APPENDIX J

SUMMARY OF PUBLIC COMMENTS ON DRAFT EE/CA

Appendix J – Response to Comments on Draft EE/CA

Appendix J includes responses to comments on the Draft EE/CA for the Mike Horse Dam and Impounded Tailings, Lower Mike Horse Creek, Beartrap Creek and Upper Blackfoot River removal areas (Hydrometrics August, 2006). The Draft EE/CA release was accompanied by a letter containing project summary information, a press release, articles in area newspapers, two public meetings and a public field trip. Meetings were held with local, State and Federal agency stakeholders, including the Natural Resources Damage Trustees for the Clark Fork Basin prior to the development of the Final EE/CA.

The Forest Service received approximately 1958 comment responses on the release of the Draft EE/CA. The responses include the following:

1) Received 10 letters which advocated for one of the removal options for the impoundment and the other sub areas and included details and/or specific technical items to consider. These are further broken out as follows:

- Four letters from conservation or environmental groups; Clark Fork Coalition (CFC), Montana Environmental Information Center (MEIC), Montana Wilderness Association (MWA) local Wild Divide Chapter, and Trout Unlimited (TU).
- One letter from Senator Max Baucus' office.
- Two agency letters; US Fish and Wildlife Service (USFWS) and Montana Department of Environmental Quality (DEQ) on behalf of all state agencies.
- Three letters from the mining industry; Chris Pfahl from ASARCO, the ASARCO legal department and the Atlantic Richfield Company legal department.

2) Received approximately 28 letters from individual citizens. All spoke to the merits of complete removal of the impoundment.

3) Received approximately 1870 identical email comments supporting full removal of the impoundment.

4) Received approximately 50 identical postcards supporting full removal of the impoundment.

Responses to the significant comments are provided in Table J-1. The Administrative Record File, located in Lincoln Montana, contains the complete text of the original comment letters for further reference.

The commentors whose letters resulted in a response on Table J-1 are identified in the first column of the table using the following abbreviation:

CFC – Clark Fork Coalition
Asarco – ASARCO
Pfahl – Chris Pfahl
FWS – US Fish and Wildlife Service
MEIC – Montana Environmental Information Center
MWAC – Montana Wilderness Association Wild Divide Chapter
TU – Trout Unlimited
DEQ – Montana Department of Environmental Quality (on behalf of all State of Montana agencies)
AR – Atlantic Richfield Company

Numerous acronyms are included within the text of Table J-1. Refer to the List of Acronyms on pages xi-xii of the Table of Contents and the main text of the document for additional information regarding acronyms.

Response to Comments - Draft Engineering Evaluation/Cost Analysis

For the Mike Horse Dam and Impounded Tailings, Lower Mike Horse Creek, Beartrap Creek and Upper Blackfoot River Floodplain Removal Areas, Upper Blackfoot Mining Complex site

ID	Comment	FOREST SERVICE Response
CFC-1	As we see it, there are two main goals to be accomplished via this removal action. The first, and most important, is to permanently remove the long-term threat of the Mike Horse Dam failing and releasing mine wastes downstream into the Blackfoot River….the primary goal of the EE/CA should be to permanently eliminate this threatened release of hazardous substances.	Removal Action goals identified in the EE/CA (Section 1-2 and 5-1) are tied to protection of human health and the environment as prescribed in the National Contingency Plan at 40 CFR 300.430. The primary goal, as identified in the EE/CA on p. 5-1 includes minimization of migration and mobility of contaminants to the environment. Permanence, or long term effectiveness, is one of the evaluation criteria for each removal option and the Site Wide Alternatives (See Section 6.3 and Table 7-1).
CFC-2	second goal…removal should be to return the areas damaged by the 1975 releases to their former health…While we recognize the current EE/CA will address only metals pollution from deposited tailings on public lands, and not on eliminating upstream sources, addressing these tailings is an essential and necessary condition to re-naturalizing these areas.	Restoration of the areas to their former health is outside the scope of this EE/CA. Options 4 and 5 for the Mike Horse Tailings Impoundment, Option 3 for Lower Mike Horse Creek, Option 5 for Beartrap Creek and Option 4 for the Blackfoot River would result in removal of all identified wastes, thus setting the stage for restoration. However, identified metals sources on private land above the floodplain areas mentioned above are problematic for an effective removal action downstream and would need to be addressed to prevent recontamination.
CFC-3	As we read them, the removal action objectives (RAOs) on page 5-2 of the EE/CA are consistent with the above two goals. It would be helpful to the public, however, to re-draft the RAOs to specifically mention the threat posed by the unsafe dam, to clarify what is at stake. The RAOs should separately address the smaller (but still significant) risk from downstream migration of hazardous materials from other sources.	This comment has resulted in the inclusion of the removal of the dam as a Removal Action Objective in the Final EE/CA in Section 5.2.
CFC-4	We also agree with the secondary removal action objectives, with the caveat that concern for “historical” features, while potentially important, must not interfere in a significant way with actions to protect long-term protection of human health and the environment. We assume this is inherent in the very concept of a “secondary” objective.	The Forest Service must comply with the substantive requirements of the National Historic Preservation Act as one of the ARARs for this project. We do not expect substantive changes to heritage features as a result of any selected removal option as most of the historic features have been removed with previous actions at the site. This site has also been declared ineligible for listing on the National Register of Historic Places.

