. (44)

Response: The remedy in progress is to cover the backfill in the Suprise and Queen Rose pits with a synthetic liner. This would minimize infiltration through the acid generating material below the pit floor and reduce contaminated seepage to Swift Gulch groundwater. Swift Gulch water chemistry changes upon reaching South Bighorn Creek due to chemical reactions in the stream causing the precipitation of iron hydroxide. A seepage collection system is not warranted in King Creek.

150. **Comment:** Draft SEIS, Section 3.3.3 Mine Site Hydrology, August Pit Lake. In mid-1997, groundwater began ponding in the August pit at the Landusky Mine and reached a total depth of about 15 feet by August 1999. The pit lake began to form after the artesian well WS-3 was closed in late 1995. Water levels for the northern shear zone wells had also increased approximately 10 feet coincident with filling of the pit. This is a perfect example of the groundwater that has been lost to the northern drainages that supply the Fort Belknap Indian Reservation. (44)

Response: Modeling results discussed in Draft SEIS Section 3.3.9 show that with artesian well WS-3 open, the total water loss in both King Creek and Swift Gulch is an estimated 64 to 76 gpm. If the well is closed the water loss is only about 5 gpm, with an actual net increase in recharge to Swift Gulch due to the presently unreclaimed mine pit area.

151. **Comment:** Draft SEIS, Section 4.3.8, Reasonably Foreseeable Significant Adverse Impacts, Liner Degradation. The GCL layers in the reclamation covers would begin deteriorating after about 30 years about the same time the Landusky Mine reaches full maturity. So is this a potential for the groundwater to become contaminated by ARD? (44)

Response: The GCL is only used in Alternatives Z1 and L1 and as part of interim reclamation in the Landusky Suprise and Queen Rose pits. The GCL material is subject to expansion and shrinkage of the clay within the liner. The Suprise Pit bedding layer of bentonite used under the GCL will provide some further protection as will the revegetation at limiting infiltration. However, there is the potential for groundwater infiltration to increase as the liner ages. That is why the materials placed above the GCL will be limited to non-acid generating materials under the preferred alternatives. This potential for increased infiltration over time is one reason that backfilling the pits with acid generating material is not recommended.

152. **Comment:** Island Mountain Protectors vigorously opposed the building of the Sullivan 1991 pad and related pads at the Landusky Mine. Since it was built over a spring, it has created AMD problems from the time of the first construction. This was gross negligence! (12)

Response: Rock drains were constructed to route flow from these springs out from under the leach pad. Since the recharge area for these springs has been covered by the leach pad liner the flow rates are low. The amount of seepage from beneath the leach pad is very small as represented by the flow at monitoring station L-28 at less than 1 gpm. Seepage from the underdrains beneath the L91 pad are being captured and treated.

ATSDR Report

153. **Comment:** Page 3-101: The draft SEIS states that the "ATSDR study concluded that based on a review of the data, there is no apparent public health hazard to the residents of Fort Belknap." The residents of Fort Belknap, the FBICC, and the FBED dispute the accuracy of this statement. It is important to note that health studies begun under the Consent Decree have not yet been completed. It is also important to note that on page 3-104, the draft SEIS states, "King Creek is listed [under the year 2000 TMDL listing] as . . . not supporting the beneficial use of drinking water, swimming, and use by agriculture and industry. Probably causes are metals, nitrate, siltation, and habitat alterations from mine tailings and abandoned mining activity." (27)

Response: The ATSDR Studies (1992, 1993, and 1998) are the best available health data for the Reservation with respect to potential mining impacts. The 1998 ATSDR study was specifically requested by the Tribal government to determine health impacts from the mines. It was completed after the Consent Decree was signed. An additional health study under the Consent Decree was initiated, but it is the agencies' understanding that agreement could not be reached regarding study protocols and ZMI opted to provide monies for the Tribes to complete the additional study on its own. In the meantime, the ATSDR's 1998 Public Health Assessment is considered as definitive. No additional information has been presented that would suggest the 1998 Report is incorrect.

King Creek received an impaired listing due to the presences of tailings in the upper reaches of the drainage, not because of any health threat to the Fort Belknap Reservation. Since that time, a large-scale tailings removal project has been completed by the EPA. Water quality monitoring continues

in the King Creek basin, with results provided monthly to Island Mountain Protectors and the Fort Belknap Environmental Protection Office.

154. **Comment:** ATSDR Study. Draft SEIS, Section 3.3.1, Description of Supplemental Studies and Information, The ATSDR report, Petitioned Public Health Assessment Kings Creek (a/k/a Fort Belknap Indian Reservation/Zortman Mining Incorporated), dated May 14, 1998, is mentioned and seems to be used to substantiate that there are no health hazards from the Zortman and Landusky mines to the residents of Fort Belknap Indian Reservation. This is misleading and irrelevant today. The data used for the study was old historical data, no new data was generated by ATSDR, and current impacts from acid mine drainage had not been determined until after 1999, well after the study was finalized. The Study should not be cited as a reference material as it was completed before the fact of the acid rock drainage has been identified as a serious threat to the groundwater that supplies drinking water to the southern communities and individuals well. Today, based on the available data on AMD at the mine sites and other new monitoring and hydrological data, one would wonder if another study would not be warranted to determine the REAL RISKS to human health and the environment to all residents downstream of the mines (Zortman, Landusky, Hays, and Lodge Pole). (43, 44)

Response: Problems with acid rock drainage at the mines were announced in 1993 and were the subject of press articles and public meetings at that time, including several public meetings held on the Fort Belknap Reservation. There has been no fundamental change in the acid generating character of the mined material from that described in the 1996 EIS. Water quality concerns were noted in Swift Gulch in the 1996 Consent Decree and acid rock drainage was well known at the time of the ATSDR Study, in fact, it was the main reason for the Study. While ARD effects in the Swift Gulch drainage have increased since 1999, water chemistry samples collected in late-September 2001 showed the effects of mining were minimal at monitoring site L-49, one-half mile upstream of the Reservation. Therefore, downgradient impacts would be minimal as are risks to human health.

The primary source of contaminants to Swift Gulch is the backfill placed into the Suprise pit, and possibly the Queen Rose pit by ZMI during 1995-1996, although ferricrete deposits are evidence of high pre-mining levels of contaminants. The majority of precipitation which falls into these pits, as well as storm water runoff which enters the pits, infiltrates into the backfill and subsequently enters the underlying groundwater system which drains toward Swift Gulch. Interim reclamation, which includes capping this backfill material, will decrease the amount of precipitation infiltrating through the backfill. This, in turn, should decrease the amount of contaminants entering the groundwater system.

Data collected from Reservation domestic wells by the EPA in June 2000 were consistent with the conclusions made by ATSDR. Water quality in wells closest to the mine in Hays (ZDW-GW-02, ZDW-GW-03, ZDW-GW-07, and ZDW-GW-11), was of good quality with no exceedances of primary drinking water standards. Samples from one well north of the mine towards Lodge Pole

showed elevated iron and manganese, which is naturally occurring in aquifers surrounding the Little Rocky Mountains. No cyanide was detected in any of the wells sampled on the Reservation.

The tailings removal conducted by EPA in 2000 and the interim reclamation work done at the mines have lowered the risk to King Creek and other community drainages compared to the health risk when the ATSDR Report was completed.

155. **Comment:** How about people who are concerned about our drinking water, our kids, or families and our kids' health and our older people who are getting cancer and things like this. Where is that addressed in here? (LO-3)

Response: None of the ATSDR reports or water quality monitoring studies have identified any contaminants coming from the mines which would create the health impacts you describe.

156. **Comment:** We've had spills, we've had children that got in there and the feet was chemically burnt. They took them to Billings to have these things analyzed. Up here at the hospital at Fort Belknap they told them well, it's poison ivy. But it kept going deeper and deeper, so this lady took her child to Billings and the doctor there said no, that's a chemical burn or something. What was he doing? So she told him he was playing in this water up there. And that's when all this stuff was coming down the creek. Real murky looking water. He got in there and his feet got burnt from it. (HA-4)

Response: Individual cases such as this should be reported to the Indian Health Service or the Fort Belknap Environmental Protection Office for investigation. DEQ and BLM are not aware of any release at the mine that would have caused such a condition in downstream water quality.

157. **Comment:** My wife had a real high level of lead in her blood. The doctor in Havre found it. But when she got a written statement from him and she gave it to I don't know who, some of the people that was wanting to see it, Pegasus went up and they bought the doctor off. Again, that's the way they treated the Indian people. (HA-4)

Response: The agencies have no information regarding such an event. Monitoring data from King Creek shows lead levels below the maximum contaminant level. Lead levels throughout the Zortman and Landusky ore deposits are very low.

158. **Comment:** There was water tested on one of the creeks right back here when I was going to college. One of the other students, we had a chemistry class and we did some tests on that, and it was tested. They did find cyanide in there, the kid that did the testing, because we all went around testing for lead and cyanide and stuff. So it did come all the way down. That was kind of hush hush. (HA-5)

Response: Without providing specific information regarding the date and place of testing a detailed response cannot be made. In general, the drainages that flow onto the Fort Belknap Reservation have not shown effects from mining at the Reservation boundary. Some of the drainages that flow to the south, away from the Reservation, have had elevated levels of cyanide and metal over the years. The leach pads and other cyanide-containing mine facilities were not constructed in drainages which flow toward the Fort Belknap Indian Reservation.

Hydrology Support Document

159. **Comment:** *Hydrology Support Document.* July 17, 2001 was spent walking up to Swift Gulch from the Reservation side. As one progresses further towards the mine area what water there was became a deep blood red (pH in some spots between 4 and 5) underlined with a very fine silt-like sediment up to two inches thick. Page 7-24 of this report indicates previous problems with mine-impacted seepage and material in 1997 in a tributary to Swift Gulch, or coming from seepage from the Suprise pit. "Water quality in Swift Gulch shows indications of increasing sulfate and TDS with a distinct upward trend since 1998." Certainly this has been amplified up until today! (37)

Response: A sample was taken from this area on July 25, 2001 by the DEQ. The results indicated a lab pH of 6.2. Monitoring of Swift Gulch was performed by DEQ and Spectrum hydrologists on September 28, 2001. The pH of Swift Gulch was taken with a calibrated meter at five locations. From downstream to upstream, the pH values and station numbers were: 7.18 in South Bighorn Creek about 300 feet above the Reservation Boundary, 7.58 about 200 feet above the confluence with South Bighorn Creek, 6.82 near L-46, 6.68 at L-19, 6.56 above BKSP-2E, and 6.98 below BKSP-3. The water in Swift Gulch was clear at all stations, however, the streambed within the shear zone area was coated with a red iron hydroxide precipitate. The lowermost station having visible evidence of iron sediments was near L-49, just above the confluence with South Bighorn Creek. The stream infiltrated into the alluvium shortly below this point and was clear where it re-emerged above the Reservation boundary.

Acidity in the range of pH 6 appears in Swift Gulch because oxygen-rich seepage water and air react with iron sulfide minerals in the weathering bedrock upgradient of the stream. The subsequent release of iron produces red ferric oxides (iron oxides) that coat the streambed. The presence of ferricrete deposits found along the upper reaches of Swift Gulch indicate this condition may not be totally mine-related. Ferricretes are comprised of sediments cemented together by red ferric oxides. The ferricrete deposits in Swift Gulch appear to be several thousand years old based on their position above the incised modern drainage. Erosion along the stream course has carried major portions of these ancient ferricrete sediments away. The recently precipitated ferric oxide on the streambed of Swift Gulch and the ancient ferricrete blanket found along the shoulders of the drainage are essentially identical products of different ages of ferric oxide production and indicate that ferric oxide deposition can be a natural phenomenon unrelated to mining. This red, very fine silt-like sediment in Swift Gulch is forming within the same reach as the ancient ferricrete deposits, suggesting that its occurrence is normal for the natural setting.

160. **Comment:** *Hydrology Support Document.* It is stated in this report that "in response to continued water quality concerns, evaluation of a passive treatment system is currently underway" (page 7-24) which has obviously not been put into play to reduce what has been taking place since 1997, especially after any storm event in the mountains. Frustrated by this information it is equally frustrating that the water balance results for Swift Gulch (page 7-26) are given INCLUSIVE of the Landusky Mine leach pads which makes it difficult to weigh in to assessments of total metal loads i.e. validity of the data becomes spurious indeed when acres of rock sprayed with cyanide are only separated by a liner, treated to remove contaminants, then released back into the environment. Don't heavy storm events erase such compartmentalization? (37)

Response: The commentor is referred to the third sentence in the third paragraph of page 7-26 of the Hydrology Support Document. The sulfate and metal loads in Swift Gulch have been given exclusive of the leach pads. There are no surface water or groundwater monitoring data that suggest leakage through the liners of the L87 and L91 leach pads has occurred. Very little storm water runoff has been generated by the leach pads, since they were constructed to optimize infiltration and prevent runoff. No storm runoff has occurred from leach pads into Swift Gulch.

161. **Comment:** *Hydrology Support Document. Appendix A: DEQ data for Northern Drainages.* A cyanide measurement was never done, or at least it doesn't appear in any of the "raw data" for any of the northern drainages. Why? When so many of these are close to leach pads? (35, 37)

Response: None of the leach pad solution collection systems are upgradient of drainages that would flow onto the Fort Belknap Reservation. Since the drainages north of the Landusky Mine are downgradient from the Suprise and Queen Rose pits, and are not in close proximity to the leach pads, metals and nutrients have been the focus of sampling. Even so, total and/or WAD cyanide has been tested for at the following locations with analytical results presented in Appendix A: BKSS-1 (9/18/00); L-19 (9/18/00); and BKSS-1 and BKSS-6 (5/6/97). Additionally, a number of monitoring stations intended to detect surface and groundwater impacts to the north are routinely sampled for cyanide. See Appendices F and G of the Hydrology Support Document, which provide graphs of constituents (including cyanide) for monitoring stations at the Zortman and Landusky Mines, respectively.

162. **Comment:** *Hydrology Support Document. Appendix C: Updated Zortman mine water balance and chemical mass loading report.* Meaningless without leach pad information. Why isn't leach pad information included? (37)

Response: The information presented provides an analysis with and without the pads. Table C-2 "Zortman Mine Mass Sub-Surface Loading Summary for Sulfate," includes leach pad data (see LP-85/86; LP-89, etc.). Table C-3 "Zortman Mine Sub-Surface Loading Summary for Sulfate Without Leach Pads" does not include leach pad data.

163. **Comment:** *Hydrology Support Document. Appendix D: Reformatted Landusky water balance and chemical mass loading report.* Meaningless, even if reformatted, as it does not include the leach pad information. (37)

Response: Tables D-1 and D-2 in Appendix D of the Hydrology Support Document included sulfate and metals loads for the Landusky leach pads, designated by the station prefix "L". The appendix has been modified to include tables without the leach pads similar to that of Appendix C.

164. **Comment:** *Hydrology Support Document. Appendix E: Water Quality Classification Data.* CN (total) is often reported as false positive, why? Granted there are "Cyanide Uncertainties" and many different substances will react or combine with cyanide giving these results but surely water samples taken from a mine using cyanide to extract the ore (gold) should insist that the most advanced method be used to clarify the presence or absence of cyanide in any given water sample. Realizing it is expensive to test for cyanide even more worrying though are some of the breakdown products of cyanide which are known to bioaccumulate in plant and fish tissue. Since cyanide is no longer monitored in many locations based upon past results, these past data require scrutinization. How many alleged "false positive" values were recorded? Where is the Quality Assurance data to back up these assertions? These should also be tested for but currently no mine is testing for these breakdown compounds that might have more environmental impacts than the currently untested cyanide. We cannot trust this past data. (28, 37)

Response: Testing for cyanide in surface and groundwater surrounding the Zortman and Landusky Mines is still routinely performed. The standard laboratory detection limit for cyanide is 0.005 mg/l. However, in the experience of DEQ water quality specialists who review data from the Zortman Mine, as well as other mines, reports of cyanide detections between 0.005 and 0.01 mg/l are often suspect. This is particularly true when the same sample does not show concentrations of other cyanide breakdown products (e.g., nitrate) which would be expected if cyanide were actually present. Nitrate is the primary by-product of cyanide degradation at the Zortman and Landusky Mines, and is routinely analyzed.

165. **Comment:** *Hydrology Support Document. Appendix F & G: Water Quality for Zortman and Landusky Drainages.* The data is discrete data not continuous and one cannot join the sample points. The illusion created is inconsistent with any real data that might be generated between sampling events. (37)

Response: Connecting data points on water quality graphs to analyze trends is commonly practiced. All data are clearly presented as discrete points on the graph; thereby limiting the illusion of "real data" by the connecting lines.

Biological Treatment System

166. **Comment:** What really happens to selenium? These bacteria sequester it, but then what? The Draft SEIS doesn't really address what happens to the selenium from that point forward. The selenium's going to stay selenium, even if it's a selenium dioxide or a selinate of some sort. That's not addressed either. (HA-1)

Response: Selenium in the leach pad water is present as selenate. The biological treatment system converts selenate and selenite to elemental selenium that is precipitated in the bioreactor, outside the bacterial cell, and for the most part outside the carbon matrix material used for a microbial support. Because it is precipitated as elemental selenium, much less buildup of sludge (50 to 1,000 times less) occurs than with conventional chemical treatment systems. Additional information on the biological treatment system has been added to the Final SEIS.

167. **Comment:** *Draft Report on Pilot Plant Wastewater Treatment System.* A great disparity exists in the report between the experimental design of the pilot technology that has been conducted and the design for the full-scale operating plant. This has led to confusion of interpretation of the feasibility of bioremediation for leach pad water treatment and its successful application over the long haul of some 10 to 15 years. The report lacked essential details necessary for an in depth scientific evaluation. For example, on page 5 of the report in the section "Microbial Analysis/Characterization" "Plate counts of total heterotrophs and total selenium reducers were made under aerobic and anaerobic conditions to profile the bioreactor microorganisms and to determine relative numbers of selenium, nitrate and cyanide reducing/degrading microbes." "This profile was used to judge the general reactor conditions with respect to the desired microbial population." It is the details of this profile that would be important in order to help evaluate whether or not appropriate populations could be maintained (at the steady state) under the conditions of the "secret nutrient mix." Won't it be extremely difficult to maintain a diverse mix of microbes for years at certain concentrations necessary to handle the unique load of waste that comes into the system? How does one keep the microbes "happy" and doing their job in the face of metabolic build up of potential waste products over time, or glitches in the system of nutrient flow, or temperature fluctuations? (36)

Response: A great disparity does not exist between the pilot-scale tests and the design for the full-scale operating plant. The major difference between the pilot-scale tests and the full-scale plant being built was the biotreatment system efficiency. By using existing on-site equipment and tankage for the pilot-scale tests to minimize costs, a less efficient biotreatment system was the result. The pilot-scale tests used modified plug-flow bioreactors similar to the full-scale biotreatment system. It was estimated in laboratory tests that the less efficient pilot-scale system tests would still be fully successful, so the pilot-scale tests successfully used the less efficient system to demonstrate that the target contaminant removals could be obtained. It was estimated that this system was approximately 35% less efficient than the proposed system would be at full scale.