ID	Comment	FOREST SERVICE Response
CFC-5	The list of ARARs discussed appears very short. It is our understanding that the state is working on, or has provided, a more comprehensive list of ARARs. These should include, for example, the substantive provisions of the Montana Metal Mine Reclamation Act.	The State of Montana provided a list of ARARs for the draft EE/CA. The Forest Service has reviewed and modified these for the Final EE/CA based on discussions with Montana DEQ and changes in the EE/CA options. An analysis of each ARAR and how it applies specifically to the selected remedy is included in Appendix D of the EE/CA.
CFC-6	We have concerns about the feasibility of creating a stable repository in the proposed West Impoundment area. Specifically, we are concerned (1) whether the fine-grained tailings can form stable 3-to-1 slopes, (2) whether there will be long-term potential for the leaching of contaminants – particularly arsenic, which…(3), whether high groundwater levels in the repository area make it an inappropriate site, and (4) whether the repository will be adequately protected from erosion at high flows.	A variety of repository sites, including the West Impoundment have been identified and evaluated within the Final EE/CA, including two new repository sites outside of the Upper Blackfoot drainage (EE/CA Section 6.1). Option 4 for the Mike Horse Tailings Impoundment sub area has been modified from the Draft EE/CA and includes removal of all of the tailings and dam from the Beartrap Creek valley bottom and identification of the Paymaster Repository as the repository site for this option (EE/CA Section 6.2.1.4). Groundwater monitoring wells were installed in the area west of the impoundment in 2006. Results of this on going monitoring will be beneficial for the design of the removal action.
CFC-7	Regarding potential off-site repository locations, a state of Montana contractor's preliminary screening of potential repository sites within a 10-mile radius shows excellent promise for an appropriate repository.	The Forest Service and Montana DEQ have pursued more detailed site information on two potential out of drainage repositories. These are described in Section 6.1.2 and are incorporated into the Site Wide Alternatives, Section 6.3. Evaluation information for these repositories is found in Appendix E.
CFC-8	Option 2 - We do not believe Option 2 adequately fulfills the RAO of reducing the risk of downstream release of mine waste from dam failure to acceptable levels. The technology relied on – e.g., a plastic liner on the interior face of the dam – would have a limited design life and require perpetual care and maintenance. Even if these technologies mitigated the risk of failure in the short term, they would creates long-term uncertainties and depend upon a high level of regulatory oversight for their success. Moreover, it is far from clear that the liner itself will address the problem of voids in the dam, whose origin is susceptible to different interpretations. In scoring an alternative for overall protection of the environment, the NCP places special emphasis on long-term effectiveness. *See* 40 CFR 300.430(f)(1)(ii)(E); 55 Fed. Reg. 8731, 8725. Therefore, we believe Option 2 should be rated "low" for effectiveness.	Option 2 is included to provide for a complete range of possible solutions utilizing available technology for addressing the issues with the dam. Effectiveness rankings are based in part on a relative scale where "low" equates to the performance that would be expected to be achieved. Option 2, a component of Site Wide Alternative 2, has been identified as having a low to moderate overall effectiveness due to the volume of waste that would be left in place and exposed to the elements (EE/CA Section 7.1 and Table 7.1).

ID	Comment	FOREST SERVICE Response
CFC-9	Option 3 - It appears the calculation that the channel will pass the 500-year flood event was based on simple calculation of flow rather than a consideration of realworld flood characteristics. We question whether this approach accurately reflects the level of protection the rip-rap channel would provide. On the ground, flood levels in timbered drainages are often controlled by the accumulation of debris that constricts flows in the channel and causes flooding, rather than by theoretical flow based on the size and shape of the channel cross-section. The potential for erosion into tailings left in place is a long-term residual risk under this alternative. Also, we note that the channel configuration of option 3 could leave some groundwater in place in areas where tailings will not be removed, creating the long-term risk of releases from these wet tailings. Option 3 would rely on the West Impoundment repository, whose long-term residual risks are discussed above. For these reasons, we believe option 3 should be rated “low to moderate” for effectiveness	Hydrologic calculations and referenced methodology used for evaluating potential flood events were performed for each sub area drainage and are found in Appendix A. Two industry accepted methods of analysis were used based on comments received on the draft EE/CA, see Appendix A. The amount of tailings removed and extent of excavation under Option 3 for the impoundment is based on a conceptual design. Diversion of Beartrap Creek and tailings dewatering which will be initiated in 2007 will provide more information for design specifics.
CFC-10	Option 4 would address some, but not all, of the residual risks that would remain on-site under Option 3. Specifically, there would still be long-term risk of erosion into the wastes left on-site in the repository, though presumably these risks would be less because of the larger channel. Option 4 would not eliminate the risk of leachate from the West Repository area. From an ecological perspective, the more-natural channel of Option 4 would be superior to the highly-engineered channel of Option 3. Option 4 should be rated “moderate” for effectiveness.	The Forest Service would like to note that any selected remedy for projects of this type results in some residual risks. For Option 4, we believe the risks are adequately described and displayed in Section 6.3 and Table 7.1. Option 4 has been revised to include the Paymaster Repository site within the drainage for disposal of the wastes due to information obtained from the five groundwater wells which were drilled in the West Impoundment area and have been sampled since August, 2006 (EE/CA Section 6.2.1.4) Option 4 generally rates higher in effectiveness categories than Option 3, in part due to the differences in the amount of tailings removed from the valley bottom, the channel design and distance of the toe of the repository from the valley bottom, as well as other design factors. (See EE/CA Table 7-1).
CFC-11	Option 5 - As discussed above, the repository site analysis conducted on behalf of the state indicates a strong likelihood that a suitable site can be located within 10 miles. We note that the EE/CA assumes that if a suitable site is found and developed as a repository, all 370,000 cubic yards of excavated soils and tailings would be hauled to that site rather than the Paymaster. Presumably it would reduce haul costs and the risk of vehicle accidents to use up any remaining capacity in the Paymaster (reserving adequate space for future removal of downstream tailings) and thereby reducing the amount to be hauled off-site. We agree that Option 5 scores “high” for effectiveness and would meet all removal action objectives.	The State of Montana conducted a two-phased repository site evaluation which is incorporated into Appendix E (Tetratech, October, 2006) The Forest Service conducted a preliminary site evaluation of an out of drainage repository location in Fall, 2006. This site, referred to as First Gulch Repository site, is located about 4.5 miles from the Mike Horse dam on Forest Service lands (Appendix E). A more complete description and comparison evaluation of these out of drainage repository options is found in Section 6.1 in the Final EE/CA.

ID	Comment	FOREST SERVICE Response
CFC-12	complete-removal options make the most sense. We would add one caveat: particularly in the downstream areas, there may be areas that, while containing elevated levels of metals, also support relatively healthy mature vegetation. The ROD should be drafted to allow sufficient leeway to leave minimal levels of contaminants in place under objective criteria where the damage from removal is determined to outweigh the benefits	Comment Noted. The specifics of this comment are generally responded to during development of the engineering construction plans for a selected removal.
Pfahl-1	the document does not adequately address the differences in implementability and the risks associated with implementing options 2, 3,4, 5.	Section 6.3 and Table 7.1 in the Final EE/CA presents an evaluation of the differences in implementability and risks associated with implementing Options 2-5 for the Mike Horse impoundment and dam. These evaluations are consistent with the primary and secondary removal action objectives presented in Section 5.
Pfahl-2	Options 3, 4 and 5 each require that various quantities of saturated tailings be excavated and moved from their current location…dewatering saturated tailings is difficult…and tend to liquefy when shaken…tailings are nearly impossible to compact once they reach their new home…in order to compact tailings, either lime has to be added to absorb water or tailings have to be mixed with coarser material such as waste rock.	A stability analysis was performed for the Final EE/CA to address the issue of saturated tailings removal and is found in Section 6.2.1.7. In addition, diversion of Beartrap Creek and initiation of dewatering of the tailings is scheduled to be initiated in 2007 which will provide additional information for the design phase of the selected alternative. A description of this activity is provided in Section 6.2.1.6 of the Final EE/CA and in Appendix H. Based on the results of these efforts, construction design requirements will be refined.
Pfahl-3	Other risks that are not adequately addressed include the risk of a catastrophic release of tailings to Beartrap Creek and the Blackfoot River during the implementation of the removal as a result of precipitation events such as thunderstorms.	The Final EE/CA at Section 6.2.1.6 identifies and describes a Conceptual Impoundment Dewatering and Water Management scenario. Any selected option for the Mike Horse dam and impoundment with the exception of Option 1 would require diversion of Beartrap Creek which is scheduled to be initiated in 2007. Design criteria for this diversion anticipate precipitation events and catastrophic release of tailings. Indeed one of the basic goals of this EE/CA is to prevent another catastrophic release of tailings as happened in 1975.
Pfahl-4	no mention is made of the potential to negatively impact water quality from leaving dewatered tailings in place (alternatives 3 & 4). Exposing tailings to the air could very well perturb the existing chemical balance and cause metals to be released to surface and ground water.	Comment Noted. Treatment of exposed tailings during construction, if needed, would be conducted, as part of a detailed construction design for the selected removal alternative. Dewatering activities in 2007 will also provide additional information on the potential for metals release during the construction period (See Section 6.2.1.6 and Appendix H).

ID	Comment	FOREST SERVICE Response
Pfahl-5	Option 2 addresses all the environmental, Human Health and water quality issues currently associated with the Mike Horse Dam. It requires no on or off site repository; it poses the least risk of releases of metals to the environment as a result of the implementation; and is 2.5 times less expensive than option 3, 6.7 times less expensive than option 4 and 15.9 times less expensive than option 5	The comparisons of estimated performance of the various removal alternatives are found in the EE/CA in Section 6.3 and on Table 7.1. A primary concern with Option 2 for long term effectiveness and permanence is due to the large amount of waste that would be left in place and the continued potential for future failure of the dam, which would require an ongoing program of monitoring and maintenance and an emergency response plan.
ASARCO	CERCLA and the NCP require selecting the most cost-effective alternative so long as it is adequately protective of human health and the environment. EPA regulations-codified in the NCP-elaborate by providing that 'cost' is one of the nine key criteria an agency must consider when selecting among several CERCLA response alternatives. Any agency applying this guidance to its selection of a removal alternative for the Mike Horse Site should conclude that Option 2 is the most appropriate choice.	As a general principle, the agency agrees that it should select the most cost effective response that is protective of human health and the environment (including compliance with ARARs). The Forest Service will comply with all CERCLA requirements at the site. The agency also agrees that the NCP elaborates on what cost-effectiveness means, and the Forest Service will comply with all NCP provisions applicable to the site. Finally, the Forest Service is aware of the EPA guidance mentioned by the commentor, and although the Forest Service is not required to comply with EPA guidance in the same way that it must comply with CERCLA and the NCP, the Forest Service generally follows EPA guidance interpreting CERCLA's statutory and regulatory requirements.
ASARCO	Judicial decisions on NCP consistency have always emphasized the importance of cost effectiveness when choosing remedies for CERCLA cleanups. The commentor cites several examples where EPA's failure to implement a cost-effective remedy was the basis for private parties' legal challenges to response actions as inconsistent with the NCP.	The Forest Service agrees that cost-effectiveness is an important element of the balancing process described in NCP 300.415 governing the selection of removal actions, but it is not the only element of an appropriate removal decision.
ASARCO	The Forest Service should further consider whether options 3,4 and 5 should be rejected based on the application of the NCP's implementability criterion. The commentor states that cleanup remedies that are extremely difficult to implement from a technical and practical standpoint may be contrary to CERCLA and the NCP.	The Forest Service has carefully considered whether Options 3, 4 and 5 for the Mike Horse dam and impounded tailings can be successfully implemented from a technical and practical standpoint. There are no unconventional or impractical construction methodologies that would be needed for implementation of these options that would suggest extreme difficulty.
ASARCO	The NCP requires that consideration be given to whether the local community accepts the proposed response action. Given the dramatic consequences of excavation and off-site disposal, the local community is likely to oppose creating a significant new waste site under Option 5.	The agency agrees that community acceptance is an important factor in selecting the appropriate removal action for the site. Numerous local commentors on the draft EE/CA identified that they believed Option 5 for the dam and impounded tailings was the most long term solution. Few commentors showed favor for Options 1-4 (see Summary above).

ID	Comment	FOREST SERVICE Response
FWS-1	protection of the fishery was not evaluated (4.3.2.1 Aquatic Assessment Endpoints)…area is a core bull trout area, the impacts to the fishery should indeed be evaluated, and protection of the fishery used as a primary assessment endpoint An "upstream source" of metals is not a sufficient justification to not assess impacts to the fishery.	The streamlined risk assessment protocols utilized in the EE/CA (Section 4.0) include methodology developed by DEQ and are consistent with EPA methodology. The evaluation is largely reliant on Montana Aquatic Life Criteria. We believe that the adaptive management approach for applying the risk assessment and goals provides for evaluation and adjustment upon completion of each increment of cleanup in the upper Blackfoot river and its tributaries, prior to initiation of the next increment. In addition, removal action objectives (Section 5.2) include an overall removal objective of improving watershed function to promote a more stable natural hydrologic system.
FWS-2	I am also concerned that the marsh at the confluence of Pass Creek, Swamp Creek and the Blackfoot River was not evaluated in the EE/CA. Marsh sediments collected had extremely high metals concentrations… also found elevated metals concentrations in sediments collected from the Blackfoot River as far as 10 kilometers downstream of the marsh and reductions in fish populations and benthic invertebrate abundance and diversity. Thus, the risk presented by metals in these marsh sediments should be addressed as part of this action or as a future action.	The analysis area of this EE/CA is based on the agreed area between the USDA Forest Service and ASARCO in their signed Administrative Order on Consent (AOC, December, 2002). The downstream extent of the AOC area includes the junction of Shave Gulch with the Blackfoot river drainage bottom on National Forest System lands into the very eastern portion of Section 20, T15N, R6W (Figure 1-1). The risk assessment area includes only the analysis area, consistent with the terms of the AOC agreement and does not include the marsh area and Pass Creek tributary intersection with the Blackfoot River.
MEIC-1	lack of data regarding ground water on the west side of the tailings impoundment. Because this area would be the primary repository of material for most of the clean up options, it seems characterization of the ground water is critical to making a decision.	Five additional monitoring wells have been completed along the west side of the impoundment since completion of the draft EE/CA for the purpose of better defining groundwater conditions in this area. Information obtained from the wells is included in Section 3.1.5 and in Section 3.5 of the Final EE/CA, and was heavily relied upon in finalizing the impoundment removal options. Based in part on the data collected from these wells, the Paymaster Repository was identified as the repository location for Option 4 for the dam and impounded tailings sub area which is part of Site Wide Alternative 4. We are confident that we now have adequate information for selection of a removal action for the impoundment, in light of the upcoming diversion and dewatering activities that will be conducted in 2007/08.