For long-term processes where native microbes are performing the degradations of interest, it is a good idea to configure a process around these microbes. This is because if they are present at high enough levels they can replace introduced microbes over time if given the right opportunities. This issue is addressed by the staged bioreactor system in the following ways. First, microbes naturally degrading nitrate in Landusky waters have been isolated and combined with selenium-reducing microbes and cyanide-degrading microbes. Since selenium-reducing and cyanide-oxidizing microbes were not found in the Landusky waters a mixture of selenium-reducing and cyanide-degrading microbes were tested with site and other nitrate degrading microbes for development of stable biofilms, capable of removing these contaminants, from site waters in the laboratory. A mixture of compatible microbes capable of growing together as a unit and performing mutually beneficial degradations can develop as a unit or biofilm. The mixture of microbes used has been demonstrated to be effective in both laboratory and pilot-scale tests and can be thought of as a single unit, a mixed microbe biofilm, performing the various contaminant transformations required. The microbial profiles included total heterotrophic bacteria, selenium reducers, denitrifyers and cyanide degraders. The bacteria selected were shown to form a stable biofilm in the laboratory using site waters. The relative numbers of bacteria in the system were matched with degradation rates observed in site waters and the level of contaminant present.

To maintain a healthy biofilm steady population state that retains its properties over time several conditions are required, including a relatively unchanging environment, a colonization surface that is covered with the healthy biofilm of choice, and a balanced supply of nutrients provided in a manner that will both maintain the biofilm and the biofilm conversions desired. It has also been shown that a diverse population within a healthy biofilm makes it more robust than one or two different cell types. The biotreatment system being put in place at the Landusky site has taken these facts for a healthy robust biofilm into consideration.

The only “metabolic by-products” that would build up within the bioreactor system would be the metals precipitated from the waters being treated. The major contaminant buildup is expected to come from selenium. However, biotreatment systems, particularly for the combined contaminants found at this site, have not been field tested for long periods. Similar systems have operated apparently unaffected for years in the laboratory and for over nine months in the field under similar conditions of contaminant level and temperature. Biofilm systems to remove other contaminants have also been shown to be effective in the field for years. Based on current selenium levels, if the biotreatment system environment is kept relatively constant it is expected that the biofilm and biofilm performance for site contaminant removal should be effective for 10 to 15 years. At this time elemental selenium in the system will be at a level that it will need to be harvested.

Glitches in system engineering are anticipated and have been addressed through economic, site environmental, and process reviews from pilot-system testing evaluators, including biotreatment system specialists, process engineers, EPA personnel, Montana State reviewers, Tribal representatives and others. Safeguards and backup systems are in place and are being monitored by site personnel to ensure proper function.

168. **Comment:** *Draft Report on Pilot Plant Wastewater Treatment System.* Lengthy scientific and somewhat technical discussions with Applied Biosciences personnel have helped to clarify some reservations concerning the bioremediation process for the mines but issues remain that warrant attention i.e.; A) this will be the most northern latitude for a large scale bioremediation plant to operate. B) our circa-annual fluctuations in temperature, of sub-zero in winter months to extreme heat during summer, were never experienced during the short duration of the pilot study, worrying is the fact that "bioreactors will be covered; semi-buried tanks in series configured for gravity feed and will not require a building enclosure." C) no bioremediation, on such a large scale, has ever been carried out for the length of time this one is supposed to be in operation (10 to 15 years). Furthermore, this type of biological system has never been tested at the latitude and elevation of the Little Rocky Mountains. (31, 32, 36)

Response: This will not be the most northern latitude for a large-scale bioremediation plant to operate. Municipal water treatment and sewage treatment plants operate in more northern latitudes and have been shown to operate for long periods of time (10's of years) with relatively little maintenance. As for the specific contaminants at the Landusky site, biotreatment systems, particularly for the combined contaminants found at this site, have not been field tested for long periods. Similar systems have operated apparently unaffected for years in the laboratory and for over nine months in the field under similar conditions of contaminant level and temperature. Biofilm systems to remove other contaminants have also been shown to be effective in the field for years and bioremediation of cyanide is occurring in colder climates and at higher elevations. If the biotreatment system environment is kept relatively constant it is expected that the biofilm and biofilm performance for site contaminant removal should be effective for 10 to 15 years.

The pilot-scale tests did not experience the full extremes in temperatures that can occur at the Landusky site. They did experience temperatures significantly below zero and above 90 F , and the biofilm performed as expected during these periods of time. As can be seen from the pilot-scale report, the water temperature of the system, although cold, moderated the effects of external temperatures. Economic, site environmental, and process reviews have been received from pilot-system testing evaluators including biotreatment system specialists, process engineers, EPA personnel, Montana State reviewers, Tribal representatives and others. Concerns expressed have been addressed through similar discussions, and modifications to treatment system locations by moving the tanks above ground, insulating/heating the tanks and water/nutrient lines, installing pumps to move the water between the tanks, and providing additional sampling ports for more complete monitoring capability have been specified to help prevent problems with site temperature extremes affecting the full-scale biotreatment system.

169. **Comment:** *Draft Report on Pilot Plant Wastewater Treatment System.* It is bothersome that such a quantum leap has been made between the start up laboratory experiments which moved into the field pilot project for such a very short time (i.e. 21 days) then onto full scale building of the plant. The 12 days at one flow rate and 11 days with a variety of flow rates are a concern. It seems that the system did not have time to come to equilibrium. This abbreviated study showed how the

system worked for only one set of conditions, followed by a variety of conditions that were changed rather rapidly and not the variety of conditions that can develop over a long period of time of use. Also, what about the biomass? Was 12 days enough time for the biomass to develop adequately? There was not much discussion as to the amount of biomass produced and whether the biomass had reached an equilibrium state or the operating quantity that is to be maintained for the treatment duration. This is especially troublesome as this system is being designed to treat waste over a minimum time period of 10 to 15 years based on a study conducted over 12 days. Why were these biological (removal) processes accepted after such a short-term pilot-scale test? (11, 26, 32, 36)

Response: The pilot-scale tests had three main objectives: 1) to demonstrate that the technology would work under the on-site environmental conditions - this was successfully demonstrated during a time of year with greatly changing temperatures; 2) to evaluate various scale-up parameters and size the full-scale bioreactors - this was successfully completed using three different flow rates during the pilot-scale tests and indicated that a retention time of 18 hours should be sufficient to achieve target contaminant removal at site temperatures; and 3) to evaluate several nutrient mix combinations and amounts to make sure that laboratory testing had correctly identified the best nutrient mix for the site - as can be seen from the pilot-scale test results at the 7.5 gpm flow rate the microorganisms were responding to the different nutrient mixtures tested.

The conduct of laboratory biotreatability and short term pilot-scale testing is an accepted method to determine if a technology will meet treatment goals required. Any technology being employed at a site with different contaminants and/or environmental conditions than have been tested with the technology previously requires such testing. Even conventional technologies when used in a new environment require similar testing and are not always successful under the new conditions. Cost and time usually dictate the number of technologies that can be tested and the test duration.

Because testing a technology at pilot-scale is expensive and time consuming a short demonstration period is usually chosen to show that the technology is capable of meeting selected target contaminant removals under site conditions. This time is also used to determine appropriate or necessary scale-up requirements for a specific site. This is why the pilot-scale tests were conducted during the time of year selected - to experience the changing site conditions as much as practical. Pilot-scale tests are also limited in time to minimize the time that the contaminants remain untreated or treated using a more costly treatment method. If funding and time were not constraints pilot-scale tests could be continued for longer periods to build a higher degree of confidence that no problems would be encountered at full-scale. Unfortunately, funding and time are usually limited.

Additionally, the Applied Biosciences process for selenium removal was recently validated under the EPA Mine Waste Technology Demonstration Program with great success. The Applied Biosciences process removed selenium to lower levels than any other process tested at a cost of

~1/10 of the recommended EPA process. The biotreatment process has also addressed the other contaminants present in the mine waters as shown in the table at the end of the pilot-scale study.

Biological processes for the removal of cyanide and nitrate have undergone more testing than most metal removal processes. However, both biological cyanide removal and denitrification can be affected by site conditions and other contaminants present in the waters being treated. Biological degradation of the complexed cyanide present in the Zortman – Landusky system is more difficult than free cyanides. Biological denitrification has been used very successfully in Europe for over a decade and is rapidly gaining approval and being used in the U.S. A most difficult issue surrounding the Zortman – Landusky Mine waters is the water temperature of 7˚C to 9˚C. This requires higher microbial densities and longer treatment times. Again, these contaminants were removed during the pilot-scale tests conducted at the site during October of 2000. A brief summary of the test results at various flow rates follows:

2.5 gpm flow rate

At 2.5 gpm the Applied Biosciences treatment system removed nitrate, selenium and cyanide from Landusky 87 Pad waters to below drinking water criteria. Throughout the 12 days of operation, nitrate was removed to below 10 mg/L by the fourth reactor of the treatment system. Cyanide was removed to below 0.10 mg/L by the fourth reactor and to below 0.001 mg/L by the last reactor. Selenium was removed to below 50 ppb by the third bioreactor, sample point #4 and to below detection in the final reactor. The 2.5 gpm flow rate was continued for an extended time to determine the base rate for nutrient addition using a complete nutrient mix – a balanced C:N:P ratio, trace elements and vitamins mix prepared by Applied Biosciences.

7.5 gpm flow rate

At 7.5 gpm the treatment system nutrient amount and composition was varied to determine the minimal nutrient composition required to treat site waters. It was found that removal of all contaminants was affected when a less than optimized nutrient mixture was used; nitrate removal was affected more than cyanide and selenium removal. During this period contaminant removals varied depending on the nutrient mixture used. Average contaminant removals were as follows: nitrate to <50 mg/L, selenium to <0.02 mg/L and complexed cyanide to <0.071 mg/L. These numbers represent average removals for the entire 7.5 gpm run. The balanced nutrient mix resulted in removal of all contaminants to target treatment criteria.

15 gpm flow rate

This flow rate was used to further examine nutrient amounts required, to help define system limitations, and in evaluation of trade-offs between bioreactor size and cost. For this flow rate, the balanced nutrient mix was used in varying amounts to determine optimal nutrient amounts required for contaminant removal, the nutrient increase required with increased flow rates and the nutrient requirements at the lower ambient temperatures. The data shown in Figures 4-6 of the pilot test report are average effluent values for contaminant removal. Effluent nitrate concentrations ranged from ~18 mg/L to ~79 mg/L, selenium ranged from 0.004 mg/L to 0.09 mg/L, and cyanide ranged

from 0.027 mg/L to 0.046 mg/L. When the nutrient feeding rates were close to optimal, the 15 gpm flow rate contaminant concentrations in the bioreactor effluents were close to drinking water criteria. A longer bioreactor retention time or higher bioreactor biofilm density would bring effluent contaminant concentrations to well within drinking water criteria.

The Applied Biosciences' balanced nutrient mixture provided the best contaminant removal. Nitrate in the Landusky waters was the most susceptible of the three primary contaminants to nutrient composition and amount. Laboratory tests indicate that removals of selenium and cyanide would also be affected, but these contaminants do not have the short response time shown for nitrate. Nitrate removal was best using a balanced nutrient mix.

The 7.5 gpm flow rate was used to test different nutrient mixes that were less costly per pound, but proved to be significantly less effective for contaminant removal. The 7.5 gpm test period was not used in calculating nutrient costs. Three main factors played a role in the nutrient costs observed: retention time, malfunctioning nutrient distribution systems, and low biofilm density. Full-scale treatment costs are expected to be ~$0.55/1,000 gallons.

The pilot-scale tests were completely successful. From the data obtained, a full-scale process was designed that will remove all three major contaminants to site criteria. As can be seen in the pilot-scale report, nitrate removals at 2.5 gpm were all well below discharge criteria for the entire test at this flow rate. At 7.5 gpm, various less complete nutrient mixtures were compared with less than satisfactory results with the notable exception of the Applied Biosciences balanced nutrient mix. At 15 gpm, the balanced nutrient mixture was used at different concentrations. As can be seen, at higher nutrient concentrations, effluent nitrate concentrations were close to discharge criteria and cyanide and selenium concentrations met discharge criteria.

170. **Comment:** *Draft Report on Pilot Plant Wastewater Treatment System.* It is realized that these temperature dependent microbes can operate enzymatically between 5 degrees Centigrade and 20 degrees Centigrade but probably at low levels of efficiency in terms of their ability to either sequester or degrade the waste water containing the nitrate, cyanide and selenium. The temperature that existed during the testing period ranged from 5°C to 16°C. A concern with these relatively low temperatures is the effect the temperatures have on the ability of the microorganisms to do their job. Most of the organisms that are to be utilized are probably psychrophiles or organisms that metabolize at their optimum in the temperature range of 5°C to 20°C. That being the case, what is the rate of metabolism of these organisms for this nutrient and contaminant feed mixture? Do they develop enough biomass to adequately populate the media to provide good removal of the contaminants, especially for the detention time provided? What happens when the temperature of the systems reach 35°C or higher as can happen during the summer months or when the temperatures fall far below 0°C? Does their rate of metabolism double or triple or are they adversely affected by these higher temperatures? These are some of the issues that would have been determined if the pilot study would have been operated over a longer time period. These are some of the issues that were not addressed in the report. (11, 26, 36)

Response: The full-scale bioreactors will run at about the same temperature year round due to the fact that the bioreactors will be insulated and they will be fed by water that routinely stays between 7°C to 9°C. Due to the naturally low water temperatures, the microbial metabolic rates will be low, this is why the bioreactors are sized at 250,000 gallons each, why they use activated carbon to establish the highest possible microbial density, and why an 18+ hour retention time will all be used to meet target contaminant removals.

Low temperatures and treatment volumes of 150 million gallons per year have been taken into account with flow rates of 300 gallons per minute, tank size of (3) 250,000 gallons, retention times of 18+ hours, and very high microbial densities as an established biofilm on a microbial support surface that provides maximum biofilm contact with the contamination to be removed by the treatment system. The activated carbon provides a tremendous amount of surface area with its pore structure and enables microbes, a biofilm, to be established at very high densities (>1012 microbes/gm) which can be maintained in a relatively steady state for extremely long periods with a limited, but balanced nutrient source. This also helps reduce the capital costs of the system by reducing the bioreactor size. (As a side note, it has been proposed that one of the largest/oldest living organisms known may be a biofilm found in coastal waters.)

While the biomass for the pilot-scale test did not reach the density desired, laboratory tests indicated that it had reached a level that the pilot-scale tests could be completed successfully. With the level of nutrients provided the biomass did reach a somewhat steady state. This state was just lower than will be used at full-scale. The decision to proceed with the lower level of biofilm establishment was due to the time left before the system needed to be shut down for the normal winter operations at the Landusky site. The use of warm water during microbial establishment at full scale will allow the biofilm to fully develop on the biotreatment system before nutrient optimization is begun at startup.

Comment: Although the cost analysis has been done for the plant and the nutrient mix, the most expensive facet, often such linear projections are grossly underestimated, especially with the length of time the plant will be in operation. Who pays for the additional funding if such a situation occurs? (36)

Response: Operation costs addressed in terms of nutrient costs are expected to be ~$0.55/1,000 gallons, based on pilot-scale testing. Pumping costs from the Landusky pads to the reactors were addressed only from the perspective that there would be a reduction in pumping costs incurred under the current treatment regime which, over the ~10 to 15 year expected treatment time, would pay for the cost of the proposed Applied Biosciences treatment system. As to the cost of nutrient over time, yes it will change. Over the past five years the nutrient cost has varied from ~$170 per ton to over $350 per ton. The calculations in the pilot scale and EPA reports were based on a cost of ~$250 per ton, as the costs were at that time. It should be remembered that this process in terms of capital costs is ~1/4 to 1/10 that of comparable treatment systems and will cost ~1/4 to 1/8 of any

currently available treatment system to operate. As to who pays for treatment system costs over time, State and Federal agencies, i.e., the taxpayer may have to cover any costs not covered by the reclamation bonds.

171. **Comment:** *Draft Report on Pilot Plant Wastewater Treatment System.* Because of patents pending we were unable to determine the composition of either the "nutrient mix" or what "selected microbial strains" are to be employed other than being told that the microbial strains will be seeded by local heap leach Landusky 87 Pad microbes. Is maybe the activated carbon, only, doing the job in the bioreactor not the microbes since nothing is to be disturbed until the plant has completed its operation. The sludge (containing the toxic waste) will then be sold to the highest bidder. Don't we have yet another problem of sludge removal? (32, 36)

Response: The entire staged process proposed for the Landusky site is not patented, only the selenium process is patented. The staged process system was assembled specifically for treatment of the Landusky site waters for nitrate, selenium and cyanide removal.

Nutrients and the energy they provide for contaminant removal can be discussed in terms of the microorganisms present. The sugar-based nutrient mixture recommended provides a complete nutrient mixture for the microbes present. It provides the vitamins and trace elements necessary to prevent microbial biofilm die off – the only source for these nutrient components when a single nutrient source, such as sugar or methanol is used. The sugar-based nutrients are also a source of higher energy than components such as methanol or acetic acid normally used in anaerobic (no oxygen) systems. Additionally, the staged system proposed for the Landusky site has anaerobic microbes, microbes that can perform the contaminant transformations under anaerobic or aerobic (with oxygen) environments. These microbes are also heterotrophic – capable of utilizing complex carbon nutrients. Therefore, by providing a completely balanced sugar-based nutrient, we are providing a higher source of energy for the heterotrophic microbes present as well as acetic acid and methanol for the strict anaerobic microbes present, as the sugars breakdown to acetic acid and methanol that will be utilized by the strict anaerobes present. The balanced nutrient also provides vitamins and trace elements needed by all microbes present. By limiting the amount of nutrient provided, bioreactor overgrowth is prevented.

Microbes naturally degrading nitrate in Landusky waters and other denitrifyers have been isolated and combined with selenium-reducing microbes and cyanide-degrading microbes. Since selenium-reducing and cyanide-oxidizing microbes were not found in the Landusky waters, a mixture of selenium-reducing and cyanide-degrading microbes were tested with site and other nitrate-degrading microbes for development of stable biofilms capable of removing these contaminants from site waters in the laboratory. A mixture of compatible microbes capable of growing together as a unit and performing mutually beneficial degradations can develop as a unit or biofilm. The mixture of microbes used for the Landusky site has been demonstrated to be effective in both laboratory and pilot-scale tests and can be thought of as a single unit, a mixed microbe biofilm, performing the various contaminant transformations required.

The fact that carbon alone is not responsible is evident from the pilot-scale test results, lab testing conducted before pilot-scale test initiation, and a large volume of published material that shows that carbon is not effective at nitrate or selenium removal. While carbon will potentially absorb a large volume of cyanide, pilot-scale test results show that cyanide degradation is occurring within the biotreatment system.

The biofilm is established on activated carbon at high density so that it fills the available pore space in the activated carbon. Once established within the pore spaces it is very resistant to removal. Also, a light biofilm is established over the entire carbon surface, blocking attachment sites for other bacteria and site contaminants. Contaminants are bound by the biofilm and reduced or oxidized as water moves through the staged reactor system. Additionally, the contaminant removal curves generated from the pilot-scale tests are not like contaminant sorption curves observed for metals being sorbed to carbon in similar environments.

Contaminant loading only occurs when selenium, present as selenate, is reduced to elemental selenium. In the reactor system running the longest, the system at Kennecott Utah Copper Corporation used in the EPA evaluation of the Applied Biosciences selenium process, selenium at ~2 mg/L was removed to near or below detection for about one year. Upon breakdown and examination of the Applied Biosciences reactor system, it was estimated that this reactor system would have a life expectancy of 10+ years. The selenium levels in Landusky 87/91 leach pad waters are approximately one-half the concentration found in the EPA test waters; therefore, a 15+ year life expectancy is probably a good estimate.