ID	Comment	FOREST SERVICE Response
MEIC-2	lack of a comprehensive search for and characterization off-site repositories.	Two off site repositories areas have been investigated in more detail since the issuance of the Draft EE/CA. See response to CFC-11 above. These repositories are described in Section 6.1.2 and the results of these evaluations are incorporated in Appendix E of the Final EE/CA.
MEIC-3	It is our experience that you can place mine waste in whatever type of structure you like and that structure will eventually leak. You can line it, cap it, double line it and double cap it but eventually it will still leak. The question, then, becomes one of minimizing the potential damage we all know will occur. In this case, it makes no sense whatsoever to leave material in the drainages of the Blackfoot River's headwaters. Removing it and putting it somewhere with less risk is a better option.	See response to MEIC-2 above. However, as noted by the commentor, development of a new location to contain mine wastes also results in the potential, although we believe it to be low, for a new location to become contaminated.
MWAC-1	Currently, the dam blocks the stream channel, and acts as a hydrologic and fish barrier. It is unthinkable that any reclamation project would be undertaken without the expressed objective of reconnecting this critical biological link. Only options 4 and 5 meet this objective.	Comment Noted. However, it is not a given with either Options 4 and 5 for the dam and removals in Lower Mike Horse Creek, Beartrap Creek and the Upper Blackfoot River will result in biologically favorable stream conditions in the short term as contaminants will still remain in Upper Mike Horse creek on private land.
MWAC-2	The dam is made entirely of toxic mine refuse. The EE/CA's alternatives 1-4 evaluate various degrees of partial dam removal, with the remainder of the dam being "stabilized", monitored, and maintained. Only alternative 5 considers full removal of the dam and all associated deposits of toxic mine waste that remain in the associated floodplains.	Option 4 for the dam and impounded tailings has been modified since the Draft EE/CA and includes removal of all of the valley bottom tailings (Section 6.2.1.4).
MWAC-3	Those who believe that the risk of toxic metal mobilization can be eliminated by engineering stability into a dynamic stream system seem bent on repeating the mistakes of the past. All streams – especially streams with floodplains – migrate over time, typically in pulses rather than in slow, incremental movements. If allowed access to the full extent of a natural floodplain, stream migration pulses are usually uneventful. But if artificial bank armor blocks a stream from its natural migration course, then stream migration can be catastrophic.	Options 3 and 4 for the dam and impounded tailings were developed to describe and analyze progressively more complex, expensive and responsive solutions to the problem at hand. Comparisons based on cost, effectiveness and implementability are found in Sections 6 and 7 which includes an evaluation of the performance of these removal options with respect to the floodplains of Beartrap Creek, Lower Mike Horse Creek and Upper Blackfoot River.

ID	Comment	FOREST SERVICE Response
MWAC-4	Even without a catastrophic erosion event, any contaminated sediments left in place would continue to leach toxic metals and arsenic into surface water. Thus, any engineered solution short of total removal would require perpetual water-quality monitoring. In addition, periodic maintenance would be required in order to maintain and, as technology advances, improve the engineered system. Will maintenance funds be available in perpetuity?	Long term leaching of contaminated materials is an important issue. Monitoring and maintenance costs for a period of 100 years are included in the costs of each alternative option with Option 1 for each of the removal areas being the highest costs for monitoring and maintenance. The agency intends to select a cleanup alternative that minimizes long-term leaching of contaminated materials into surface waters onsite.
MWAC-5	In its cost analysis, the EE/CA inappropriately assumed a finite period of monitoring and maintenance for Alternatives 1-4. Consequently, the costs associated with these unlimited activities appear to be limited.	See response MWAC-4 above.
TU-1	recommend the Forest Service further characterize mine waste problems in the Paymaster Creek drainage while also investigating the engineering feasibility and cost of remediating mine waste problems there.	Wastes, if any, already located on private land in the Paymaster drainage, are outside the scope of this EE/CA which has focused on the historic mine contamination on land in the National Forest System.
TU-2	recommend sequencing ensure upstream sites are cleaned up first to avoid re-contamination of downstream sites with Forest Service lead responsibility.	Comment noted.
TU-3	recommend the Forest Service issue an updated plan for addressing the short-term stabilization and monitoring of the sites, especially the tailings impoundment, to ensure risk of failure is minimized until a final remedy is completed.	The Forest Service has requested and received approval to use funds from the ASARCO Trust for 2007 to initiate design and construction activities to divert Beartrap Creek and dewater the tailings impoundment and thus temporarily avert the possibility of a dam failure in the short term.
TU-4	We have our doubts that the West Impoundment Repository Site can be used with acceptable risk. Placing saturated material on a site with proposed slopes of 2.5:1 or 3:1 in a seasonally wet, seismically active area might be assuming too much risk of failure.	See responses to Pfahl-2 above.
TU-5	recommend the Forest Service work with Montana DEQ- in evaluating additional potential sites for waste repositories in the vicinity of the Upper Blackfoot Mining Complex.	The Forest Service and Montana DEQ have conducted preliminary investigations of two out of drainage repository sites since the issuance of the Draft EE/CA in August 2006, including Horsefly Creek and First Gulch. The results of these investigations, as well as the overall repository site evaluation conducted by Montana DEQ in September, 2006 are incorporated into the Final EE/CA in Appendix E. Description and evaluation of the repository sites is included in Sections 6.1.2 and 7.

ID	Comment	FOREST SERVICE Response
TU-6	recommend, as commonly occurs in CERCLA remediation, that the universe of removal and cleanup standards be detailed fairly precisely in an RI/FS or a similar technical evaluation beforehand.	This response action has been conducted as a removal action not a remedial action, so an RI/FS was not performed. The EE/CA is a similar technical evaluation and the agency believes that it fully and adequately evaluates the extent of contamination onsite and the appropriate cleanup alternatives.
TU-7	The EE/CA is deficient in describing the measurable targets for the aquatic community during cleanup and in the post-remediation landscape. The list of ARARS, in our view, also seems incomplete or at least incompletely explained. For example, we recommend the aquatic life standard for water quality be based on acute AND chronic standards. Moreover, we recommend that metals be evaluated using the total dissolved standard.	Chronic aquatic life standards have been identified as removal action goals in Table 5-1. A complete list of ARARS and their application to the selected alternative is incorporated into the Action Memorandum. The complete list of ARARs is found in Appendix D. The list of ARARs was identified by the Forest Service and reviewed by Montana DEQ and EPA.
TU-8	We disagree with statements in the EE/CA that “extensive site characterization” has occurred on the sites. We believe, as does the State of Montana, that groundwater and waste characterization is still incomplete to conclude that leaving wastes on site is a good idea.	Evaluations of waste characteristics and volumes, surface and groundwater and other features of the EE/CA area, has been ongoing at the UBMC since the early 1990’s (EE/CA Section 8). Additional data collection since the draft EE/CA includes the drilling of five groundwater wells into the west impoundment area in August, 2006, drilling of three groundwater monitoring wells at the Paymaster Repository area, water chemistry data on the west impoundment, repository site investigations, collection and evaluation of the physical characteristics of the tailings based on cores was conducted in December, 2006. A stability analysis of the tailings was conducted in March, 2007 (Section 6.2.1.7). Two out of drainage repository sites have also been included in Section 6.1.2.
TU-9	All selected options should include final engineering designs that accommodate post-remediation restoration, including elements that restore natural channel and floodplain function. This means the selected alternative for Beartrap and Mike Horse Creeks, as well as the upper river, should accommodate restoration of groundwater exchange in the floodplain, fish passage, sediment transport, stabilization of channel bedforms, channel complexity and riparian health.	Engineering designs will be prepared following selection of removal options in the Action Memorandum and negotiations with potentially responsible parties. As described in TU-6 above, the scope of this EE/CA is defined by the AOC and includes removal actions. Also explained above in MWAC-1 is the Forest Services’ concern for recontamination of removal areas in Lower Mike Horse Creek, Beartrap Creek, and the Upper Blackfoot river by unconfined wastes and contaminated surface and groundwater located on the upstream private land. That being said, the EE/CA identifies in Section 6 that the objectives of Options 4 and 5 for the dam and impounded tailings, and the complete removal options for Lower Mike Horse Creek, Beartrap Creek and the Upper Blackfoot River would be to create hydrologically and biologically functioning channels to the extent practicable.

ID	Comment	FOREST SERVICE Response
TU-10	The cost analysis in the document is inadequate in describing potential O and M costs for all alternatives. Moreover, it seems to understate costs associated with alternatives that provide for leaving materials on site. For example, Option 2 for the Lower Mike Horse site seems to understate the costs for repository soil caps, lime amendments and engineered bank stabilization. It also appears the estimated costs in Option 2b for the Mike Horse impoundment don't include the full cost of lining (or spell out the type of liner material). Option 3b for the Mike Horse impoundment seems to include costs that only cover about half of the proposed lining and capping for the repository site and dam. In addition, no costs are cited for long-term capture and treatment of contaminated leachate or runoff.	Revisions to the Engineering Cost Estimates (Appendix I) have been made since the draft EE/CA to reflect costs for Operations and Maintenance for 100 years. It is understood in identification of costs for "conceptual" CERCLA removal options that the margin for error is +50% to -30% due to the lack of design details at this stage of the project. That being said, many of the costs identified in Appendix I were prepared using actual bid prices from similar projects conducted in Montana in the past 2-3 years and were validated in discussions with Montana DEQ in April, 2007. Obviously, fuel cost changes, at a minimum, could result in significant changes to any cost estimate. A description of impoundment dewatering and potential treatment options is included in Section 6.2.1.6. This activity would be common to Options 2-5 for the impoundment. The liner material that would be utilized for Option 2b is HDPE, however other liner materials may be considered during final design.
TU-11	The document assumes (p. 6-13) that wetland treatment cells are appropriate for treating post-remediation discharges that don't meet ARARs…Passive wetland cells can certainly perform some level of preliminary removal of pollutants, but to assume they are adequate for end-product treatment is wishful thinking.	Section 6.2.2.4 in the Final EE/CA describes the complete removal option for Beartrap Creek. The Forest Service is concerned that the unconfined contaminants from Upper Mike Horse Creek could result in recontamination of this stream segment where total removal was conducted, thus, the wetlands concept is introduced herein as a possible mitigation to the unknowns of upstream contamination and a timeframe for their remedy.
TU-12	we believe a comparison of the relative costs among these alternatives is less important than the comparative risk that will be assumed upon completion of cleanup activities…issue of not wanting to "contaminate" a new site with wastes relocated from the Upper Blackfoot Mining Complex is a red herring.	Comment noted. A comparison of the out of drainage and in drainage repository sites and performance is discussed in Sections 6.1, 6.6 and Section 7.0
TU-13	estimated costs of the options we recommend represents less than 1 percent of the Forest Service's annual budget of more than $4 billion. In addition, we note, again, the agency has an opportunity to dedicate some of its budget to cleanup of the upper Blackfoot sites while then seeking triple the damages under CERCLA from the responsibility parties.	Comment noted.

ID	Comment	FOREST SERVICE Response
DEQ-1	If the source of the voids in the dam is from piping of embankment materials into the foundation, then dam removal or repair must proceed quickly. If the source of the voids is from settlement of hydraulically placed material, then the need for immediate action is less urgent.	The Evaluation of the Mike Horse Dam (Forest Service, 2005) simply concluded that voids in the dam exist. The primary failure mode of concern for the Mike Horse dam is still overtopping since the overflow pipe is not designed to pass the ½ probable maximum flood. Information regarding the existence of voids added to Forest Service concerns about the long term stability of the structure.
DEQ-2	The saturated tailings at Mike Horse Dam remain a threat to the environment until removed. Therefore, interim measures must be taken to mitigate the Mike Horse Dam safety concerns regarding stability. there are two options that should be implemented to provide an additional factor of safety: Divert incoming flows from entering the pond (develop diversion channel) before next spring runoff. Test the emergency action plan. When a dam has a problem, the current standard of care in the dam/engineering community is to conduct a table top exercise of the emergency action plan.	Comment noted. Diversion of Beartrap Creek is scheduled for 2007 and funds are available to undertake this effort. Dewatering of the tailings is also scheduled to be initiated in 2007. The remote monitoring and activation systems for the Emergency Action Plan were tested on March 15, 2007 and proved successful. Montana DEQ received prompt notification during implementation of the test.
DEQ-3	Due to the sources of contamination located on private property in the Mike Horse Creek drainage and their potential to "recontaminate" drainage bottom/floodplain removal areas proposed in the EE/CA, Montana requests that the Forest Service wait until these upstream sources are addressed before proceeding with the three creek floodplain removal areas described in the EE/CA	The Forest Service recognizes that construction activities for a selected removal action on Forest Service lands will likely take multiple field seasons for implementation. The Forest Service expects to coordinate the removal activities with other Federal and State agencies and responsible parties. Adaptive management also provides the flexibility for incremental actions and monitoring.