The biotreatment system converts selenate and selenite to elemental selenium that is precipitated in the bioreactor. This is the only contaminant of the three - nitrate, selenium, and cyanide - that is building up within the bioreactor system. This selenium is precipitated outside the bacterial cell and for the most part outside the carbon matrix material used for a microbial support. Because it is precipitated as elemental selenium, much less buildup of sludge is experienced - 1,000 to 10,000 times less sludge than in conventional chemical treatment systems.

At this time there are several options available: 1) back flush the reactor system to harvest the collected elemental selenium and reinoculate the bioreactor for continued use; 2) remove the system carbon by vacuum, rebag and sell to a refinery or back to the supplier for reactivation; and 3) sell the selenium to a refinery or use the selenium for animal feed supplements or dispose of the selenium as a hazardous waste. The carbon would need to be washed to remove the selenium precipitate. This would be accomplished by rinsing the carbon and collecting the elemental selenium precipitate in a filter press.

172. **Comment:** *Draft Report on Pilot Plant Wastewater Treatment System.* Although told that the bioremediation plant will be fully automated, how does one automate, at all times, the right mix of nutrients, temperature, flow rate, contamination build-up, and happy microbes! Who will be on site

to make decisions and problem solve if either mechanical or biological (microbiological) problems arise? Will there be a microbiologist on site? (32, 36)

Response: Nutrient addition will be optimized at plant start-up and programmed into a simple timer. Temperature is controlled within the L87 pad and ranges from ~7°C to 9°C year around. Outside temperature fluctuations have been addressed through tank insulation, heat tracing plumbing, and location of the nutrient supply system within an existing building. Outside temperature effects on the biotreatment system will be moderated by the constant flow of water through the system.

Flow rates will be driven by pumps that produce precise flow rates through the system with back-up systems available for immediate replacement in event of component failure. Contaminant buildup is a function of contamination levels in the water being treated. Currently, selenium is the major contaminant of concern. Because it is precipitated as elemental selenium, much less buildup of sludge is experienced and because of the low selenium levels present in site waters the buildup in the treatment system should not require the metal to be removed for 10 to 15 years.

Site personnel will be monitoring the biotreatment system engineering and process function on a daily basis to troubleshoot and problem solve for mechanical malfunction. Applied Biosciences personnel will be available to troubleshoot microbial problems if they arise.

173. **Comment:** Applied Biosciences will be using an EPA approved removal process for selenium. Will the removal processes for cyanide and nitrate be EPA approved also? (32)

Response: It takes many years to get technology verification and EPA validation. Currently, the cyanide and nitrate treatment has the concurrence of EPA after their review of the pilot test results and full-scale design plans being implemented. These two processes are currently not validated in the same manner as the selenium process.

174. **Comment:** What about the sludge produced by these processes? Are these processes only concentrating these metals? Is there a backup plan in place in case these processes should fail? What was the criteria used to determine the effectiveness of these processes? Were these processes tested with other media besides activated carbon? (32)

Response: Sludge buildup will come from the metals present in the site waters. Sludge formed in biological precipitation is on the order of 1,000 to 10,000 times less than in chemical precipitation. Currently, selenium, at ~0.7 mg/L, is considered as the main contaminant that will cause sludge buildup in the reactor system. However, during the expected treatment life at the site there may be options or requirements to treat waters other than those in the L87 pad. Cyanide heap leaching is the predominant technology used in processing low-grade gold ores. During mine closures that have used cyanide heap leaching, residual cyanide and often arsenic, copper, iron, silver, selenium, mercury, nitrate, zinc and other inorganics must be removed from process and

waste solutions. If other waters are processed in the biotreatment system, other metals that form precipitates under reducing conditions found in the treated waters will precipitate and accumulate in the system. This accumulation will be proportional to their relative concentration in the waters being treated. Still, biologically precipitated metals will form on the order of 1,000 to 10,000 times less sludge than chemical precipitation and be accepted by a refinery.

Metals such as arsenic, copper, silver, gold, cadmium, and chromium, also present in site waters, would build up as metals and metal sulfide sludge in the reactor. However, these metals are present in trace amounts and are not expected to build up to a point that they would shorten the life expectancy of the treatment system. They will need to be removed upon decommissioning of the treatment system. Because the reactions occurring in the treatment system are very similar to the reactions that initially formed the site metal deposits, the metals concentrated in the treatment system will be valuable resources. Once the treatment system has fulfilled its need, the carbon and metals concentrate can be sent to a refinery for metals recovery. Most of the selenium and other metals are found to be precipitated outside of the carbon and can thus be effectively separated using conventional technology and be processed separately from the carbon.

Metals such as iron, calcium and manganese present in the water are precipitated under aerobic conditions as metal oxides and will not be removed by the anaerobic treatment system, which is designed to remove the contaminants of highest concern. These metals could be removed through the addition of an aerobic process stage following the existing treatment system. Additionally, much of the sulfate present in the system will not be utilized because of the low contaminant level present in site waters and will flow through the system.

The site chosen for location of the treatment system considered the event of treatment system failure due to ineffective operation and natural disaster. A contingency analysis that addresses the "what if this happens what do we do" scenario was conducted. System evaluation included analysis to address optimal placement of the full-scale biological treatment system to meet various water treatment contingencies. Placement of the biological treatment system near the current Landusky 87 pad pumping and water distribution system allows for maximum system flexibility and system containment in case of a natural disaster. This location allows:

1) Release of treated waters to the stream if all discharge criteria are met.
2) Sending waters to the Landusky water treatment plant for polishing, if necessary.
3) Pumping treated water to the LAD using existing piping.
4) Installation space for additional post- or pretreatment stages.
5) Pumping waters from the Zortman site to the Landusky biotreatment system as water treatment loads decrease.
6) Containment of the treatment system in case of natural disaster by location of the system over the existing L87 pad liner.

Processes to remove metals from waters to the low levels currently being mandated are new processes, and the processes to remove multiple contaminants, including metals or metalloids are newer still. Many of these processes are developed to treat a given set of contaminants that are somewhat site-specific under site-specific conditions. The Zortman – Landusky treatment system is one of the first treatment systems of this kind, specifically configured to treat nitrate, cyanide and selenium at site water temperatures. However, a process configured to treat these contaminants at site water temperatures was successfully demonstrated at pilot-scale using L87 pad waters.

Activated carbon provides a tremendous amount of surface area with its pore structure and enables microbes, a biofilm, to be established at very high densities. This helps reduce the capital costs of the system by reducing the bioreactor size. The pore structure also provides for an extremely resilient bioprocess, allowing quick recovery if process waters were to become toxic or the process interrupted or perturbed by an unexpected event. For example, the cyanide-degrading microbes can tolerate up to ~300 mg/L cyanide while free in solution, but when used as a carbon biofilm, they can tolerate ~500 mg/L cyanide. The nature of the biofilm formed on activated carbon somewhat protects the microbes from the toxic effects of higher cyanide concentrations.

It is recognized that activated carbon contributes much of the cost of the proposed bioreactor system. Applied Biosciences has investigated the use of other biofilm support material, but has not found a suitable substitute. Materials that provide the same advantages as activated carbon are all more expensive.

175. **Comment:** It is also understood that the Landusky deleterious water contained in the L87/91 heap will be biologically treated for contained nitrates, cyanide and selenium. However, EPA does not understand whether or not heavy metal cations, also contained in these waters, will be reduced to sulfide forms and remain inside the bio-reactor tanks. (See Zortman and Landusky Nitrate, Cyanide and Selenium Reduction Project RFQ; Water Summary for Zortman and Landusky Leach Pads and Ponds (March 2000); Landusky Leach Pad Water Quality Summary (1997-1999), July 1, 2000.) We understand based on conversations with BLM and DEQ staff that the bio-reactor system treated water could be discharged to Montana Gulch if the discharge is adequate to meet water quality standards. As planned, if only elevated acidity and/or heavy metals are present, the biological water treatment effluent of this contaminated water may be routed to the Landusky WTP. If only an elevated levels of cyanide are present, the effluent may be routed to the Zortman treatment pond and treated with peroxide. If an elevated level of nitrate and/or selenium is present, the water may be land-applied on the Zortman LAD. The precise operation of the bio-reactor remains uncertain. We suggest that longer bio-reactor residence times and thus lower flow rates could be evaluated regarding these variables that would affect effluent quality. (23)

Response: Heavy metal cations will be precipitated in the reactor system along with the reduction of selenium to elemental selenium. To more completely answer your question, sludge buildup will come from the metals present in the site waters. Sludge formed in biological precipitation is on the order of 1,000 to 10,000 times less than in chemical precipitation. Currently, selenium at ~0.7 mg/L

is considered as the main contaminant that will cause sludge buildup in the reactor system. However, during the expected treatment life of the system there may be options or requirements to treat waters other than those in the L87 leach pad. During mine closures that have used cyanide heap leaching, residual cyanide and often arsenic, copper, iron, silver, selenium, mercury, nitrate, zinc and other inorganics must be removed from process and waste solutions. If other water is processed in the biotreatment system, other metals that form precipitates under reducing conditions found in the treated waters will precipitate and accumulate in the system. This accumulation will be proportional to their relative concentration in the waters being treated. Still, biologically precipitated metals will form on the order of 1,000 to 10,000 times less sludge than chemical precipitation and be accepted by a refinery.

Since selenium will be precipitated as elemental selenium within the system when treating pad waters it is expected, based on longer pilot-scale tests with other mining waters, that the system will operate 10 to 15 years before flushing of the system will become necessary to the contaminants. With the 10-year expected treatment life required at the site, it is expected that sludge removal will only need to be done once, on decommissioning of the site.

Metals such as arsenic, copper, silver, gold, cadmium, and chromium also present in site waters can be expected to build up as metals and metal sulfide sludge in the reactor. However, these metals are present in trace amounts and are not expected to build up in the treatment system to a point that they would shorten the life expectancy of the treatment system. They will need to be removed upon decommissioning of the treatment system. Because the reactions occurring in the treatment system are very similar to the reactions that initially formed the site metal deposits, the metals concentrated in the treatment system will be a valuable resource. Once the treatment system has fulfilled its need, the carbon and metals concentrate can be sent to a refinery for metals recovery. Most of the selenium and other metals are found to be precipitated outside of the carbon and can thus be effectively separated using conventional technology and be processed separately from the carbon.

Metals such as iron, calcium and manganese present in the water are precipitated under aerobic conditions as metal oxides and will not be removed by the anaerobic treatment system, which is designed to remove the contaminants of highest concern. These metals could be removed through the addition of an aerobic process stage following the existing treatment system. Additionally, much of the sulfate present in the system will not be utilized because of the low contaminant level present in site waters and will flow through the system.

It is agreed that longer retention times are better. However, the retention time in the bioreactors should be adequate to remove nitrate, selenium, and cyanide to target levels. As the remediation of the Landusky site proceeds and water entrainment into the pads decreases due to this effort, there will be less water to treat enabling longer retention times or possible treatment of additional waters.

176. **Comment:** Will this bio-passive treatment system work in cold climates? Have there been any studies to substantiate their success in cold weather? Is Zortman/Landusky going to be another "experiment" to determine if they will work in this type of climate and elevation? More data needs to be included in the SEIS regarding this type of water treatment system. This technology-based treatment seems to be an experiment. As a member of the community affected by the reclamation, I do not want to see an experiment conducted on such a large scale. (5, 43)

Response: Applied Biosciences Corp. has successfully conducted pilot-scale tests of the biological selenium removal (BSeR) process in conjunction with the EPA Mine Waste Technology Program administered by MSE Technologies Applications Inc. In these tests, the BSeR process successfully removed selenium to at or near detection levels for over nine months, including winter months, from waters averaging <12°C using bioreactor retention times of 11 hours, 8 hours and 5.5 hours.

In general, biological treatment is a well-proven approach for contaminant removal from many types of waters. Biological wastewater treatments have been used for many decades and remove both organics and many metals from waters being treated. Biological and microbiological methods are more often being considered to remove and recover metals from contaminated aqueous solutions. Current applications range from large-scale removal of metals from sewage and industrial effluents and mining waters, to smaller-scale metal recovery processes. Most current large-scale processes are generally unsophisticated, nonspecific, and often do not remove metals to desired levels.

Biological processes for the removal of cyanide and nitrate have undergone more testing than most metal removal processes. However, both biological cyanide removal and denitrification can be affected by site conditions and other contaminants present in the waters being treated. Biological degradation of the complexed cyanides is more difficult than free cyanides. Biological denitrification has been used very successfully in Europe for over a decade and is rapidly gaining approval and being used in the U.S. The most difficult issue surrounding the Zortman-Landusky Mine waters is the water temperature of 7˚C to 9˚C. This requires higher microbial densities and longer treatment times. These contaminants were removed during the pilot-scale tests conducted at the site during October of 2000.

Processes to remove metals from waters to the low levels currently being mandated are new processes, and the processes to remove multiple contaminants, including metals or metalloids are newer still. Many of these processes are developed to treat a given set of contaminants that are somewhat site-specific under site-specific conditions. The biological treatment system is one of the first treatment systems of this kind, specifically configured to treat nitrate, cyanide and selenium at site water temperatures. However, a process configured to treat these contaminants at site water temperatures was successfully demonstrated at pilot-scale using water from the L87 leach pad.

Additionally, the Applied Biosciences process for selenium removal was recently validated under the EPA Mine Waste Technology Demonstration Program with great success. The Applied Biosciences process removed selenium to lower levels than any other process tested at a cost of ~1/10 of the recommended EPA process. The biotreatment process has also removed other contaminants present in the mine waters as shown in the table at the end of the pilot-scale study.

177. **Comment:** The amount of biomass produced and maintained within the system was not addressed. If microorganisms are provided food, electron acceptors and all the conditions necessary for their growth, they are going to reproduce, make new cells and these cells will eventually run the course of their life cycle and die. When the cells die, some of their components can be utilized by other cells, but some cannot and thus there is always biomass left over (often referred to as "bug bones"). These bones will accumulate over time, albeit, very slowly depending on the conditions of growth. My question is how is the accumulated bug bones going to be handled? How are they going to be disposed? How long does it take to establish the optimum biomass concentration? Is there an optimum biomass concentration for the best removal? How does it handle rapid temperature change? (11, 26)

Response: "Bug Bones" are organic matter that in a properly functioning system will be held to a minimum. To a large extent they will degrade as they slowly move through the system. This organic matter is not expected to build up within the reactor. To insure the development of a stable biofilm that will endure over time, a number of safeguards are incorporated into the proposed Landusky process. First, the biofilm consists of some microbes native to the Landusky site. Second, the biofilm is established on activated carbon at high density so that it fills the available pore space in the activated carbon. Once established within the pore spaces it is very resistant to removal. Third, a light biofilm is established over the entire carbon surface, blocking attachment sites for other bacteria and site contaminants. Fourth, the biofilm is fed a complete nutrient source – C:N:P vitamins and minerals so that die-off of microbes is not needed to replace trace nutrients in order for the living microbes to transform the contaminants present. Fifth, the microbes are fed on an intermittent basis so that growth of non-performing native microbes is minimized and so that the biofilm established on the carbon does not grow to a level that it sloughs off and exposes attachment sites.

It will take approximately 1.5 months to establish the biofilm to the desired levels within the bioreactors. A high-density biofilm (>1012 microbes/gm) can be maintained in a relatively steady state for extremely long periods with a limited, but balanced nutrient source.

Activated carbon provides a tremendous amount of surface area with its pore structure and enables microbes, a biofilm, to be established at very high densities. This helps reduce the capital costs of the system by reducing the bioreactor size. The pore structure also provides for an extremely resilient bioprocess, allowing quick recovery if process waters were to become toxic or the process interrupted or perturbed by an unexpected event such as temperature change that you mention.

Rapid temperature changes within the bioreactor system are not expected because the biotreatment system is insulated and the feed waters are relatively constant.

178. **Comment:** The lack of discussion on the general mechanisms taking place in the reactors was also troubling to me. The first part of the process is the nitrate removal step which utilizes an organic carbon source without oxygen being present. The subsequent steps include the removal of cyanide and selenium through oxidation, which I am led to assume requires an oxidative environment. How is the oxidative environment provided? What is the rate of selenium accumulation in the system? What is the rate of cyanide oxidation that occurs within the system? (11, 26)

Response: A staged bioprocess addresses the need for both a process and microbes to reduce nitrate and selenium and to oxidize cyanide. Oxygen is provided from the reduction of the oxyanions to facilitate the cyanide removal. To effectively address these particular contaminants, nitrate must be addressed first since the nitrate oxygen is more easily reduced than the oxygen of selenate or selenite. Therefore, in order to reduce selenate and selenite in the presence of nitrate a process must be designed in a manner that addresses nitrate first. It is not necessary to remove all the nitrate before selenate and selenite can be reduced, but it is important that reduction oxidation (redox) potentials be such that nitrate is the primary target initially. Keeping the redox potential in this range somewhat reduces the effectiveness of both nitrate and selenium reduction, but this can be minimized by using a staged reactor system with microorganisms selected specifically for nitrate reduction followed by microorganisms selected more for selenium reduction and by providing sufficient process retention time.

The mine waters are further complicated by the presence of cyanide, mostly present as complexed cyanide (total cyanide) rather than weak acid dissociable (WAD) cyanide or free cyanide. The biological degradation of cyanide requires oxygen. Again a staged bioprocess can address this problem best using microbes that will degrade cyanide under low oxygen conditions. In a staged bioprocess, the reduction of nitrate and selenate/selenite provides the oxygen, on a micro-environment level, that microbes can use to oxidize cyanide. Again, as in the case of nitrate and selenium reduction, this process will not be as effective as a process configured specifically for cyanide degradation, but can be effectively used in a staged bioprocess with sufficient retention time. This is why a three-bioreactor system with an ~18 hour retention time would be used.

Selenium in the leach pad waters is present as selenate. Selenate is reduced in the biotreatment system to elemental selenium that is precipitated in the bioreactor. Selenium removal rates of >2 mg selenium per 5.5 hours have been observed in waters at ~12°C. During pilot-scale tests, removal rates of ~ 1.0 mg selenium per 14 hours were observed. This selenium is precipitated outside the bacterial cell and for the most part outside the carbon matrix material used for a microbial support. Because it is precipitated as elemental selenium, much less buildup of sludge is experienced and because of the low selenium levels present in site waters the buildup in the treatment system should not reach levels that require the metal to be harvested for 10 to 15 years. At this time there are several options available: 1) back flush the reactor system to harvest the

collected elemental selenium and reinoculate the bioreactor for continued use; 2) remove the system carbon by vacuum, rebag and sell to a refinery or back to the supplier for reactivation; and 3) sell the selenium to a refinery or other selenium used such as for animal feed supplements or dispose of the selenium as a hazardous waste. The carbon would need to be washed to remove the selenium precipitate. This would be accomplished by rinsing the carbon and collecting the elemental selenium precipitate in a filter press. The biomass can also go to the refinery.