ID	Comment	FOREST SERVICE Response
DEQ-4	Two of the proposed alternatives for dealing with Mike Horse Dam are dependent on the construction of the West Impoundment Repository. The technical review for this proposed repository has identified two critical concerns. First, the physical characteristics of the waste are of concern due to the homogeneity of the waste (fine-grained flotation mill tailings) and its saturated state. All options considering the use of the West Impoundment Repository prescribe the placement of "dewatered tailings" on top of in-situ saturated tailings. At best, this will produce a very unstable repository in the short term and there is insufficient data to suggest that this will only be a short term problem. Data gaps to consider include the proximity of any bedrock aquifer discharge and seasonal shallow groundwater flow, both of which may contribute significantly to continued/perpetual saturation of waste in the bottom horizon of the repository. Instability of the tailings due to saturation could cause slope failure... can West Impoundment Repository be built at all if the proposed slopes (2.5:1 and 3:1) cannot be shown to be stable	A stability evaluation was conducted in 2007 in response to concerns regarding placement and stability of dewatered tailings. The results of this evaluation are included in the Final EE/CA in Section 6.2.7., and have been used to refine the concept design and capacity of the West Impoundment Repository (Section 6.1, Drawing 4). In addition, five groundwater monitoring wells (TDMW3S, TDMW3d, TDMW4S, TDMW4D, TDMW5) were drilled in the area of the proposed West Impoundment Repository in August, 2006 and have been monitored through May 2007. The results from the monitoring of these wells (Section 6.1.1.2, Appendix B, Section 3.5.1) indicates that a higher level of engineering controls and additional data regarding the groundwater connection with impoundment water levels would be needed to increase repository capacity in light of the recent groundwater monitoring data which shows a rise in the groundwater table near TDMW 4D and 4S in the spring. In light of the information obtained from the groundwater monitoring wells in 2007, Option 4 for the Mike Horse dam and impounded tailings identifies the Paymaster as the priority in drainage repository for this Option.
DEQ-5	The second major concern with Mike Horse Dam Options 3 and 4 is the geochemical nature of the tailings. It is mentioned throughout the options proposing use of the West Impoundment Repository that there is potential for leachate generation that may discharge to surface water, at least in the short term. Again, there is insufficient data to suggest that this will only be a short term problem. The proximity of any bedrock aquifer discharge and seasonal shallow groundwater flow may cause leachate generation to be more than just a short term problem. In addition, the arsenic content (135 – 426 mg/kg; 260 mg/kg average) in the tailings may be problematic when considering liming, the method most often applied for drying saturated mine waste… the potential to produce arsenic leachate as a result of liming would need further evaluation… it is important to note that the proposed 12-inch soil cap (one of two capping options) would exacerbate the aforementioned physical characteristic and geochemical concerns due to the introduction of up to 24,000 gallons of infiltration (precipitation) per acre per year (based on the 5% infiltration rate in the HELP modeling). In addition, the proposed 12-inch soil cap does not comply with state law (ARARs).	Dewatering of the impoundment is expected to be initiated in 2007 with diversion of Beartrap Creek and initiation of tailings dewatering activities (Conceptual Plan described in Section 6.2.6) A water treatment plan will be developed as part of this effort as a contingency in the event that leachate develops. This plan would include review by Montana DEQ. Based on the results of the 2007 dewatering activities, we will be able to ascertain the hydrologic controls on the bedrock monitoring wells along the west impoundment and within the impoundment itself. The diversion and dewatering also serves a more important primary purpose which is to remove the threat of a failure of the dam by overtopping in the short term. The 12 inch soil cap was removed as a capping option in the Final EE/CA. See Section 6.1.3 for a description of the repository cap design.

ID	Comment	FOREST SERVICE Response
DEQ-6	DEQ conducted a repository screening evaluation that investigated the feasibility of locating a repository within 10 miles of the tailings impoundment. The results of this screening suggest that it may be feasible to locate a repository within 10 miles from the Mike Horse Dam	The final EE/CA incorporates the Horsefly Creek Repository Site as one of the out of drainage repositories and includes this site in the description for sitewide Alternative 5, as well as in the cost estimates (Sections 6.1.2.2, 6.3.5, Appendix E).
DEQ-7	While adaptive management may have a role in resource management (stream rehabilitation, drought issues, etc.), it does not lend itself well to Superfund sites or cleanup of contamination. If the outcome of an alternative is uncertain and subsequent monitoring is needed to determine its effectiveness, then a contingency needs to be added for that alternative. The point at which the contingency alternative will be implemented (as well as who will conduct it) needs to be clearly defined (e.g., if macroinvertebrate diversity is not achieved, then …). If an alternative with an adaptive management component is selected, then the potential for failure of that alternative and its impact on downstream cleanups also needs to be evaluated	This EE/CA and its removal options is one of series of response actions that have been or will be conducted at this site due to the complexities presented by onsite and upstream contaminant sources as well as the landownership, and the complexities associated with potentially responsible parties. An adaptive management approach has been utilized successfully by EPA at several ongoing Montana sites including the Tenmile and Basin Creek sites.
DEQ-8	there was no evaluation of the risk to the aquatic environment. This is a significant data gap… In order to ensure that additional work will not be required on Forest Service land, we recommend that the human health risk assessment be revised and an ecological risk assessment (that includes the aquatic environment) be completed if alternatives other than complete removal are selected to determine what the cleanup level	A streamlined ecological risk evaluation was conducted for the Final EE/CA (Section 4.0). This evaluation included identification of potential routes of exposure in the aquatic environment and concluded that without an understanding of the long term contribution of contaminants from private land on Upper Mike Horse Creek, it would be difficult to identify and quantify fisheries and other aquatic impacts from this project. Therefore a full scale ecological risk assessment was deemed unnecessary at this time. Although the Forest Service intends to select a removal action that addresses ARARs to the extent practicable, we are also prepared to conduct follow up actions on the environmental response to the selected option, and as developments regarding removals on upgradient sources warrant. This adaptive management response which is premised on source removal/control and monitoring of the environmental response, is precisely why a streamlined risk evaluation approach, consistent with recommendations in the EPA's EE/CA Guidance Document, is deemed appropriate, as opposed to a lengthy and expensive conventional risk assessment.

ID	Comment	FOREST SERVICE Response
DEQ-9	The removals should support the concept of full re-naturalization of streams and contaminated floodplains… Restoration needs to involve water quality (e.g. bringing water conductivity, metals and pH to near background levels) while integrating major physical habitat conditions related to valley floor and channel morphology, and include habitat complexity in a manner that provides suitable conditions to multiple-year classes of West-Slope Cutthroat Trout (WSCT**)**. The stream channel should be capable of passing flow and sediment without aggrading or degrading its valley and in a manner that provides for stable channel bedforms and habitat features suitable for native species. Incorporating removals that could facilitate these restoration concepts will contribute to the fisheries potential of the site being realized.	See responses to TU – 9, TU-11 above.
DEQ-10	The EE/CA includes cleanup on private property. As a general rule, the Forest Service is not granted authority under Executive Order 12580 (January 23, 1987: see 52 FR 2923) to approve cleanup on private property.	In general, the Forest Services' authority to perform cleanup actions on private land is limited under Executive Orders 12580 and 13016, but it is not correct to say that there are no circumstances where the Forest Service can proceed with the cleanup of privately owned property. In cases where cleanup is desirable on private property due to waste configuration and juxtaposition of intermixed landownership, and where the Forest Service does not have the authority to proceed under the relevant executive orders, the Forest Service will partner with EPA or the appropriate State agencies, to perform the cleanup.
DEQ-11	the EE/CA and the potential for a short construction season due to weather, the EE/CA should consider scenarios in which the options require more than one season to implement.	The scope of construction that would be needed to implement Options 2-5 for the dam and impounded tailings will likely require more than one construction season. Dewatering of the tailings alone (described in Section 6.2.1.6 and in Appendix H) expected to commence in 2007, may take one or more construction season to achieve suitable tailings moisture levels. Additional information regarding construction sequencing and multiple construction season issues is described in Appendix H. Specific construction work items and practices that would be needed to over winter a construction project would be identified in the detailed engineering design for the selected remedy.

ID	Comment	FOREST SERVICE Response
DEQ-12	The NCP requires that removal actions attain ARARs to the extent practicable considering the urgency of the situation and the scope of the removal. The Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA provides that the EE/CA must provide a detailed analysis that summarizes which requirements are applicable or relevant and appropriate to an alternative and describe how the alternative meets those requirements. The EE/CA does not comply with either portion of this requirement. Montana provided its evaluation of ARARs to the Forest Service prior to the release of this EE/CA. However, many of Montana's identified ARARs were not incorporated into the EE/CA. Given that the planning process for implementing this EE/CA will take some time, as will the actual removal work itself, it is practicable to require that all State ARARs are met. In addition, although the work will be conducted as a removal action, it is intended that the work will also serve as the final remedy in this area. Included with Montana's comments is a revised ARARs package for the Forest Service' consideration. Please consider each of these ARARs as a public comment on the EE/CA. If the Forest Service does not intend to include an identified ARAR, please explain why not.	The Forest Service agrees that the NCP requires that removal actions attain ARARs to the extent practicable considering the urgency of the situation and the scope of the removal. The Forest Service is aware of the EPA guidance mentioned by the commentor, and although the Forest Service is not required to comply with EPA guidance in the same way that it must comply with CERCLA and the NCP, the Forest Service generally follows EPA guidances interpreting the CERCLA's statuatory and regulatory requirements. The agency has carefully reviewed its selected ARARs again, and it has incorporated those proposed ARARs that have been identified by the State that are appropriate. The agency recognizes that this is not an emergency action, and sufficient time is available to evaluate the appropriate ARARs, but that does not necessarily mean that every ARAR identified by the State should be implemented. Time is not the only relevant consideration in selecting ARARs. Some have not been selected because they are not relevant to the response actions under consideration in this phase of the cleanup. The current removal action is not necessarily the last response action that the Forest Service will implement on this site. The agency uses an iterative process (adaptive management) to clean up large or complex sites, like the Upper Blackfoot. This allows the agency to use its resources, seek cooperation and/or compensation from responsible parties, and evaluate effectiveness of selected actions before possibly implementing additional actions. In addition, the Forest Service focused the present EE/CA on the portions of the Site that are on or impacting NForest Service lands, and the agency expects that further investigations of appropriate cleanups will be performed at this Site by itself, EPA and/or the State.
DEQ-13	Please provide a removal schedule as provided for in Section 2.5 of the Engineering Evaluation/Cost Analysis (EE/CA) Guidance document	Identification of a detailed removal schedule is premature at this time.
DEQ-14	Please clarify current ownership for the unpatented mining claims where the tailings impoundment and historic by-pass ditch are located. In addition, please clarify "responsibility vs. ownership" with regard to unpatented mining claims when mine waste comes to be located on these claims.	Historically land in this area was held as unpatented mining claims that, at least until recently, were owned by ASARCO. In 2006, ASARCO filed a notice of withdrawal with the Bureau of Land Management, but the current ownership of the property is a matter disputed by the parties in bankruptcy litigation. Further discussion of this issue is not warranted here because it is outside the scope of this EE/CA.

ID	Comment	FOREST SERVICE Response
DEQ-15	All work falls under the authority of CECRA, the Montana superfund program. While the work proposed in the EE/CA is being conducted under CERCLA, it is also within the boundaries of the UBMC Facility as defined by CECRA. Please revise to indicate the additional CECRA authority at the UBMC.	DEQ provided a regulatory history to the Forest Service, including a description of the State's CECRA authority at the site. This has been incorporated into the Final EE/CA in Section 2.4.
DEQ-16	Please indicate which "portions" of the TMDL document are relevant to the development of the EE/CA.	All portions of the TMDLs are considered relevant, in particular the TMDL targets, source assessment, and allocation sections. .
DEQ-17	Page 1-3, Section 1.2: This refers to a data compilation report prepared by Hydrometrics in 2005. Given that DEQ- had significant comments on this report which were not incorporated and which resulted in DEQ- deciding to complete the report, DEQ- does not believe it is advisable to rely on this report as a basis for the EE/CA.	Section 8.0 includes over 40 technical references, in addition to the reference mentioned, that were utilized in preparing this EE/CA. The Forest Service does not believe there is an over reliance on any one technical reference.
DEQ-18	Pages 2-5, Section 2.3: Please provide references for this section. Briefly describe the nature of the testing that was performed to characterize the groundwater gradient and yield; e.g. pump tests. In addition, please clarify if aquifer tests were conducted on the alluvium in the various reaches covered by the EE/CA.	The hydrogeology provided in Section 2.3 is strictly a summary to capture a large amount of information provided from the surface monitoring sites and groundwater monitoring wells at UBMC over the past 15 or so years, as well as from available literature. For a more complete data set regarding surface and groundwater monitoring data, refer to Comprehensive Data Summary Report for the Upper Blackfoot Mining Complex Site, Lewis and Clark County, Montana, Hydrometrics, 2005b. A selection of data from surface and groundwater chemistry, is found in the Final EE/CA in Appendix B. Five monitoring wells were installed near the shoreline of the West Impoundment in August 2006. These are described above in response to DEQ-4. Three monitoring wells were installed in the vicinity of the Paymaster Repository in August, 2006. PRMW 1, 2 and 3 were all completed in bedrock and have been sampled monthly since August 2006. Data shows groundwater ranged in depths from 24 to 44 feet below ground surface in August to 19 to 31 feet below ground surface in May 2007 (Section 6.1.1.1). One well, PRMW 2 intersected a mineralized vein at 44 feet.