Cyanide is mixed with numerous other contaminants and is therefore somewhat more difficult to treat. In general, cyanide metal complexes degrade much slower than free cyanide. Free cyanide removal rates of >40 mg/L have been observed in waters of ~12°C. The cyanide in the mine water is a mixture of complexed cyanides that are more difficult to degrade than free cyanide. During pilot-scale tests complexed cyanide removal rates of ~ 1.0 mg cyanide per 14 hours were observed.

179. **Comment:** An additional item I have noticed in reviewing the pilot plant report and the recommended full-scale design is that the systems appear to be of different configuration and operation. The full-scale unit does not have the initial denitrification tank and filter followed by a series of activated carbon filters. Instead the system is three upflow activated carbon filters with recirculation capabilities. Why the change in design? (11, 26)

Response: The major difference between the pilot-scale tests and the full-scale plant being built is the biotreatment system efficiency. By using existing on-site equipment and tankage for the pilot-scale tests to minimize costs, a less efficient biotreatment system was the result. It was estimated in laboratory tests that the less efficient pilot-scale system tests would still be fully successful, so the pilot-scale tests successfully used the less efficient system to demonstrate that the target contaminant removals could be obtained. It is estimated that the pilot system was approximately 35% less efficient than the full-scale system.

180. **Comment:** I want more information on your biological treatment circuit that you're proposing to put on Goslin Flats, the studies that have been performed on it, examples where it's been used before on such a massive scale and the success rates. This type of biological system has never been tested on this scale for an extended period of time. (HA-1, LA-5, 31)

Response: The system would be constructed on the L87 leach pad, not at Goslin Flats. Some water which passes through the system may be piped to Goslin Flats for final disposal via land application.

Processes to remove metals from waters to the low levels currently being mandated are new processes, and the processes to remove multiple contaminants, including metals or metalloids, are newer still. The biological treatment system is one of the first treatment systems of this kind, specifically configured to treat nitrate, cyanide and selenium at site water temperatures. The process

was successfully demonstrated at pilot-scale to treat these contaminants at site water temperatures during October of 2000.

Biological processes for the removal of cyanide and nitrate have undergone more testing than most metal removal processes. However, both biological cyanide removal and denitrification can be affected by site conditions and other contaminants present in the waters being treated. Biological denitrification has been used very successfully in Europe for over a decade and is rapidly gaining approval and being used in the U.S. The most difficult issue surrounding the leach pad waters is the water temperature of 7˚C to 9˚C. This requires higher microbial densities and longer treatment times.

A staged bioprocess addresses the need for both a process and microbes to reduce nitrate and selenium and to oxidize cyanide. The following discussion covers additional information about the biological treatment process.

Selenium

Selenium is a problem in many wastewaters and represents a major environmental problem in the U.S. This contamination originates from many sources including mining operations, mineral processing, abandoned mine sites, petroleum processing, and agricultural runoff. For mining waste, the principal sources of selenium contamination are precious metals- copper- and uranium bearing ores and sulfur deposits. Selenium is commonly found in mining wastewater in concentrations ranging from <3 mg/L to >12 mg/L. The National Primary Drinking Water Standard maximum contaminant level (MCL) is 0.05 mg/L for selenium. Furthermore, the U.S. Fish and Wildlife Service has recommended that these standards are inadequate, particularly in regard to protection of fish, waterfowl, and endangered aquatic species. These standards have been questioned because laboratory and field studies indicate that water borne selenium concentrations as low as 2.0 mg/L may bio-accumulate in complex aquatic food chains to toxic levels.

The Applied Biosciences water treatment system being put in place at the Zortman-Landusky site was validated under the EPA Mine Waste Technology Demonstration Program to remove selenium to below discharge criteria and described as having the highest potential for economical selenium removal from environmental and mining waters. Under the EPA test, the process removed selenium to below detection in treatment of over 200,000 gal of ~12°C water at a cost of ~$0.55/1,000 gallons, a cost approximately 8 times less than the nearest competitive technology, including the EPA BDAT (ferrihydrite precipitation) that were unable to meet discharge criteria. Additionally, it was validated as the only viable economical process under a larger concurrent testing program conducted by site operators, being approximately 1/5 the cost of the nearest process competitor and producing 50 to 1,000 times less sludge. The process also removed other metals such as copper and arsenic that were present in the waters at levels below detection, polishing the water even further.

Nitrate

Nitrate is a stable and highly soluble ion with a low potential for co-precipitation or adsorption, resulting in a high potential to migrate to groundwater. Because nitrates/nitrites do not evaporate, they are likely to remain in the water until consumed by plants or other organisms, or until remedial action is taken. Nitrite generally does not accumulate in a groundwater system because it is normally oxidized to nitrate as rapidly as it is formed. These properties make nitrate difficult to remove using conventional water treatment technologies such as lime precipitation, softening and filtration.

Biological denitrification is well established for wastewater treatment throughout the U.S. Biological denitrification processes are based on microbial denitrification that converts nitrate to nitrogen gas through a series of reactions occurring under anoxic (anaerobic) conditions. Therefore, there is no buildup of nitrate in the reactor system. Both heterotrophic and autotrophic bacteria can perform denitrification. Heterotrophic anaerobes or facultative anaerobes utilize a carbon source such as sugars, methanol, ethanol or acetic acid for the conversion of nitrate to nitrogen gas. Autotrophic bacteria utilize hydrogen or reduced sulfide compounds as substrates, and carbon dioxide or bicarbonate as the carbon source for cell synthesis.

The Applied Biosciences biological denitrification process uses both types of microbes to remove nitrate from mine waters containing sulfate and has been implemented at full scale to successfully treat mine waters containing up to ~200-mg/L nitrate-N to non-detectable levels. However, it should be noted that these waters were at a higher temperature (~20˚C) than the waters pumped from the Zortman/Landusky Mine site pads. Pilot-scale testing demonstrated that the L87 pad waters can be treated with the full-scale system being installed at site water temperatures of 7˚C to 9˚C. As with other Applied Biosciences processes, the denitrification process is configured to be used in a process system using a sugar-based nutrient demonstrated to promote microbial growth and long-term nitrate reduction while minimizing biofilm-fouling problems.

Cyanide

Cyanide heap leaching is the predominant technology used in processing low-grade gold ores. During closure of a heap leach operation, residual cyanide must be removed from the process and waste solutions as well as the heap. Naturally occurring biological and chemical processes will degrade cyanide over time, usually years to decades. Cyanide is degraded to carbon dioxide and ammonia by a number of different microorganisms. The carbon dioxide is released as a gas and the ammonia is readily utilized by the microbial population for cellular metabolic functions or can be degraded through processes of nitrification and denitrification.

The Applied Biosciences process has been implemented at full scale at four gold mining operations in the Western U.S. Three treatments involved spent process waters, and the fourth required cyanide removal from both process waters and heaps to meet closure requirements. At one site, low levels of arsenic, selenium and mercury were also removed along with ~200 mg/L total nitrate and 2.5 mg/L cyanide. A second site successfully treated cyanide at 150 mg/L cyanide to meet

discharge requirements. At a third site, several conventional chemical treatment technologies had failed to remove low levels of metal cyanide complexes in the spent heaps, but the Applied Biosciences process was fully successful.

Treatment System Evaluation Factors Included

Technical Functionality/Waste Reduction – this parameter addresses whether a technology configuration is designed to handle the waste form. All technology configurations considered must address the fundamental aspects of contaminant removal and site or environmental concerns. Higher weightings are given to process configurations that have greater contaminant removal potential.

Capital Costs – address costs of the actual treatment hardware, controls and buildings associated with the treatment or those costs involved with the implementation of a treatment process at a specific site.

Operating Costs – address costs of renewable materials such as biofilm support materials, biofilms, and nutrients or chemicals. The same is true for nutrients sources in biological treatments. The use of cost effective and environmentally safe nutrient sources is paramount in operating cost evaluation. Operating costs also include any predicted resource recovery including clean water and valuable/recyclable recovered metals.

Reliability – addresses the short- and long-term reliability and maintenance of the process system. Less complex and environmentally stable processes usually are indicative of higher reliability.

Based on the factors above, full-scale treatment was examined for several alternatives including seasonal and year-round treatment. In the case of multiple contaminants such as are found at the Zortman-Landusky Mine site, processes using different chemical, biological and/or environmental requirements must be staged or configured as a treatment train that treats the individual contaminants according to their individual requirements. For example, nitrate removal is required at the same time or before cyanide and selenium.

Additional information can be obtained from various reports published through the EPA and on their web site (http://www.epa.gov); Applied Biosciences (http://www.bioprocess.com); and MSE Technology Applications, Inc. (http://www.mse-ta.com) or at P.O. Box 4078, Butte, Montana 59702.

181. **Comment:** I am in favor of the use of microbial technology-based treatment if it can be shown to work and if there is a plan for safely removing the selenium sludge (or dead bacteria) that may accumulate within the biomass and be left as part of the "bug bones." It is understood that the oxidation of selenium occurs within the cell and over time, can accumulate into crystals, but also usually within the cell. Upon the death of the cell, this material can be released. How is the selenium going to be handled and how is the biomass that still may have some of the selenium sequestered in the biomass going to be handled and disposed? What are the provisions for long-term storage of the end waste products. Since the plastic liner underneath the sludge will eventually

decompose, removal from the site, even if this increases the expense, should be considered. (5, 11, 26, 31)

Response: Selenium in the leach pad waters is present as selenate. The treatment system converts selenate and selenite to elemental selenium that is precipitated in the bioreactor. This selenium is precipitated outside the bacterial cell and for the most part outside the carbon matrix material used for a microbial support. Because it is precipitated as elemental selenium, much less buildup of sludge is experienced, and because of the lower levels present in site waters the buildup in the treatment system should not reach levels that require the metal to be harvested for 10 to 15 years. At this time there are several options available: 1) back flush the reactor system to harvest the collected elemental selenium and reinoculate the bioreactor for continued use; 2) remove the system carbon by vacuum, rebag and sell to a refinery or back to the supplier for reactivation; and 3) sell the selenium to a refinery or other selenium use such as for animal feed supplements or dispose of the selenium as a hazardous waste. The carbon would need to be washed to remove the selenium precipitate. This would be done by rinsing the carbon and collecting the elemental selenium precipitate in a filter press. The biomass could also be sent to a refinery.

There was not enough time during pilot-scale testing at this site to evaluate value-added benefits of selenium and/or other metals recovery at this site. To address this issue, conclusions will be drawn on data from laboratory testing and other pilot-scale tests that lasted considerably longer and treated waters containing ~3 times the selenium. Laboratory testing of the selenium precipitate in Applied Biosciences' bioreactors indicates that the elemental selenium is precipitated at <97% purity. This means it is a good product for recycling. In pilot-scale tests at the Kennecott Utah Copper Corporation site it was determined that the value in selenium alone would more than offset bioreactor re-inoculation and re-startup when it reached a level that prevented the system from meeting discharge criteria.

Applied Biosciences is also investigating the possibility of using the selenium and minerals produced as an animal feed supplement. Evaluation of the bio-sludge compositions from several mine sites and the added microbial protein indicate that it is a prime candidate for this use. We are pursuing this avenue with one of the largest international animal feed product suppliers at this time.

It should be noted that Spectrum attempted metals recovery during 1999 and barely broke even. There will definitely be metals loading, but one should assume no economic recovery. The ASARCO East Helena smelter is indefinitely shutdown and may never open again. Reno is the next closest place to process carbon.

182. **Comment:** I saw in your SEIS, where you got a test plot on Goslin Flats which is now growing grass that has selenium and some other element in it. At the time you put your EIS together there was some steers there. They felt that they weren't affected in any way, but you probably couldn't tell it if they're walking around on the hoof. You'd have to kill them animals and check out their

vital organs and meat, whatever. So this is still open. This is still a big concern of mine because this is what we do on this side of the mountain. We raise cows. (LO-6)

Response: The potential exists for the development of livestock toxicity problems related to plant tissue selenium content. Preliminary evaluations suggest that the soils and vegetation on the Goslin Flats area had relatively high selenium concentrations prior to development of the land application system. Plant tissue samples collected for selenium analysis during late summer 2001 will be used to develop an operating and monitoring program for the 2002 and subsequent field seasons that will limit selenium uptake by plants. Results from this summer's work show elevated plant tissue selenium levels, but at concentrations generally not considered toxic to livestock. While monitoring is conducted so as to limit the amount of selenium in land-applied waters that could accumulate in plants, the grazing of livestock on the land application area is at the livestock owner's own risk.

Appendix C, Draft MPDES Permits

183. **Comment:** Appendix C, For Swift Gulch, part 5, page 25, it says bench scale testing shall be completed no later than September 30, 2002. So this has not been done? It would be real helpful for the community to know exactly what the whole process is before there is approval of these systems, because it is novel. I think it would be good to have information on this whole process of how it goes into the approval stages and then is actually applied to these kinds of systems. What parameters do you use to judge, and what criterion, or what criteria do you use to really say okay, this would work here. (HA-1)

Response: No bench scale testing has been completed for a Swift Gulch treatment system. The application of a passive or semi-passive treatment system has been reviewed by Applied Biosciences for the Swift Gulch drainage. Due to access difficulties it has been decided to wait and see the if conditions improve as a result of the interim reclamation work. This work includes placement of additional material by backfilling the bottom of both the Suprise and Queen Rose pits to be free-draining and covering the pit floors with a synthetic liner. The exposed sulfide highwalls in the Suprise and Queen Rose pits are to be covered with material from the oxide material in the east lobe of the August #2 waste rock dump. The success of these efforts will determine if a water treatment system needs to be installed in Swift Gulch.

184. **Comment:** Appendix C: MPDES Permits. (Page 7) "The limits set in this permit will serve as the TMDL's for each limited parameter." The parameters monitored should include biological indicators as well as some of the cyanide breakdown products not currently regulated. (35)

Response: The combination of chemical monitoring and whole effluent toxicity (WET) testing required in the MPDES permits is designed to detect any parameters or combination of parameters that will negatively impact water quality. Biologic indicators are addressed by the WET testing. WET testing uses samples of the discharge water to assess the impacts to specific aquatic species in a controlled laboratory environment.

The MPDES permits require monitoring and include limits for total cyanide. Historic and recent water quality results have shown that the breakdown products of cyanide are present at very low levels and pose little risk. Therefore, it is not necessary to include additional monitoring specifically for the breakdown products of cyanide.

185. **Comment:** Appendix C: MPDES Permits. *"The pH in the Discharges is maintained at between 6 and 9 standard units. The permit does not allow a discharge, which will cause habitat alteration."* Current seepage into surface water at Swift Gulch is between pH four and five and the only visible invertebrates are the planaria. Habitat alternation has happened and is currently taking place. (35)

Response: Given the quantity of chemical monitoring, biomonitoring has not been deemed necessary. The seepage entering Swift Gulch currently has a pH of 6.2 according to Montana State lab results. The reclamation plans for the Landusky Mine are designed to minimize the discharges that are causing a lowering of pH levels in Swift Gulch. It is expected that after the reclamation work is completed the pH levels in the water bodies will meet the MPDES permit limits.

186. **Comment:** Appendix C: MPDES Permits. (Page 9) Water Quality Based Effluent Limits. "The 30-day average limit was set at the standard and 1.5 times that limit was set as the instantaneous maximum." Does this take into consideration the tremendous fluctuations of storm events in the mountains which could generate water that greatly exceed effluent limits? A pulse of pollution could be averaged out giving a false illusion of lower amounts over time. (35)

Response: The MPDES permit limits include an instantaneous maximum specifically to account for large discharge pulses of flow and/or concentrations. By definition in Part I, Section A.12. of the permits, an *instantaneous* measurement is as single reading, observation or measurement. Therefore, numerous samples cannot be averaged to comply with the instantaneous maximum permit limit. Any single sample that exceeds an instantaneous maximum permit limit is considered as a noncompliance incident (see Part II, Section J of the permits). Part II, Section J includes specific requirements that must be met for each incident of noncompliance. The instantaneous maximum limit of 1.5 times the 30-day average is considered conservative. Storm overflow from the Mill Gulch capture system was sampled and found to meet all water quality standards.

187. **Comment:** Appendix C: MPDES Permits. Table 1: Numeric surface water effluent limitations. Add to the list of cyanide, total recoverable - free cyanide, weak-acid-cyanide, cyanates and thiocyanates. (35)

Response: The MPDES permits require monitoring for total cyanide. Historic and recent water quality results have shown that the breakdown products of cyanide are present at very low levels and pose little risk. Therefore, it is not necessary to include additional monitoring specifically for the breakdown products of cyanide.

188. **Comment:** Appendix C: MPDES Permits. (Page 11) Table 2: Numeric surface water effluent limitations. Footnote #2 Because of the lack of flow data in the drainages loads have not been allocated. Data developed over the five year term of the permit will be used to develop load allocations in the future. What about current load allocations? Change this statement to reflect current as well as long-range reclamation. (35)

Response: The Consent Decree does not include load allocations for discharges. The lack of load allocations in Table 2 of the Zortman Mine Fact Sheet is due to a lack of flow data in those drainages. Without applicable flow data, the load allocations cannot be calculated. Under the reclamation plan the hydrology of the site stormwater will be modified and the flow in the drainages listed in Table 2 (Alder/Carter Gulch, Ross Gulch and Goslin Flats) will likely change over current conditions. Therefore, load allocations will be defined after the reclamation plan is implemented and there is sufficient flow data to calculate the load allocations. Although there are no load allocations for the discharges in Table 2, there are 30-day and instantaneous maximum concentration limits in the Fact Sheet and the Permit.

189. **Comment:** Appendix C: MPDES Permits. (Page 11) Table 2: Numeric surface water effluent limitations. Footnote #4, This parameter is not required at sampling site S-1 in Ross Gulch. Why not? (35)

Response: There is no potential source of cyanide in the mine areas that will drain towards site S-1 (Ross Gulch). There is no reasonable expectation that detectable concentrations of cyanide will be present in discharge waters, therefore monitoring is not required in the MPDES permits.

190. **Comment:** Appendix C: MPDES Permits. (Page 12) Table 3: Numeric ground water effluent limitations. Cyanide, total recoverable to include free cyanide, weak-acid-cyanide, cyanates and thiocyanates. (35)

Response: The MPDES permits require monitoring of, and limits for, total cyanide. Historic and recent water quality results have shown that the breakdown products of cyanide are present at very low levels and pose little risk. Therefore, it is not necessary to include additional monitoring specifically for the breakdown products of cyanide.

191. **Comment:** Appendix C: MPDES Permits. (Page 12) C. Self-Monitoring Requirements. Add soil sampling to requirements. (35)

Response: There is no regulatory basis for limiting concentrations of soil pollutants in an MPDES permit. The MPDES permits only address compliance with surface water and ground water standards. Soil sampling is required as part of the LAD monitoring plan.

192. **Comment:** Appendix C: MPDES Permits. (Page 13 and 14) Tables 4 and 6: Effluent Monitoring Requirements. Add free cyanide, cyanates and thiocyanates, daily. (35)

Response: The MPDES permits require monitoring of, and limits for, total cyanide. Very little cyanide remains in leach pad waters. Historic and recent water quality results have shown that the breakdown products of cyanide are present at very low levels and pose little risk. Therefore, it is not necessary to include additional monitoring specifically for cyanide breakdown products.

193. **Comment:** Appendix C: MPDES Permits. (Page 15) Table 7: Effluent Monitoring Requirements. Measure during any storm event adding cyanide monitoring. (35)

Response: DEQ generally requires mining facilities to sample their storm water discharges semi-annually or at a minimum of once a year. In Montana, runoff from storm events is generally generated during the months April through October (in higher elevations May – September). The sampling requirement of once during May or June and once during July, August, or September is consistent with DEQ requirements for storm water monitoring at mining facilities. In addition, the storm water best management practices (BMPs) are required to be inspected after each major storm event.

Based on sampling data required by the Consent Decree, cyanide has not been detected in the storm water since September 1997. Storm water from the mines is the surface runoff from roads, reclaimed areas and unimpacted areas of the mines. This water is separated from mine process waters. Once reclamation of the mines has been completed, storm water is not likely to come into contact with cyanide-containing materials. Therefore, cyanide is not expected to be present in the storm water.

194. **Comment:** Appendix C, MPDES Permits. Why isn't cyanide in any form mentioned in Table 8: Storm Water Discharge Parameter Benchmark Values? (35)

Response: The values in Table 8: Storm Water Discharge Parameter Benchmark Values are from EPA's October 30, 2000 Final NPDES Storm Water Multisector General Permit for Industrial Activities. Cyanide was not a parameter in which EPA required sampling or had established a storm water benchmark value. EPA's Multisector General Permit applies to mining facilities with SIC codes of 10, for active and inactive metal mining.

195. **Comment:** Appendix C: MPDES Permits. (Page 16) Table 9: Ground Water Monitoring Requirements. Should be done monthly. (35)

Response: Monthly monitoring was conducted during 1997 and 1999 for new wells (ZL-300 series) during the WMCI Groundwater Study. Data show that, due to the relatively slow rate of groundwater movement in this area, semi-annual monitoring is sufficient to detect changes in the chemical quality of ground water under the reclamation plan. Representatives from the EPA, DEQ, BLM, and Tribe have agreed on this groundwater monitoring frequency.

196. **Comment:** Appendix C: MPDES Permits. (Page 17) J. Special Conditions, Storm Water Pollution Prevention Plan (SWPPP). Omit to now include another plan not prepared by Hydrometrics! Redo the administrative requirements of the SWPPP as they reflect expansion of the mine not reclamation! (35)

Response: The Storm Water Pollution Prevention Plan developed by Hydrometrics applies to the facility whether mining or reclamation is taking place. The plan describes how the mines will handle storm water, mine drainage water and process water in order to comply with the Consent Decree. Storm water from the mines is the surface runoff from roads, reclaimed areas and undisturbed areas of the mines. This water is separated from mine drainage waters which includes surface runoff and seepage from waste rock piles, rock dumps, mill tailings, storage piles, etc. Mine drainage waters are collected and treated via the water treatment plants. Storm water is managed by using BMPs to control and remove sediment, the major pollutant in runoff from these areas. The current plan was accepted by all parties to the Consent Decree. The plan was not specific to either mine expansion or reclamation and is suitable in either case.

197. **Comment:** Appendix C: Draft MPDES Permits. Redo to reflect reclamation plan. (35)

Response: The permits were drafted in conjunction with development of the reclamation plan, therefore the permit requirements are compatible with the reclamation plan.

198. **Comment:** Appendix C: Draft MPDES Permits. Add effluent limits for bioremediation discharge. (35)

Response: Separate effluent limits for the bioreactor being constructed for selenium-nitrate-cyanide treatment of leach pad waters are not necessary because effluent from these cells will not be directly discharged. This treated water will either be (1) mixed with the effluent from the Landusky water treatment plant, in which case the combined effluent will still have to comply with the same MPDES limits set for the Landusky water treatment plant (designated as either outfall #560 or #591 depending upon discharge location in Montana Gulch), or (2) discharged to the land application disposal (LAD) area south of Zortman. In the second case, the MPDES limits set for the surface and groundwater compliance points downgradient of the LAD area would apply.

199. **Comment:** Appendix C: Draft MPDES Permits. Add a microbiological component to include bacterial counts and diversity of microorganisms present in reclamation area waters. (35)

Response: There is no known source of bacterial contamination from the mine, and therefore no need to require bacteria monitoring in the MPDES permit. Microorganism diversity assessments will not be included in the MPDES permit, but may be used in the assessment of these water bodies as a part of the TMDL process after the reclamation plan has been implemented.

200. **Comment:** As for the proposed wastewater effluent limits, why were the water quality standards for metals calculated based on the hardness parameter? Why are storm water outfalls not tested for any type of cyanide? Why are groundwaters not tested for mercury? Why is the numeric groundwater effluent limit set at 0.2 mg/l of total recoverable cyanide for the 30-day average and 0.3 mg/l for the instantaneous maximum for the ground water monitoring wells when the EPA only allows 0.07 mg/l of cyanide in mine waste waters? Aren't these wells monitoring the effects of these mine waste waters (i.e. infiltration into groundwater)? (32)

Response: Under the Consent Decree, cyanide was required to be sampled in stormwater. Based on sampling data required by the Consent Decree, cyanide has not been detected in the storm water since September 1997. Storm water from the mines is the surface runoff from roads, reclaimed areas and unimpacted areas of the mines. This water is separated from mine drainage waters which include surface runoff and seepage from waste rock dumps, retaining dikes, etc. After reclamation of the mines has been completed, storm water is not likely to come into contact with cyanide-containing materials. Therefore, cyanide is not expected to be present in the storm water. The concentration at which certain metals have a toxic effect on aquatic life depends on the hardness of the water. The State water quality standards (Circular WQB-7) for these metals are hardness-based, and therefore the water-quality based limits in the permit must also be based on the hardness of the water. As discussed in section F.2. of the Fact Sheets for both mines, mercury was analyzed in water samples from both mines during the 1990's. Only a few samples from the upper Ruby Gulch area had low levels of mercury above the laboratory detection limit. There is no reasonable expectation that elevated concentrations of mercury will be present in discharge waters, therefore monitoring is not required in the MPDES permits.

There are no EPA technology-based effluent limits for cyanide for these mines (see new source performance standards listed in 40 CFR 440.104). Therefore, the surface water limits for total cyanide are water quality-based. The total cyanide aquatic life standards in WQB-7 are 0.0052 mg/L (chronic) and 0.022 mg/L (acute). Both of these surface water limits are more stringent than the 0.07 mg/L limit referenced by the commentor.

201. **Comment:** Although monitoring is occurring in selected areas around the mine, Swift Gulch seems to be exceeding the levels mandated in the MPDES. Where is the monitoring data for Swift Gulch and who audits these data? If the data show no problem with Swift Gulch, why do so many individual accounts of the runoff signal a major problem? (31)

Response: Swift Gulch waters, as monitored monthly at station L-19, began to exceed the proposed MPDES permit limits during 2000. These data are routinely submitted to DEQ, EPA, Fort Belknap Environmental Protection Office, and Island Mountain Protectors. DEQ reviews the data and has been developing remediation plans to address the problems over the past year. The reclamation plans for the Landusky Mine are designed to minimize the mine discharges that are causing the elevated pollutant concentrations in Swift Gulch. It is expected that after the reclamation work is completed the pollutant concentrations in Swift Gulch will meet the MPDES

permit limits. Best management practices including reclamation and MPDES permits are the primary means for maintaining or restoring Montana water quality (303(d) List, 2000) under the Total Maximum Daily Load Program.

202. **Comment:** King Creek and Swift Gulch are considered as sources of drinking water among other uses. These streams will be impaired by the reclamation (Page 7 of the MPDES Statement of Basis). This is unacceptable. Alternatives must be found that will restore the water quality of these streams. (31)

Response: The Fact Sheet states that King Creek and Swift Gulch are currently impaired for drinking water uses, it does not state that they will become impaired due to reclamation. The reclamation plan is designed to improve the quality of these water bodies so their uses will no longer be impaired.

203. **Comment:** It seems absurd to delete the analysis for mercury and cyanide during the reclamation process. Allegedly it can be shown (although has anyone seen the results and quality assurance to back it up?) That no mercury has been present and cyanide was below an acceptable range for certain areas. However, how can it be known that during the reclamation process mercury or cyanide will not start showing up? The hydrology and geology of this region are too complex to state with any credibility that all is known and certain for any given alternative. (31)

Response: Analysis for mercury in groundwater and surface water at both mine sites occurred between 1990 and 1999. Some 1,875 water samples were analyzed for mercury during this period. It is evident from this extensive sampling throughout the Little Rocky Mountains, including many samples of the most acidic and highly ARD-impacted waters at the mine sites as well as samples from the highly alkaline cyanidated process waters, that mercury is not present at levels of concern within the formations of the Little Rocky Mountains. The trace levels rarely detected in upper Ruby Gulch may be related to placer or other historic mining, or may be false positive results. As mercury did not show up during active mining, there is no reason to believe it would be present during reclamation.

Cyanide has not been removed from the parameter list, except in a few locations which have no reasonable theoretical hydrologic connection to areas where cyanide has been used at the mines. Cyanide levels at the mines are now at less than 1% of the concentrations at which it was maintained in the process water during the 20 years over which leaching of ore occurred. Given these lowered concentrations, it is now much less likely that cyanide will be detected outside of the former leaching facilities and LAD areas than in the past.

204. **Comment:** Regarding the arsenic limit at the Landusky Mine: Why do the MPDES permits propose an effluent limit that is so far below background, the proposed 0.018 mg/l (Total recoverable)? Data from the 1979 EIS (pg. 37) lists Gold Bug adit water as having an arsenic content of 0.19 mg/l (TR). This test dates from 1977. Over the years the fact that arsenic is

naturally high (relative to standards) is well known. The discharge limit in the proposed MPDES permit is approximately an order of magnitude (10 times) more stringent than background levels. Seems like with the limited funds for operation of the treatment plants, you shouldn't be setting such a difficult and costly treatment requirement just to remove contaminants to 1/10 of background, only to have them increase again downstream. While there is probably some technical uncertainty as to exactly what background is, it seems like there is enough room in this range that DEQ ought to be able to arrive at some reasonable number between 0.018 and 0.19 that is both protective of the environment and cost-effective for treatment. (53)

Response: The baseline concentration of arsenic in Montana Gulch prior to 1979 was established in the report, "Water Resources of the Zortman-Landusky Mining Areas" (Botz and Gartner, 1978). The Gold Bug adit, which comprised nearly all of the baseflow of Montana Gulch, had a range of arsenic concentration of 0.18 to 0.31 mg/l in 1977 and 1978. The arsenic concentration of Montana Gulch at the county road was 0.11 mg/l in May 1978. The DEQ recognizes this as evidence of a naturally elevated pre-surface mining baseline level. These data, and those obtained from analysis of other water samples collected from Montana Gulch over the next several years (prior to observed changes in water chemistry related to Pegasus' operations), document that arsenic in Montana Gulch was substantially elevated (approximately 0.1 mg/L) prior to initiation of modern mining in the Landusky area.

As stated in the Montana Water Quality Act, 75-5-306 (MCA), it is not necessary that wastes be treated to a purer condition than the natural condition of the receiving stream as long as the minimum treatment requirements are met. However, DEQ does not consider the 1977-1979 baseline data for Montana Gulch as representative of the stream's natural condition. The natural range of arsenic concentrations in upper Montana Gulch, prior to the development of underground mines in the area between 1890 and 1960, is unknown. Discharges from historic underground workings are not regarded as natural, and are subject to water quality standards. In addition, the Water Classification System described on page 3-56 of the Draft SEIS and developed in the Hydrology Support Document, found that groundwater in the naturally mineralized zones had an average arsenic concentration of 0.1 mg/l or greater. Arsenic concentrations in groundwater within the mineralized syenite of the Little Rocky Mountains show a high degree of spatial variability, undoubtedly related to short-range variations in the degree and type of mineralization. The naturally elevated arsenic concentrations in groundwater may or may not have correlated with elevated arsenic concentrations in Montana Gulch surface water prior to the initiation of underground mining. The development of mine workings fundamentally changes a site's hydrogeology (more groundwater is drawn down deeper into the mountain, contacts previously unweathered rock, and then discharges to the surface at a single location rather than as diffuse seepage) which in turn may significantly alter natural geochemical processes of attenuation that may occur between groundwater and surface water. In the natural state, mineralized groundwater discharging to the surface as seepage over a wide area may have time to become fully oxygenated prior to reaching a stream, thus dropping out dissolved constituents such as iron and arsenic within ferricrete deposits peripheral to the stream. However, once flows have been concentrated via development of underground mine

workings, the discharge to surface becomes much more rapid and substantial oxidation of the groundwater does not occur prior to reaching surface water.

The natural condition of Montana Gulch may have been analogous to Swift Gulch, which lies at the other end of the mineralized shear zone that extends between the two drainages and hosts the majority of the Landusky-area precious metal deposits. Despite the concentrations of arsenic in groundwater within the mineralized syenite bedrock surrounding Swift Gulch, water quality sampling in Swift Gulch (at site L-19) in the late 1980's prior to substantial development of the Queen Rose and Suprise pits indicated arsenic concentrations in surface water in the 0.010 to 0.020 range, which would be consistent with the proposed MPDES limits.

All mine drainage waters, including the Gold Bug Adit and WS-3 will continue to be routed through the Landusky water treatment plant. The current plant, although not specifically fitted with an arsenic treatment process, nonetheless removes a significant mass of arsenic in the lime precipitation process. The agencies will monitor the arsenic concentration in the Landusky water treatment plant effluent and the assimilative capacity of Montana Gulch as reclamation progresses. Based on trends established following reclamation, if elevated arsenic levels persist, additional treatment, pre-treatment processes or mixing of process waters may be implemented.

In the event that sufficient credible data are obtained to prove that arsenic levels in surface water in Montana Gulch exceeded the proposed MPDES limits prior to any development in the area, the managing agencies could submit a petition to the State's Board of Environmental Review for a water quality reclassification of Montana Gulch. This petition would be made in accordance with applicable State (see 75.5.310 (MCA)) and Federal laws if information indicated the stream to be misclassified and the requirement for additional arsenic removal to be unwarranted.

6.6 SOIL and RECLAMATION

205. **Comment:** There's a terrible big hole there and I was wondering if they were going to cap that after they get through, with bentonite or whatever they use, or just cover it up the way it is. If they don't, I'm scared that drainage is going to come right down into the groundwater and everything. (HA-4)

Response: Synthetic liners are proposed for covering the backfilled Zortman Mine's Ruby and O.K. pits, and the Landusky Mine's Suprise and Queen Rose pits. These are being used to reduce the potential for impacts to groundwater.

206. **Comment:** It appears that it is proposed to deposit the heavy metal sludges from water treatment pretty much at the top of all these drainages. Were other alternatives considered, or is this it? It didn't really say. If there were others, why was this chosen over the others? Why not dry it somehow and haul it off? Why not try to reclaim some of these metals? At some point the plastic barriers are going to wear out and allow the sludge, with concentrated heavy metals, to enter the groundwater and/or surface water as runoff. Putting all of the sludge from the water treatment plants at the top of the watershed represents extremely poor planning. (HA-1, 31)

Response: Sludges from the Zortman water treatment plant are placed on the Z89 leach pad, which was built with a synthetic liner to protect groundwater. Should leakage occur there is an underdrain beneath the leach pad which reports to the Ruby Gulch capture system. Similarly, the Landusky water treatment plant sludges are placed on the lined L83 leach pad, which was constructed in a tributary to Montana Gulch. These sludge disposal options were selected during the Consent Decree negotiations (ZMI, EPA, FBICC, DEQ, & IMP). The water treatment plant sludges have been tested and the results show that the metals in the sludges are not easily remobilized and that the sludges don't constitute a hazardous waste.

207. **Comment:** Where they had that fire in 1988 there are ten thousand young trees per acre up there. I think those need to be managed. We can't just home in on the mine itself. There's got to be some management up there, and we have the manpower here to do that. We have fire crews that are waiting to go on fires, but they like to work their mountain. (LO-6)

Response: Forest management beyond the mine reclamation area is outside the scope of this analysis. Presently the BLM is developing a long-term management plan for the forest resources in the Little Rocky Mountains. You can participate in that planning effort by contacting the BLM office in Malta.

208. **Comment:** Have you guys got a record that shows where one of your mining cleanup deals have worked? Can you prove to us that this works? From what I'm understanding, there's never been a mine in this world cleaned up, reclaimed. Nobody knows how to do it. (LO-9, LO-12)

Response: There are many examples where both modern and historic (abandoned) mines have been successfully reclaimed. In some cases, such as at the Zortman and Landusky Mines, long-term water management and treatment remains necessary after reclamation is complete.

209. **Comment:** You state on Draft SEIS page 2-124, Alternative L6, Total Backfill and Topography Restoration, that 65.3 acres would be revegetated. Does this include my patented claims? (7)

Response: Yes. The reference to reclamation and revegetation acreages includes all disturbance caused by mining irrespective of ownership.

210. **Comment:** I have asked to place the waste rock in the Suprise Complex and asked not to go below 40' so rock could be moved around under the Queen Rose Complex. Below 40' would hinder the mine. (7)

Response: Under the preferred alternative (L4), backfill would be placed in the Suprise and Queen Rose pits sufficient to allow drainage of storm water out of the pit complex. Some highwalls would also be covered with clean rock. This is necessary to minimize water pollution.

211. **Comment:** All highwalls should be covered or brought down. Then the area needs to be properly covered and sealed to stop water infiltration and AMD generation. We don't agree with the premise that the highwalls should stay up because bringing them down may expose more ore or AMD generating rock since adequate covering will solve this problem. This is especially true for acid generating high walls as do now exist at the mine. (12)

Response: Aside from aesthetics, there is no benefit from eliminating highwalls that do not contain much acid generating rock. Furthermore, there are not sufficient quantities of non-acid generating rock to completely fill the pits to where they would cover all the highwalls. If acid generating rock is used as backfill, it will increase groundwater pollution because broken rock has orders of magnitude more surface area to release pollutants than does solid rock walls that remain in place. In addition, no liner cover system can completely stop water infiltration and ARD generation in the long term.

212. **Comment:** Draft SEIS, Page 2-19. (Water Barrier Covers) What is the expected longevity and thickness of liners? Will somebody address the lining material, its longevity, what it's made out of, because that's a high cost item. (LA-2, 6, 32)

Response: Page 4-59 of the Draft SEIS states, "Geosynthetic liners would have a functional life of about 100 years." after which they would slowly decompose. Page 2-19 states, "HDPE stands for high density polyethelene. This is basically a plastic sheeting that is laid in large strips and seamed together. Other similar synthetic materials, such as PVC or hypalon, may be substituted if determined more desirable or cost effective." The liner that would be used in the water barrier covers would be HDPE or PVC material. The actual liner life is an unknown. None of the liner

manufacturers have ever conducted any long-term studies of the actual life of liners. The only study is a Bureau of Reclamation review of ditch liners where they evaluated 10 mil PVC ditch liner life. They found that these were intact after 30+ years. This exposed, heavy water flow application is not the same as the mine application. The current manufacturer warranty of a 30 mil PVC liner is 20 years and 10 years for a HDPE liner due to increasing liability issues. The installers polled all believe that under the proposed, unstressed, application and with proper installation, that both the PVC and HDPE should last 100 years. The GCL is only used in Alternatives L1 and Z1 and as part of interim reclamation in the Suprise and Queen Rose pits at the Landusky Mine. The mechanics of deterioration for PVC are that the plasticizers migrate out. The HDPE liner material eventually crystalizes. The GCL clay liners are subject to expansion and shrinkage of the clay within the liner. On a leach pad application, the GCL can also crack due to a reduction in swelling caused by the exchange of Ca2- in the infiltrating water for Na+ in the bentonite with the reduced swell capacity insufficient to seal preferential flow paths formed during desiccation when the GCL is dehydrated in the summer months.

The proposed liners for the Zortman Mine are a 30 mil PVC liner over the O.K./Ruby pit complex, the North Alabama pit, and the upper Alder Gulch waste rock dump. A 40 mil high density polyethylene (HDPE) liner is proposed in the ditch across the Zortman Mint pit and around the north side of the Z 85/86 leach pad. The HDPE typically consists of about 97.5% polyethylene resin, 2.5% carbon black and trace amounts of antioxidants and heat stabilizers. The proposed liner for Alternatives L1 and Z1 and the Landusky Suprise and Queen Rose pit floors is a geosynthetic clay liner (GCL) composed of a layer of bentonite sandwiched between two geotextiles. The Suprise and Queen Rose pits will have a layer of compacted bentonite as a cushion layer under the GCL liner.

213. **Comment:** As for the liners chosen for the pits, will there be a leak detection system installed? Why are only certain pits to be lined with these liners? (32)

Response: Leak detection systems are not proposed in any of the alternatives. The liners are intended only to reduce infiltration through the reclamation cover, directing it laterally, not to prevent it. Therefore, a leak detection system is not considered necessary. There are numerous monitoring wells which will be used to verify water quality and quantity. Only certain pits are lined because only certain pits have the potential for significant amounts of infiltration to come in contact with highly sulfidic material that would generate large amounts of acidic drainage in adjacent streams.

214. **Comment:** Section 2.1, Significant Issues and Alternatives, Mine Pit Backfill. The mine pits and highwalls should be reclaimed regardless of the economic cost with associated backfilling according to all Federal and State environmental laws and regulations. (44)

Response: The reclamation plan ultimately selected by the agencies cannot include highwall and pit reclamation that does not meet legal requirements. However, neither the Metal Mine

Reclamation Act, the Federal Land Policy and Management Act, nor the rules adopted under these acts require complete backfill of mine pits and highwalls.

215. **Comment:** The potential advantages of full removal of the Sullivan 1991 pad with the contents being placed in adjacent pit areas should be considered a part of full Landusky Mine reclamation. First, the Sullivan pad is the biggest visual impact to the people of the Fort Belknap Reservation and should be removed. Secondly, the pad is a very large collector of water that creates AMD. It certainly also has free cyanide in it that is a threat. Third, we feel it is better to fill in the pit, seal it and then capture the contaminated waters. Finally, common sense tells us that the liner of the Sullivan pad will not last as long as AMD is generated in the pad which some experts say will be hundreds of years - or as another expert said, "until the next ice age..." Surely the current liner under the pad will not last that long. At that point, someone will have to remove the pad and redo the liner or some other treatment - probably put the pad contents into the pits. Leaving pads as they are is not reclamation, it just postpones future, real reclamation which will most certainly have to be done in the future by future generations. (47)

Response: The agencies also have concerns about the material on the L91 leach pad, and believe that the comment cites excellent reasons to not increase the risks to groundwater and northern drainages by moving this material into the mine pits. It is the L87 leach pad which is most visible from the Reservation. Reclamation of the L87 and L91 leach pad in-place would significantly reduce their visual impact. The same concerns you have raised regarding the ultimate life of the liner system would apply if the leach pad material was removed and placed in the lined pits. The only difference would be that failure of the pit liner would result in contaminated water migrating north. While failure of the current leach pad liner (which monitoring shows is intact) would result in contaminated water moving south, into existing collection systems, and away from the Fort Belknap Reservation.

Failure of a liner beneath backfilled pits would result in the release of pollutants into a groundwater regime from which it would be much more difficult to recover than a release of similar pollutants from the leach pad locations. Furthermore, the pits could not be completely lined prior to placement of the acid generating spent ore due to the steepness of the pit highwalls.

6.7 VEGETATION

216. **Comment:** Where is the contingency plan if the vegetation up there fails? (LO-7)

Response: Under the various reclamation alternatives a portion of the funding would be held in reserve to do follow-up re-seeding, fertilization, and erosion repair.

217. **Comment:** I would prefer using alternatives that have a greater percentage of revegetation done on them. When mining ceased, a total of 851 acres at the Landusky Mine and 404 acres at the Zortman Mine had been disturbed. At the Zortman Mine, Alternative Z4 has the best percentage of reveg-cover (84%), most of the increase is in the forest vegetation type which would occur over the backfilled mine pit areas. At the Landusky Mine, I recommend using Alternative L6. Alternative L6 would take more time to complete, because of all the backfilling to eliminate the highwalls and revegetation up the pit highwall areas. A total of 92% of the mine disturbance would be revegetated using forest vegetation. (39)

Response: It is difficult to get to 100% revegetation of the disturbance area for several reasons. One reason is that post-reclamation access roads for conducting monitoring and maintenance of the water capture and treatment systems have to remain under all alternatives. The second reason is that under some of the alternatives the remaining rock highwalls could not be revegetated.

218. **Comment:** In Section 3.5 of the SEIS, it says no other noxious weeds were observed in the study area, however, "Astragalus bisulcatus" was left out and has taken over the slopes and adjacent streambanks above Cumberland Dam. Attached is some information on the plant. (39)

Response: This plant is not listed as a noxious weed in the State of Montana.

219. **Comment:** In the Ethnobotany section (3-120) traditional uses of some plants have been documented, but only a few of these species are included into the Seed Mix Plans. I would like to see a higher percentage of these species (Snowberry, Wildrose, Juniper, Oregon Grape) incorporated. I recommend using other species as well (Red Osier Dog Wood, Currents, Service Berry, Yarrow, Arrowleaf Balsamroot, and native grasses). (39)

Response: The seedmix used in the reclamation is intended to establish a cover that will minimize erosion and infiltration, and provide for wildlife habitat while at the same time being nonpersistent so as to allow for native species such as those mentioned above to gradually encroach on the reclaimed area. The agencies would be willing to include the species you suggested directly in the seedmix if it does not conflict with these reclamation objectives.

220. **Comment:** Reclamation Grading, Cover Design, and Revegetation. The Fort Belknap Indian Community Council recommends more money being set aside for future revegetation at both mines as the reclamation that has been performed by the previous mine owners was unsuccessful. (44)

Response: The agencies believe that the amount of money shown as set aside in Tables 4.12-1 and 4.12-2 would be adequate for reclamation repair. This is for several reasons. One, the last spent money is a cash outlay from the sureties that is held in an interest-bearing account. Two, the interim reclamation conducted to date appears to be successful despite a below-normal precipitation year. And three, actually a large amount of the reclamation done by ZMI, some as long ago as 10 years, is still in fairly good condition.

221. **Comment:** Some of the trees and stuff they planted up here by Pegasus all died. We've got pictures of where they've been planted but it didn't work. I don't know what killed them, and I don't know what's happening to our trees on the reservation side, the big Ponderosas and stuff. The seed trees have cones, but there's nothing in them. I don't know if this has something to do with the heavy metals or what. I'd like to see a study done of that whole thing all the way down. A lot of the plants and stuff that the Indian people use are along this creek. There's so many plants that are just not coming back to what they were before when the mine was operating. (HA-4)

Response: Many of the trees that were planted by ZMI appear to be healthy after some 10 years. Others appear stunted. This is believed to be a function of the amount of soil that was placed in the reclaimed areas. Trees planted in areas with thin (8-12") soil are not doing as well as trees with thick soil covers. That is one of the reasons the reclamation plans call for at least 18" of soil cover to support revegetation.

6.8 WILDLIFE and AQUATICS

222. **Comment:** Senator Baucus is going to go back for [funding] the Fort Peck fish hatchery. Should the ARD get away, that'd pretty much kill all the fish down there, wouldn't it? (LO-6)

Response: It is highly unlikely that degraded water would reach the Missouri River, even if the water capture and treatment systems were to completely shut down. Even if it did, the Fort Peck fish hatchery would not be affected by ARD. In order for toxins from the mine to reach the fish hatchery, they would have to pass through Fort Peck Reservoir which at maximum capacity holds approximately 18.7 million acre feet of water. Any toxins that escaped the mine would be diluted to lower than toxic levels long before they reached the Fort Peck fish hatchery site that is proposed to be built downstream of the Fort Peck Dam.

223. **Comment:** None of the preferred alternatives that are listed in the SEIS take into consideration the animals using the water for consumption here and now. What are the effects to animals using the water for consumption? Can the metals bioaccumulate and are they affecting birth rates of the animals in close proximity to the mine and its contaminated waters? I am a hunter and have been cautious about consuming meat that might be affected by mine activities. Is this possible? In the SEIS all that is mentioned is the possibility of vehicle animal collisions. This should be the last thing on people's minds. What are the effects to the animals physically from drinking the contaminated water? The SEIS also mentions covering the water sources that are being treated so the animals are not utilizing mine water for drinking water. (29)

Response: Where there are capture systems, the water from the mine waste piles is captured and treated before reaching surface water. In Swift Gulch, which does not have a capture system, the primary concern is iron and manganese, but these constituents do not have toxic effects. At the Zortman Mine, the Ruby capture pond is fenced to reduced access by animals. There is a very low potential for exposure of wildlife to contaminated waters. The mines' water treatment systems consists of capture ponds which contain heavy metals, have no vegetation, and are fenced off. These capture ponds provide little attraction to wildlife. The water in the capture ponds is treated to remove heavy metals before the water is released. However, there is still some potential for accidental exposure of wildlife, with the possibility of bioaccumulation and bioconcentration in the food chain if wildlife were to ingest contaminated water. The degree to which an animal may be affected would depend on the amount of exposure and the type of contaminants that it is exposed to. It is difficult to determine what effects the heavy metals may have on wildlife that consume contaminated water because mortality would not be instantaneous. It is more likely that the animals would become sick over the time period that they are exposed and die off site of the contaminated water source. At present, it is unlikely that any wildlife death is linked to heavy metal toxicity. Die-offs have not occurred on a large scale, which would be indicative of exposure of the population. Mule deer and white-tailed deer populations in the Little Rocky Mountains appear to be healthy. Doe-fawn ratios appear to be normal and a variety of age classes are present, indicating that there is not a problem with heavy metals affecting birth rates. Regarding concerns about

consuming meat that might be affected by mine activities, a good guideline to follow, regardless of where the animal is taken, is: Don't eat the meat of an animal that appears to be sick.

224. **Comment:** Azure cave is one place that might be affected should the new water treatment plant be placed at Goslin Flats. The fact that it is possibly the northernmost bat hibernaculum in the United States should be reason enough to persuade the public that the people who wrote the SEIS are not taking the wildlife into account at all. It says in the SEIS that the bats will not be affected by the noise and commotion at Goslin Flats. How do they know this? (29)

Response: It should be noted that relocation of the Zortman Mine water treatment plant to Goslin Flats is not a part of the agencies' Preferred Alternative. The 1996 Final Environmental Impact Statement for the Zortman and Landusky Mine expansion analyzed the impacts on bats hibernating in Azure Cave from the noise created by the development of an ore conveyor belt and leach pad in the Goslin Flats area. It was determined that the noise heard at the entrance to Azure Cave would increase above background levels due to such activities on Goslin Flats. Noise levels were estimated to be 59 dBA, 14 dBA above background. This level is comparable to noise levels that occur in urban residential areas. Literature reviews and consultation with experts at Bat Conservation International determined that the activity proposed in the 1996 FEIS would have little impact on the Azure Cave bats (FEIS 1996, pg. 4-147). Placement of the water treatment plant under some of the Zortman Mine reclamation alternatives would result in considerably less noise than was proposed for the area in 1996 and consequently would have negligible impact on the bat population.

225. **Comment:** The health of the streams and organisms that are living there should be at the top of the list for discussion. The low diversity of taxa and abundance of the streams that were studied should say something about the quality of water coming directly from the mine. The studies I am referring to are listed but not shown in the SEIS. Will the health of these streams be the same as in 1996 when the macroinvertabrate collections took place? (29)

Response: The seepage capture and treatment systems have been improved since 1996, resulting in less pollution to these drainages. Most of the southern drainages (Ruby, Alder, Mill, and Sullivan gulches) are ephemeral or intermittent streams and do not provide quality habitat for aquatic life. The 1996 study showed that of the sample sites that had above-ground flow, the invertebrate populations had Shannon-Weaver diversity values which indicated balanced or healthy populations. Tables 2.8-1 and 2.8-2 list the effects each alternative would have on ground water quality and quantity for various drainages associated with the mine. In addition to these tables, Section 4.6 of the SEIS describes the effects of each alternative. In general, reclamation activities will improve water quality and quantity in most drainages, which should result in benefits for aquatic organisms in these drainages over time.

226. **Comment:** I see also in your SEIS that you have fish in three drainages, but they're further downstream. You've identified, I believe they were brook trout, is that right? To my mind,

Lodgepole Creek never did have brook trout in it. We always caught rainbow trout. So evidently these brook trout are planted fish. It was my understanding that planted fish don't spawn. We had Fish and Game come in here through the years and plant fish in the spring, and if we didn't catch them all they'd die or something. (LO-6)

Response: Populations of planted fish can spawn. Seasonal low water flows may be the reason fish populations cannot be sustained from year to year. The water quality in Lodgepole Creek remains pristine and unimpacted by mining. Nor has the water quantity been reduced by mining activity. Lodgepole Creek should be able to support the same fish populations it always has.

6.9 AIR QUALITY

227. **Comment:** One of my concerns was with the air quality monitoring they are doing. I have noticed they are monitoring in Zortman and Landusky, but there is no monitoring in the communities of Hays and Lodgepole, which lie directly northeast and northwest of the reclamation activities. Even though the air they are monitoring in Zortman/Landusky meets the State and Federal standards, with the winds coming off the mountains, there is the potential of carrying pollutants into these two communities. As you know, we use the canyon for our annual pow-wow, cultural activities, and various other activities year round. I have been up to tour the mines at various times and noticed the heavy wind activity. (25)

Response: Air quality impacts during reclamation should be less than during operation of the mines due to a lower amount of material moved per day. Air quality would improve further after reclamation is completed. Landusky is by far the nearest town to the mines, and Zortman is downslope of the prevailing wind direction. So these communities should experience the greatest impacts to air quality.

6.10 LAND USE

228. **Comment:** All our homes are built right along the road that goes over the hill from Landusky to Zortman. Even with the limited traffic, dust is a constant battle. The safety of the children attending the school near the road is a concern. We are strictly a residential district and will never open a business to warrant the added access to Landusky. If the road should open, does the county's budget allow for the high maintenance required? Who would be responsible for the liability on the proposed road? Why not open only one side for travel to the communication equipment. Making the road available as a shortcut from Highway 66 to Zortman would cause hardship to the Landusky residents and cancel any reason we chose to live here. The last of the businesses in Landusky closed over twenty years ago. The mining company closed the mountain road because of insurance liability. I would feel safer if the road was not open for strangers to drive through our town. (1, 2)

Response: The access roads running from Landusky to both Hays and Zortman will be left in place under all reclamation alternatives. However, for the foreseeable future the roads will not be open to the general public in order to protect the reclaimed areas from vehicle impacts. If the roads were to be opened to the public at some time in the future, an agreement would have to first be reached between BLM and Phillips County regarding road maintenance.

229. **Comment:** A thru road into Landusky from Zortman, and possibly from Hays, would negate all the qualities which made us decide to select this site as our retirement home. We cherish the security our dead end road affords us. We do not understand the need to open this road because we offer no services in our town. When the dust blows thru town from increased traffic it will be impossible to dry our clothes outside. A road over the mountain would by winding and steep and therefore dangerous, especially during the winter months. If Zortman and Hays need access to each others communities you should open a road between the two communities and leave our isolated community isolated. (3)

Response: For the reasons you have stated and to protect the reclaimed areas, use of the road will be restricted to activities associated with mine reclamation and water treatment. The road will not be open to the general public at this time.

230. **Comment:** We like the quiet and remoteness of Landusky. There are two roads that go into Zortman already and we don't think another one will help them out at all; it is not that far to go around. We don't think the county and whoever would be responsible to keep up the road through the mountains could adequately maintain a road that would be open for the public. Traffic currently has no consideration for the ones who live here and have to put up with all the dust, let alone to make sure all is clear on the road. There are so many reasons not to open it and so little reason to reopen it we just hope you take into consideration all of the ones who live here and are around most of the time before there are any concrete plans for reopening it. (4)

Response: For the reasons you have stated and to protect the reclaimed areas, use of the road will be restricted to activities associated with mine reclamation and water treatment. The road will not be open to the general public at this time. If the roads were to be opened to the public at some time in the future, an agreement would have to first be reached between BLM and Phillips County regarding road maintenance.

231. **Comment:** I need more information from these people [the agencies] on the right-of-ways of roads and the roads that exist. I do need the road to cross into my private claims and out the other side. Pegasus was supposed to keep that up but they let it go. (LA-4)

Response: The main access roads would remain after reclamation. Other roads in the area that were constructed by Pegasus would be reclaimed, as they were only permitted as temporary roads. Roads on private lands may be left if they would not create environmental problems and the landowner releases the State from reclamation liability.

232. **Comment:** Roads need to be built from the LeRoy fraction and across the Montana and Defiance to the Complex and Swift. We need the road rebuilt and the waste removed for drilling and underground mining. Roads left open and rebuilt should be constructed for the two groups of patented claims of the Old Fergus Mining Company. The road should continue over Regal Mountain to the head of the north fork of Little Horn and at the head of Peoples Creek. (7)

Response: Any new roads would have to be constructed at the miner's expense, and only after completing all permitting requirements for mineral exploration.

233. **Comment:** We had talked with mine officials early in the bankruptcy, and somewhat with the BLM, about moving the road up to the communications equipment, making less steep slopes and still being able to access the equipment. I was wondering where that issue was. (LA-1)

Response: It appears that under the preferred alternative the existing access road from Zortman to the communication site can continue to be used with only minor alteration through the mine pit area.

234. **Comment:** Page 2-20: The draft SEIS states that some of the post-reclamation access roads may be restricted to authorized personnel only. The primary reason for reclamation is so that tribal members can once again use the Little Rockies in the same manner that they were used prior to the onset of open-pit cyanide heap-leach mining. Restricting access will undermine this goal. Further explanation of which roads will be restricted and the reasons for these restrictions must be included. (27, 44)

Response: The primary reasons for reclamation are stated in Montana's Metal Mine Reclamation Act, 82-4-301 MCA, and the BLM's surface management regulations at 43 CFR 3809. Tribal members and the public will be able to use the Little Rocky Mountains. However, vehicle access

for that use may continue to be restricted in order to maintain the security of the water collection and treatment facilities, for public safety reasons, where private land restrictions apply, or to minimize damage to reclaimed areas until vegetation becomes adequately re-established. The ultimate decision on vehicle access would have to be made with the county and through BLM's land use planning process.

235. **Comment:** I have another great problem with the pit liner because when you take the ore out from underneath the liner you're going to get in great trouble because it's going to fall and we have to put holes in it again to check and cross-check the first drilling program that I did here in the mountains. (LA-4)

Response: Any redisturbance of the reclamation area for mining purposes will not be allowed without first obtaining an operating permit and posting the required bond to assure reclamation performance and water treatment. Such issues as how to prevent impacts to the existing reclamation would have to be addressed at that time.

236. **Comment:** When you put the liner in, on my drilling program there will be approximately 250 holes drilled in the bottom of the pit, or a cross-section of the pit. What will plug that liner up again so it don't leak? (LA-4)

Response: Redisturbance of the reclamation area for mining purposes will not be allowed without first obtaining an exploration license or operating permit and posting the required bond to assure reclamation performance. Measures to ensure the continued integrity of the pit liner would have to be included in any such plan approvals.

237. **Comment:** The liner within the August/Little Ben Suprise Rose pit complex would be a hindrance to future mining. The liner in the pit would be an invasion of property rights to a new company interested in mining the ore. The company's plan is to drill to check the reserves that have already been drilled and the drilling goes to the stock works, 500' in depth by the drill holes. (7)

Response: The liner to be placed over the backfill that Pegasus Gold put in the Queen Rose and Surprise pits is necessary to control pollution that may leach from the backfill. As the landowner leased the claims to Pegasus Gold to allow mining under State operating permits, the mining authorized under those permits has been completed and reclamation of those pits, including liner placement, would not be an invasion of private property rights.

238. **Comment:** When the liner is placed in the Suprise pit complex, the water is apt to seep underneath the liner from fractures with contact ore that is in the walls. The underground water in a wet year will rise and apt to make an angle of dams and the liner will push water to the north. This will hinder underground mining that is beneath the liner. A death trap may occur for the miners if the water drains on the south end of the pit, as it may plug up and water will fill up underneath the liner. (7)

Response: Such concerns would have to be addressed during engineering design of any subsequent mining proposal.

239. **Comment:** Page 4-97, 4.8 Land Use, Impacts Common to All Alternatives. Public Land Order 7464 created a locatable mineral withdrawal on 3,530.62 acres of public lands in the Little Rocky Mountains. The Draft SEIS states that upon the expiration of the locatable mineral withdrawal, they would be available for the purpose of mining again. Is it the BLM's intention to facilitate future mining in the Little Rocky Mountains during or after the reclamation of the mine sites? (27, 44)

Response: Under the General Mining Law, all public lands, unless withdrawn, are available for mineral entry and development. The justification BLM used for the five-year withdrawal was to protect the area during reclamation activities. After the five-year protective withdrawal has expired, the 3,530.62 acres of public land will be open to mineral entry. BLM is not facilitating future mining; future mining is provided for under law unless a withdrawal action prevents it.

240. **Comment:** It is apparent in your Preferred Alternatives that just enough backfilling of the pits will be done to make future gold mining at this site feasible again should gold prices rise. (40)

Response: The various pit backfilling amounts under each alternative were developed to achieve a specific environmental goal, and not to increase or decrease the potential for future mining. The future of gold mining in the Little Rockies is probably more dependent upon the price of gold, and the expense of necessary environmental controls, than on the amount of pit backfilling required.

241. **Comment:** All public lands in the Little Rockies should be permanently withdrawn from future mineral entry. Private claims should be closed out through purchase or trade. The notion that we are contemplating the expenditure of many millions of dollars for reclamation while at the same time leaving them open to possible future mining seems wasteful and irresponsible. (46)

Response: Changes in long-term management of the Little Rocky Mountains is outside the scope of this Supplemental EIS, the purpose of which is to consider the necessary reclamation actions for the specific disturbance at the Zortman and Landusky Mines. Other processes such as consideration of a long-term withdrawal through an amendment of the Judith-Valley-Phillips Resource Management Plan would have to be conducted to consider changing overall management of the Little Rocky Mountains. Such a process would take several years and occur independent of any decisions on mine reclamation.

242. **Comment:** What if gold went up like $600 an ounce and we start getting hammered on by these mining companies again. Is there things in the plans to stop them if they did start hammering on us again to mine? I was just wondering if everybody was making plans just in case if that does happen, to counteract or to stop it. We need to be addressing the question of potential future mining in the Little Rockies, in particular the area that's been mined. If we don't address that issue now, we may be leaving ourselves open years down the line to just have more mining come into this area

when the price of gold goes back up. People don't want future mining in these mountains by anybody. We should be dealing with the question, is this an appropriate area for mining at all, and if it's not we should be talking about a permanent mineral withdrawal up there. (LO-2, LO-8, HA-3, HA-4)

Response: If new mining were proposed, it would have to comply with all environmental laws, including permitting and bonding requirements, in place at the time. There are other processes outside the scope of this reclamation plan review, such as land use planning and withdrawal, that are used to determine whether an area is to remain open to mining activity.

6.11 RECREATION and VISUAL RESOURCES

243. **Comment:** Why is Alternative L4 the preferred alternative, as opposed to Alternative L5? It's the aesthetics, where it's essentially going to look about like it does now, which I think a lot of people might find very objectionable. (HA-1)

Response: Alternative L5 would look virtually the same as Alternative L4 from a distance. The main difference visually is that Alternative L5 would reduce the pit-like appearance from close up. However, a highwall would still be visible under both alternatives. The main difference is that the use of sulfide-bearing waste rock under Alternative L5 would present a greater risk to water resources, especially those in northern drainages. So while visually there is not much difference in Alternative L4 versus L5 for the distant viewer, Alternative L4 is preferred due to its reduced impacts to water quality.

244. **Comment:** We still have hunting rights along the Missouri Breaks. Malta people and the BLM airplanes keep the big game from coming to the mountains. They keep the Indians from hunting on land that was once theirs. You should educate your BLM game wardens about our treaty rights of hunting, fishing. (13)

Response: Hunting is regulated by the Montana Department of Fish and Game, not by BLM. Questions regarding game regulations can be answered by your local Game Wardens.

6.12 CULTURAL RESOURCES

245. **Comment:** Nowhere did I see any evidence that anybody went out during the process of making this document and interviewed the traditional cultural leaders, the spiritual leaders. There's nothing in here about the views of the traditional people as to which alternative is the one that should be accepted. I think it's a serious problem because all along one of the really important things about this whole particular mine case is these are mountains that have particular value and meaning to the traditional Native American people. So spiritual values and cultural issues have been very important in this thing right from the beginning. Yet the document does not have anything in it except to say there's some cultural values. The mountains are full of spiritual sites and religious sites. I don't think that this document really approaches it from that. It's mostly just what's best from the standpoint of water treatment. (LO-2)

Response: SEIS Section 3.10.1 provides the background for understanding the concerns of American Indian traditionalists. The range of alternatives in the Draft SEIS, developed in concert with the Fort Belknap Indian Community Council (FBICC), was designed to include a variety of viewpoints on reclamation. The FBICC represented the views of its members while participating as a sovereign Tribal government in the development of the Draft SEIS, and all members of the public have been free to express their views on appropriate reclamation. A specific meeting was held in December 1999 with the traditionalist societies to solicit their views on reclamation. At the same time, these alternatives represent a shifting balance between the various resources considered since what is optimal for one resource will not be optimal for all others. Please see SEIS Section 4.10 for a comparison of the impacts of the alternatives. As indicated in that section, Alternatives Z5 and L6 would be most beneficial at restoring traditional pre-mining uses.

246. **Comment:** Draft SEIS, Page 3-134: The section on cultural resources is primarily a history lesson taken from various books and studies. The entire section would benefit from more information from Fort Belknap elders and traditionalists regarding their views on what would constitute adequate reclamation. (27)

Response: The 1996 Final EIS provides additional discussion of cultural resource values which are applicable today. Draft SEIS Section 3.10 was intended to provide enough information for the reader to understand the resources involved as a basis for comprehending the benefits and drawbacks of each alternative. While more information is often desirable, it is unlikely that additional information would significantly alter the impact assessments in Chapter 4.

247. **Comment:** I have been told on the mine tour that blasting on Spirit Mountain will occur with any alternative. This is culturally insensitive, as many might feel that this is one last slap in the face. (31)

Response: Reclamation involves balancing the benefits and drawbacks of each measure for each resource identified. This is illustrated by the Multiple Accounts Analysis (Draft SEIS, Appendix A) which shows that what is best for one resource may not be the best for another. Blasting is

proposed to break up the unnatural appearance of the vertical highwall and create a visually more natural landscape, which has been one objective of reclamation.

248. **Comment:** Draft SEIS, 3.10 Cultural Resources. Would be helpful to have more information from elders and individuals who actually practice their cultural ways, and even include the views of the White Clay Society and Buffalo Chasers Society. (43)

Response: Section 3.10 was intended to provide enough information for the reader to understand the resources involved as a basis for understanding the benefits and drawbacks of each alternative. While more information is often beneficial, it is unlikely that additional information would have significantly changed the impact analysis in Chapter 4. Groups and individuals were provided opportunities to express their views and preferences in addition to the formal involvement of the FBICC as a participating sovereign Tribal government. The agencies have consulted with the traditional societies as part of the alternatives development process. Comments were received from members of the traditional societies and are published in this SEIS. The 1996 Final EIS provides additional discussion of cultural resource values which are applicable today.

249. **Comment:** Draft SEIS, 4.10 Cultural Resources. Should be consistent under each alternative when reclamation would be complete and the percent of revegetation that will be complete. (43)

Response: See additions to Alternatives Z3, Z6, L3 and L4, SEIS Sections 4.10.2 and 4.10.3.

250. **Comment:** Restoration of Area Aesthetics and Land Use. The Fort Belknap White Clay and Buffalo Chasers Societies and the general public use the canyon for our annual pow-wow, cultural activities, and various other activities year round. The unreclaimed highwalls are an eye sore to our culture and to the tourists that visit our reservation and surrounding communities. (44)

Response: Alternatives L1-L6 include regrading of the L87 leach pad and either blasting of the highwall or backfilling to reduce the visual impacts of these mining features.

251. **Comment:** Draft SEIS, 3.10.1 The Little Rocky Mountains as a Traditional Cultural Property District. What happen to this study to list the entire Little Rocky Mountains as a Traditional Cultural Property (TCP) District under criterion of 36 CFR 60.4? Which would make future mining non-existent. (44)

Response: The Little Rockies have been considered eligible as a TCP District by the BLM, BIA and the State Historic Preservation Office. The working boundaries of the District include private land, and many owners objected in writing to the boundaries. Listing a property on the National Register cannot occur unless a majority of owners concurs with the District (36CFR60.6(g)).

However, listing a property on the National Register, whether in public or private ownership, does not prohibit mining or other destructive uses (36CFR60.2(a)), though it does require federal

agencies to complete a series of steps to ensure that alternatives to destruction are considered. Federal agencies must complete the same procedures for a property considered eligible (like the Little Rockies) as for a "listed" property.

252. **Comment:** Reclamation efforts must reflect traditional cultural concerns and viewpoints. The review process to date has failed in this regard. (46)

Response: Reclamation efforts must balance the benefits and drawbacks to multiple resource interest as well as comply with appropriate law and regulation. The Draft SEIS analyzed a range of alternatives encompassing a variety of approaches and viewpoints as required by NEPA. Alternatives Z5 and L6 were developed specifically to address traditional cultural concerns and viewpoints that advocated restoring the areas to their pre-mine topography.

253. **Comment:** Show respect to them [traditionalists] and go on their grounds and sit and talk to them and listen to them with your heart open, instead of just trying to convince them that your way is the right way. (LO-2)

Response: Over the past decade, BLM specialists and cultural resource consultants have had many conversations with traditionalists. The traditionalists have often expressed concern for the sacred values of the Little Rockies and this concern is well documented and reflected in the alternatives and analysis contained in the 1996 Final EIS and this Supplemental EIS.

254. **Comment:** I've been to a lot of EIS scoping meetings. I've been to them before during the mining process. Our concerns never were addressed in these reports. The traditional and spiritual and sacred sites. They never were. (LO-4)

Response: While much effort was expended to find acceptable solutions to all concerns, this is not always possible. It is apparent that no mitigation (reclamation) can undo the desecration to the land that occurs from mining in the view of some commentors.

255. **Comment:** I don't like the way they do these surveys and these reports. That one report they had, was it a Deaver Report? Some of the people they interviewed in there, they don't know nothing. They don't know anything about our ways or our history. They're Indians here, but they never were concerned. Their families never were. (LO-4)

Response: All individuals that participated in the "Deaver Report" had their opinions treated equally. However, it was not a voting process but an effort to identify areas of traditional concern.

256. **Comment:** There were some graves up there that was tore up by putting that big rock pile down. Indian graves. There was family here on the reservation that every time, every decoration day they'd go up there in a team and wagon. They'd stay all day and they'd pray at these graves. Those two old people are dead and gone now. I just wonder a lot of times what they'd of thought if they'd

seen it now. I told the BLM about it when they first started, that the graves were there. They didn't take time to look. They told us there was nothing there. When that fire went through in 1936 it destroyed all the evidence of a lot of that stuff that was there. (HA-4)

Response: Intensive cultural resource inventories were conducted of all mining areas. Graves or burial sites were not identified during these inventories, nor were specific sites identified to BLM for avoidance. As documented in the record over the last decade, there were numerous attempts made to obtain this type of information. While BLM recognizes that such locations may be present, none were identified.

6.13 SOCIAL and ECONOMIC CONDITIONS

257. **Comment:** Getting real information out to the community is a useful thing to do because there is an impact on a community just that feels afraid there is a health impact, that they're not safe. I think that one of the impacts to the Fort Belknap community of living next to this mine site has been a frequent fear, especially since they feel that they were often lied to, that they were consistently throughout the life of the mine being exposed to contaminants and to health threats. I think that there was a constant fear that there was cyanide in people's drinking water, that vegetation for browse wasn't safe, that their air wasn't safe, that if children were playing in creeks that it wasn't safe. (HA-2)

Response: The agencies agree that it is important the community have access to test results relating to water quality or other monitoring results. All such information is public. Monthly reports containing the water quality test results are provided to the Fort Belknap Environmental Department and to Island Mountain Protectors. Individuals can obtain test results from these organizations or directly from BLM or DEQ. In addition, numerous public meetings have been held over the years to meet with local residents and explain conditions at the mines. The agencies continue to be available upon request to meet with anyone to discuss impacts from the mines.

258. **Comment:** The time that it will take to perform this "cleanup" will extend far into the future. The precious and base metals that will be covered up in the process will increase in demand. By the time the "cleanup" is finished, the demand will create a reopening of mining in this area. As a result, the time and money spent on the "cleanup" will be wasted and the reclamation process will again be for naught. (7)

Response: Mine reclamation is necessary to protect human health and the environment and is required under state and federal law. "No reclamation"' is not a viable option. The range of alternatives analyzed in the SEIS presents a great number of tradeoffs, one of which is the tradeoff between the amount of pit backfilling and the potential for future mining. Mineral development potential in the long term is lower the more backfilling that is done simply because economic reserves would be harder to reach. Given present economic conditions it is unlikely that the remaining mineralization would be developed in the near future. In the unlikely event that remaining mineralization becomes profitable to develop after reclamation, the operator would be required to post bonds to assure that the site would be reclaimed again.

259. **Comment:** On page 3-140, paragraph 4, it states that the most recent poverty information is from the year 1989. Poverty rates are available from the year 1989 to the present, either from the Bureau of Indian Affairs and the Fort Belknap Tribal Planning Department. The Fort Belknap Indian Community must keep updated figures to utilize in their pursuit of grants, contracts, and housing projects, which serve the community. (45)

Response: Both the Bureau of Census and BIA report that poverty rates have not been updated on the Reservations since 1989. However, BIA Labor Force Surveys indicated in 1997 that 42% of the Fort Belknap Indian Community employed on the reservation earned below the poverty guidelines. The SEIS has been changed to reflect this information.

260. **Comment:** The unemployment rates for the Fort Belknap Reservation for the year 1999 is calculated at 76%, utilizing the 1999 Bureau of Indian Affairs "Labor Force Survey," not the stated 22.9% within the document. What source was utilized for the 22.9% figure? The Fort Belknap Tribal Planning Department has unemployment rates for the years 1990 to the present. (45)

Response: The source of the 22.9% unemployment figure in the Draft SEIS was the Montana Department of Labor and Industry's (DLI) Research and Analysis Bureau, Local Area Unemployment Statistics Program. DLI produces these data in cooperation with the U.S. Department of Labor's Bureau of Labor Statistics (BLS). It is the BLS-approved series that is used to allocate federal funds and determine eligibility for federal assistance programs. These statistics measure the number of employed persons, unemployed persons, and the total civilian labor force. The Final SEIS has been changed to include the employment and unemployment data from the 1999 Bureau of Indian Affairs "Labor Force Survey."

261. **Comment:** Table 3.11-1 is incomplete; it combines the Fort Belknap Reservation with Blaine County. There should be a separate column as it pertains to Fort Belknap. Detailed employment data exists from the Fort Belknap Tribal Planning Department. (45)

Response: Employment data provided by the Fort Belknap Tribal Planning Department only listed occupations for about 255 employed persons of the Fort Belknap Indian Community Council governing body and therefore could not be used to update Table 3.11-1. These estimates include employment under federal, state, and tribal *programs;* it does not include employees of BIA, Indian Health Services, other government agencies, or private industry employment. Of the 255 employed persons, the occupational breakdown is as follows:

Occupation	# of persons
Officials and managers	25
Professionals	73
Office and clerical	50
Operatives (semiskilled)	34
Laborers (unskilled)	37
Service workers, others	36
Total	255

262. **Comment:** On Draft SEIS page 3-144, the document attempts to include Fort Belknap as being part of the multiplier effect for local expenditures. This statement is misleading, because the

multiplier effect does not relate to the economy of Fort Belknap, nor does it benefit the Fort Belknap community. (45)

Response: The multiplier effect (i.e. economic impact) analysis for current reclamation expenditures includes both Blaine and Phillips Counties, within which the Fort Belknap Reservation lies. So, the combined effects listed for Blaine and Phillips Counties includes the portion of the economic impacts that would be felt on the Reservation, but the impacts are not specifically broken out for the Reservation. Spending by reclamation workers who reside on the Reservation would provide an economic impact to the Reservation if that spending occurs on the Reservation.

263. **Comment:** Draft SEIS, 4.11 Social and Economic Conditions. Each of the stated alternatives does not separate the effects to the Fort Belknap Indian Community. All alternatives combine Fort Belknap with either Phillips or Blaine Counties. We would better understand the social and economic impacts if the information was directed towards Fort Belknap along with the other affected areas. (45)

Response: The input-output model used to estimate economic impacts (i.e. IMPLAN) cannot break out impacts below the county level. To our knowledge, there are no other input-output models which are capable of breaking out the impacts specifically to the Reservation. To estimate impacts specifically for the Fort Belknap Indian Community would require development of a input-output model specific to the Reservation. This would be an expensive and multi-year process. The primary economic effects to the Fort Belknap Reservation from the alternatives analyzed would mostly likely come from spending by reclamation workers who live on the Reservation. Business purchases on the Reservation by reclamation contractors would also provide an economic impact. However, larger communities, specifically Malta, would likely see the largest share of local business purchases by the reclamation contractors.

264. **Comment:** Under the current "interim reclamation" there is not a Native American in sight working on reclamation. Most of the people working on reclamation are going to be "white" people. A majority of the people involved in the reclamation must come from the Fort Belknap population. This clause should be a legally binding one for all involved in the process. (LO-5, LO-9, 13, 31, 35, 46)

Response: As noted in the SEIS, about one-third of the current interim reclamation workforce is American Indian (pages 4-115 to 4-116). The State of Montana administers the existing reclamation bonds and, under State law, cannot allow reclamation contractors to base hiring decisions on race, color, religion, sex, or other characteristics unrelated to direct employment qualifications, nor require preferential hiring (MCA 18-1-111). However, reclamation contractors have been encouraged to hire from the local workforce. State law requires State agencies conducting construction projects within Indian Reservations to give preference to Indian residents of the reservation who have substantially equal qualifications for any position (MCA 18-1-110). For State agencies conducting construction projects outside of an Indian reservation, the hiring of

the workforce is required to be 50% Montana residents. The SEIS cannot be worded to mandate that State contracting laws be violated. If additional funds beyond the existing bond amounts become available in the future, the ability to extend employment preference to Indians may or may not be possible, depending on the source of the funds and any restrictions placed on those funds. If the State of Montana continues to administer reclamation contracts, employment preference to Indians would not be possible. The Federal Government does have a clause in its Federal Acquisition Regulations (FAR) governing the issuance of federal contracts which allows federal contractors, "...to extend a publicly announced preference in employment to Indians living on or near an Indian reservation...," (FAR 52.222-26). However, this clause applies only to contracts administered by the Federal Government and does not allow a federal contractor to limit hiring to specific tribes. Consequently, it would not be possible to limit hiring to the Fort Belknap population.

265. **Comment:** *Draft Report on Pilot Plant Wastewater Treatment System*. Applied Biosciences has made no mention of hiring local Fort Belknap Reservation inhabitants for building the plant (ongoing presently) or its maintenance. They should have, and somewhere in the contract with DEQ it should be so stated that a majority of the workforce, technical expertise and or professionals will be hired from the Fort Belknap Reservation. (36)

Response: The State of Montana cannot require preferential hiring. The SEIS cannot be worded to mandate that State contracting laws be violated.

6.14 RECLAMATION and BONDING STATUS

266. **Comment:** Use the money that was bonded to complete this work. Do not ask for any additional money. Putting reclamation projects on a budget cuts out a lot of waste, such as painting rocks for a more natural look. (9)

Response: All available reclamation money will be spent on constructive reclamation tasks that will hopefully provide a net improvement in the environmental conditions at the mine sites.

267. **Comment:** How long will the water treatment plants run if you don't get funding? (LA-3)

Response: Using annual operating costs from 2000 and assuming a constant inflation rate of 3%, a return on invested money of 6%, and no decrease in treatment costs from reclamation efforts, money for water treatment is projected to run out sometime in the year 2028.

268. **Comment:** The DEQ and BLM should have been more conservative and required more realistic, larger bonds. Regardless of this, the Sacred Mountains must be properly reclaimed and the waters protected and funds must be made available to do this by the governments involved. Nothing less is acceptable to Island Mountain Protectors. (12)

Response: The DEQ and BLM have been working with the Fort Belknap government to arrive at a reclamation plan that is agreeable to all parties that ensures the protection of surface lands and water quality and quantity. Part of the shortage in reclamation bond is due to the changes that are being proposed in the previously approved reclamation plans.

269. **Comment:** Draft SEIS, Section 3.11 Reclamation and Bonding Status. The Fort Belknap Indian Community Council strongly recommend that any shortfall of money needed for reclamation and water treatment at the mines be appropriated in BLM's budget request to Congress, due to the natural resource impacts from mining sulfide bearing ore, which generated ARD impacts to the Fort Belknap Indian Reservation. BLM has a trust obligation to the sovereign nations of the Fort Belknap Indian Reservation to protect Tribal trust resources and assets. (44)

Response: Analysis of water quality monitoring data has not identified any impacts from ARD to Fort Belknap trust resources. BLM does support funding of the preferred alternatives and has included an additional funding request for Zortman-Landusky Mine reclamation in their budget submissions. BLM would note that the mine pits at the Landusky Mine, where most of the additional funds would be spent, are mostly private land over which BLM had no approval role. In addition, the Montana Legislature has recently authorized the sale of bonds to fund mine reclamation. Some of this money may be available for reclamation work at the mines.

270. **Comment:** Draft SEIS, Section 4.12.3 Water Treatment Bonds and Options, Consequences of Alternative Selection on Water Treatment Bond. The Draft SEIS states that long-term water

treatment bonds will last only for the next 80 years. Throughout the Draft SEIS it is made clear that ARD will be a problem for hundreds of years, if not forever. How will water treatment occur after 2080? (27, 44)

Response: A trust fund was established to pay for the annual operating costs of long-term water treatment. In arriving at an initial value for the trust fund, the agencies estimated this amount using a 'discounted cash flow analysis.' This is performed by estimating the amount of money one would need today in order to meet the cost of operating the plant during every year going forward. The annual cost for any given year is derived by increasing the current year's cost by a cost escalation factor (inflation) for every year into the future up to the point in time of interest. This cost, which represents the cost for operating the water treatment plant for only one year at some future date, is then 'discounted' back to the present by applying a discount factor. The discount factor the agencies used is 6%. This represents what the agencies consider is a reasonable return on invested money. The objective of this exercise is to determine how much money the agencies need today, which they would invest at 6%, where the interest from this invested money would pay for the subsequent years' operating expenses. The discounted yearly amounts are added together to arrive at a sum total needed today in order to cover the annual expenses into the future.

To meet a cost at a point in the future, the amount of money one would need today if it were invested at 6% becomes increasingly small. It is estimated that in order to have enough money to meet the annual operating expenses in the year 2436, one would only need to invest $1 today. Of course this assumes that inflation will always be 3% and one can always earn 6% on the invested dollar. The shortcomings of this approach lie in the determination of the annual inflation percentage that is used, and in the annual return on invested money. Inflation will not remain static year after year, nor will the interest earned on the invested trust fund earn a constant rate.

Given the uncertainties associated with making an estimate using constant rates of inflation and the return on invested money over hundreds of years, let alone tens of years, the agencies felt that the discounted cash flow analysis should be terminated after 80 years rather than running it to a point in the future when the amount of money needed today in order to service an annual expense in the future approached $0. Any change in inflation or investment return would change the amount needed in the trust fund. Any increase in inflation above 3% would create a shortfall at a distant point in the future; conversely, if the trust fund earned more than 6% over the course of a few years, then there would be more money in the fund at some distant time in the future. As the analysis is so dependent on these two variables, the agencies believe that an estimate over hundreds of years yields very little utility and presumes an accuracy that is simply not there.

As currently estimated, the sum total of the annual discounted amounts after 80 years represents 93% of the estimated total needed provided inflation and return on investment remain constant. As post-reclamation conditions equilibrate with respect to water quality and quantity needing treatment, the agencies will be able to better anticipate and estimate the annual water treatment costs. It is possible to get a higher annual return on the trust fund which could make up for shortfalls due to

increased inflation or higher than anticipated annual operating costs. Conversely, a decrease in inflation below 3% or lower than expected annual operating costs would result in more money in the fund. In summary, between the year 2001 and 2080, the agencies will be tasked with determining an estimate for the anticipated long-term annual operating requirements, and adjusting the return on the trust fund to meet these annual expenses up to and past the year 2080. The trust fund will cover water treatment costs beyond the year 2080. The discounted cash flow analysis was not carried beyond this timeframe due to the insignificant difference in the dollar amount needed today to cover costs projected to occur beyond 80 years in the future. That does not mean treatment will be terminated after 80 years, just that there is no point in running the cost projections beyond 80 years.

271. **Comment:** EPA has a suggestion to optimize the design of the Z6 Preferred Alternative: Considering the request associated within this preferred alternative would include funding to optimize grading for source control, in parallel with the contention that such control of sources will result in lower short term (through the year 2017) and longer term (next 100 years) water treatment/water management O&M costs, we suggest that an add-on optimization include relocating the Zortman Water Treatment Plant down to Goslin Flats. By relocating the Zortman WTP to the Goslin Flats at lower elevation, process water for treatment would not have to be pumped to its current location but would flow by gravity, and, should the existing lime precipitation process be considered for conversion to a lower O&M cost plant such as a biological treatment process in the future; the slightly warmer ambient operating temperature at this lower elevation (Goslin Flats) may be beneficial to promote the needed kinetics of such a biological process. (23)

Response: There are several reasons for not moving the Zortman Mine water treatment plant. The Goslin Flats area is owned by Zortman Mining, Inc. and is subject to sale through the bankruptcy process. A new owner will probably not want a water treatment plant on their property. Seepage capture pipelines from the Alder Spur and Carter Gulch capture systems would have to cross patented mining claims that are not part of the mining operation. These lines would require additional maintenance and present a risk of impacts to the Alder Gulch drainage from pipeline breakage. The lines would have to be buried in the winter to protect them from freezing. Burying the pipelines in such steep terrain would require the use of heavy equipment, creating additional surface disturbance and impacts to the drainage. A March 23, 2000 cost estimate to move the Zortman water treatment plant to a new location was $1.9 million. Reclamation of the area currently being used for a water treatment plant, purchase price of the Goslin Flats property, and easements could add another $600,000. Cost savings by relocation are estimated at only $60,000 in yearly power costs for the three capture systems (last 20-month average of $911/mo for Alder Spur, $1,120/month for Carter Gulch, and $2,995 for Ruby Gulch). Sludge removal becomes a problem; and if it is pumped back up to the mine, there are no cost savings at all. There is no way economically or environmentally to justify moving the water treatment plant. It would take 42 years of current pumpback costs to recoup the initial capital outlay assuming you ignore the time value of money and the new slurry handling costs. It is for the above reasons that the technical working group did not include this feature in the development of Alternative Z6.

272. **Comment:** EPA has some observations regarding the Long-Term Water Treatment and the related need to increase the associated funding for this element on the preferred alternative. According to page 4-140 of the Draft SEIS, the agencies are reminded that when the water treatment plants and water management/water treatment systems capital cost for construction and O&M costs were initially estimated by EPA's staff in 1996, a total of need of $15 million was estimated on the basis that advances in water treatment technology, over the years, would permit reduction of the O&M costs by 50% by year 2017. In the third paragraph of the text on page 4-140, the last sentence, also addresses the need to either reduce present operating costs or to increase the size of the trust fund available to pay for long-term treatment. The only water treatment process that presently has the potential to significantly reduce operating and maintenance costs is a biological process.

Several of these lower capital cost biological AMD-ML (acid mine drainage-metal leaching) water treatment processes are being evaluated at other properties. We expect that BLM and DEQ will continue to support evaluation of these emerging new methods as needed in order to improve the likelihood that this information could be utilized at these mines to design and operate biological water treatment plants at both the Zortman and Landusky Mine sites. For example, assuming that 250 milliion gallons is treated at the two mine sites annually at the current cost of approximately $3.36 per 1000 gallons for a current charge of $840,000 annual cost. At a annual O&M escalation of 2.5%, the O&M cost escalation factor is approximately 1.52 to year 2017 which could result in annual costs by 2017 of $1,277,000 per year. With improved source control that volume to be treated might be reduced, for example, by about 1/3 to 170 million gallons which would result in an annual cost of approximately $868,000 by year 2017. Biological water treatment, if it can be done for a present cost of $1 per 1000 gallons (based on information supplied by Applied Biosciences for two anaerobic and one aerobic biological treatment unit, and the potential economies-of-scale not considered), would cost $170,000 per year for the same 170 million gallons needing treatment annually. Assuming an O&M escalation of 2.5% per year, the escalator to year 2017 is approximately 1.52 times the present cost or $258,000 per year. Estimating that there will be $12.5 million in the zero coupon bond trust fund accumulated at that time for long-term WT/WM in year 2017, then if the capital cost to build two biological water treatment plants is presently approximately $2 million each, escalated by a 1.52 factor for a 2.5% annual inflation rate, that leaves approximately $12.5 million less $6.1 million biological water treatment plant(s) construction capital or $6.4 million for WT/WM O&M in year 2017. If this account were invested at 6% rate of return (discounted at 6%) the income from $6.4 million is about $384,000 per year which would be sufficient for the year 2017 O&M escalated estimate of $258,000 per year. By year 2025, for example, we also hope to be evaluating an even lower cost biological-based water treatment system, one based on enzyme (protein based) deleterious substance assimilation. Calculations are based on the assumption that the existing 300-gpm Landusky Mine bioreactor system has no use beyond that predicted for current nitrate-selenium-cyanide water treatment. This assumption is conservative based on what is understood at this time. With bioreactor operational experience backed with analytical results on heavy metal precipitation, we may be able to consider

broader use (perhaps modified continued use) of the Landusky Mine bioreactor system sometime in the near future. (23)

Response: When the initial long-term water treatment cost was estimated, it was assumed that reductions in water flows needing treatment due to reclamation capping, and advancements in water treatment technology would alter the initial cost projections. During the course of managing the mines the agencies anticipate that alternative treatment processes such as biological treatment will be investigated in an attempt to increase the effectiveness of treatment at a reduced annual operating cost. The agencies have not ruled out any treatment process as a solution to long-term water management.

Of course, the BLM and the DEQ are fully supportive of any cost reducing measures which could be implemented to treat water. In 2000, a total of 326,301,344 gallons were treated at a cost of $843,387.18 or $2.585 per 1000 gallons. For 2001, a total of 246,050,230 gallons were treated from January through September for a total cost of $646, 020.46 or $2.626 per 1000 gallons. Source control (coversoil placement) has already resulted in significant reduction in leach pad water requiring treatment, helping reduce the load in the LAD area. Water volume is expected to decrease in 2002 in the Zortman Ruby capture system due to the backfilling of the O.K./Ruby and Mint pits and also to decrease at the Landusky Mine due to regrading the Gold Bug pit to achieve positive drainage.

273. **Comment:** Draft SEIS, Page 4-59: States that there would be significant repairs and expenditures necessary in the event of a large storm which destroys covers, captures systems and other structures. Where would the money come from to make these repairs? Also, what will happen after the liners degrade as predicted? Will it be necessary to replace them? (27)

Response: Pages 4-57 through 4-60 is a section dealing with significant adverse impacts. The statement near the top of page 4-59 “There would be significant damage to mine reclamation covers, capture systems and other structures that would require major expenditures to repair or replace” is an incorrect statement and has been removed from the Final SEIS. While large storm events can be expected and have occurred in the past, the amount of money required to repair storm damage has been minor. In June of 2001, the mine sites received two different 2-inch rain events with minimal erosional damage costing less than $1,000 to fix. The capture systems have withstood the 100-year event before with minimal to no damage whatsoever. Other structures have not been affected by any rain events. Heavy rain events have caused ditches and a few of the capture systems to overtop. The discharges from those events have all met discharge standards. The amount of money set aside to handle long-term repairs varies by alternative. For both mines, an average of $500,000 per mine will be left in the current bonding to handle reclamation cover repair, diversion repair, and sediment basin maintenance. In addition, several million dollars will remain in a set-aside fund to cover future process water treatment and disposal.

As the liners degrade over time the overlying vegetation and soil will build up, limiting infiltration. This would not affect overall reclamation performance. There would be no need for liner replacement in the mine waste units. The only area where liner replacement is planned is in the lined runoff ditches. Funds have been set aside for this purpose.

274. **Comment:** The reclamation bonding was set without adequate consideration of water quality issues - it was set just on the basis of the amount of "dirt" to be moved. The water bonds were set without proper consideration of water quality standards. (12)

Response: The reclamation bonds were set based upon both earthmoving costs and the costs for water management, including seepage capture and treatment. The 1996 bond amounts were approximately $29.6 million for earthwork and $37.5 million for water treatment.

275. **Comment:** I was involved along with other people in the bonding, when they set up the bonding, and we asked for a whole lot more bonding on this thing and they all just cut it back and cut it back and cut it back, the agencies. I think if we got the bonding that we wanted, we wouldn't have had a money problem. (LO-2)

Response: Part of the shortfall is due to the proposed changes that would occur under the preferred alternatives to the reclamation plans that were bonded for in the 1990's. The dollar amount of the reclamation bonds has increased dramatically over the years instead of being cut back. In the early 1990's, after permitting of the Sullivan Park (L91) leach pad, the bond amount was approximately $13 million. Since then the bond has increased to over $67 million through a combination of reclamation surety bonds and trust funds for water treatment.

276. **Comment:** It's a strange thing to say that we need a larger bond for a bond, but in fact, I'm concerned that the amount of money here is going to run out long before the treatment at this site is going to be done. That follows not only water treatment but also long-term monitoring and active management of native vegetation on this site. (HA-2)

Response: The cost estimates presented for the various alternatives assume that the funds would be available. However, backup reclamation plans that are affordable within the existing bond amounts have also been developed. As supplemental funds are provided, reclamation measures could be "added on" in a piecemeal fashion to the existing reclamation. This allows for funding to be acquired over time, making it more likely the preferred alternatives can someday be fully implemented.

6.15 EDITORIAL COMMENTS

277. **Comment:** A map (or maps) similar to the one found in "FEIS, Volume I, Zortman and Landusky Mines: Reclamation Plan Modifications and Mine Life Extensions, March 1996," Figure 2.7-1 would be helpful. Map(s) to include: full page, color; reservation boundaries, mine sites, towns; watercourses, roads; groundwater potentiometric map with flow arrows, groundwater divides; public land survey grid with township, range, and section. (6)

Response: Since this is a "Supplemental" EIS the maps in the Final EIS should be used in conjunction with the SEIS text. While the maps in the Draft SEIS are in black and white, the version of the Draft SEIS on the website is in color (www.mt.blm.gov). In addition, the Hydrologic Support document can be consulted for more detail on groundwater patterns and larger scale maps. Copies of the support document are available upon request.

278. **Comment:** Page 3-9, The last sentence should read, "...due to their ability to readily transmit..." rather than "inability." (6)

Response: This change has been made in the Final SEIS text.

279. **Comment:** Page 3-24, 3rd line from bottom of page should read, "...drainages have not warranted..." (6)

Response: This change has been made in the Final SEIS text.

280. **Comment:** Section 2.4.3 - Landusky Mine Reclamation Alternatives, Alternative L4. Page 2-106. The SEIS states, "A HDPE liner would be placed over the graded fill to maximize water infiltration through the pit floor." Was it meant to say minimize? (10, 22, 38)

Response: Yes, the text should have said, "minimize." This change has been made in the Final SEIS text.

281. **Comment:** Appendix A - Multiple Accounts Analysis Spreadsheets, Table A-2e. The "overall Ranking" does not match the "Multiple Account Score" in this table. In the other tables in this appendix the Overall Ranking and Multiple Account Score are appropriately aligned. For the purposes of my comments, I have assumed the Multiple Account Score is correct. This is a significant discrepancy, and should be corrected. (10, 22, 38)

Response: The multiple account scores have been recalculated and rounded off to one significant digit, a more realistic representation of their precision. The table has been corrected to reflect the new scores.

282. **Comment:** Appendix B - Reclamation Cover Performance Modeling. Figures B-19, 20, 21 and 22 are missing. (10, 38)

Response: These figures have been added to Appendix B of the Final SEIS.

283. **Comment:** 1.2 Project Location and History. Suggest including Figures 1-1 to 1-4 and Tables 1-1 and 1-2 in the SEIS (from the DEIS). Public would have a better appreciation of what the mine area looked like pre-1979 versus what it looks like today. (43)

Response: Figure 1-1 of the 1996 Final EIS is included in the SEIS. The other figures and tables are referenced only. Since this is a "supplement" to the 1996 Final EIS, the reader should consult that document for the type of background information provided by these photos and permit history tables.