ID	Comment	FOREST SERVICE Response
DEQ-19	Pages 2-6 and 2-7, Section 2.4.2: Key elements of the Regulatory History are missing from this section. The UBMC is a State CECRA high-priority facility and the area covered in the EE/CA is located within that facility. The Forest Service is using its CERCLA authority to implement the EE/CA. Inclusion of all the regulatory history is important because of the complex issue of administrative authority at the site and the need to ensure that the actions described in the EE/CA are consistent with all future actions that will occur under CECRA.	DEQ provided a regulatory history to the Forest Service in 2006. This has been incorporated into Section 2.0 of the Final EE/CA.
DEQ-20	Page 3-1, Section 3.0, 4th sentence: Montana cannot support the general statement that the UBMC has undergone "extensive site characterization activities"… However, certain media investigations at the site (within the boundaries of the EE/CA) have been extensive including surface water and the delineation of mine waste in the drainage bottoms. However, DEQ- does not believe that the groundwater has been adequately characterized for contamination and/or sources identified in all locations described in the EE/CA.	See response to TU-8, and DEQ -18 above.
DEQ-21	Page 3-1, Section 3.1, 1st sentence: The capacity of the reservoir is given as "approximately 40 acre-foot pond created by the dam." In Section 2.1.1 of the EE/CA, the capacity of the reservoir is given as "a 150 to 200 acre-foot reservoir." Please address this discrepancy in the reservoir capacity.	This has been corrected in the Final EE/CA.
DEQ-22	Page 3-4, Section 3.2.2, 1st paragraph: For risk assessment purposes, typically the top two feet of soil is evaluated during a recreational exposure scenario, such as those used in the EE/CA. Since the metals concentrations increased with depth, if some of the deeper samples reflect the 18 to 24 inch depth, they must be included in the risk calculations.	The risk assessment does use the "combined" data. While not described in detail in the risk assessment, the decision to use the combined approach would increase the sample size and provide more robust averages. The mine removal materials were generally considered to be monolithic with significant stratification and differences in metals concentrations with depth. The different averages that would be attained by sorting the samples into surface and non-surface samples were not expected to change the overall conclusions of the risk assessment. Section 3.2.2 describes the sampling and methodology for the Lower Mike Horse Creek sub area. Section 4.1 has been modified to explain the rationale for the combined data set.

ID	Comment	FOREST SERVICE Response
DEQ-23	Page 3-14, Section 3.5, 2nd paragraph, last two sentences: Montana does not believe that there is adequate characterization of groundwater in the vicinity of BRSW-12, as well as other areas within the boundaries of the EE/CA. The monitoring wells and piezometers referenced in Figure 2-2 and described in Section 3.4.4 are completed in the Blackfoot River alluvium aquifer. Without data from the bedrock aquifer in the area of BRSW-12, it is premature to assess the origin of the mineralized groundwater. Please remove this assumption from future documents.	Everything in the referenced paragraph is factual and accurate and is relevant to the EE/CA. Therefore, the discussion will not be deleted. However, additional information has been added to the final EE/CA supporting the statement that bedrock groundwater quality may influence surface water quality.
DEQ-24	Page 3-14, Section 3.5, 2nd paragraph: Historically, the groundwater flowpath at the upper Mike Horse necessitated the removal of two large waste rock piles due to the highly reactive nature of the waste rock when contacted by the seasonal shallow groundwater flow. This scenario resulted in very high metals concentrations in the groundwater that eventually flowed out into Mike Horse Creek. Similar concerns regarding seasonal shallow groundwater flows should be noted when assessing the removal requirements for the lower Mike Horse Creek mine waste piles and when assessing the proposed location of any repository presented in the EE/CA.	Comment noted. See response to TU-8 above regarding groundwater wells drilled in the vicinity of the proposed West Impoundment repository and Paymaster Repository.
DEQ-25	Page 3-14, Section 3.5, last paragraph: As with the discussion of human health risks, please include discussion regarding eco-health risks and their significance with regard to the Conceptual Site Model. The discussion must include the various media that are identified as eco-health risks to plants, invertebrates, birds, and mammals based on the screening of the streamlined eco-risk assessment.	See response to FWS-1 and DEQ-8 above.
DEQ-26	Page 3-14, Section 3.5, last paragraph, last sentence: The last sentence in this paragraph seems to contradict previous portions of the document. For example, the last paragraph on page 3-7 indicates that in some instances the dispersed tailings have higher metal concentrations. This is repeated in the second paragraph on page 3-11. Therefore, it is unclear how the concentrated mine wastes (primarily tailings) pose the greatest risk to human health and surface water quality compared to the dispersed wastes. Based upon the results presented in previous sections, it appears that they both are problematic.	The concentrated mine wastes pose the greatest threat to human health and surface water based on their surficial location, making them more accessible to human contact and to runoff water, due to their greater acidity and acid generating potential, and the greater leachability as demonstrated in the EE/CA. Also, the dispersed tailings are intermixed with alluvium and contain abundant (50% or greater) coarse rock content, which was excluded from the samples. In order to get a true representation of the metals concentrations in the dispersed tailings material (including the coarse rock content), the dispersed tailings concentration would have to be divided by a factor of 2 or greater (since the coarse rock content is primarily benign Belt Rock or non-mineralized intrusive rock).

ID	Comment	FOREST SERVICE Response
DEQ-27	Page 3-15, 3rd paragraph, last sentence: Montana agrees that groundwater conditions in the vicinity of the impoundment and sources of seepage in the area are integral to the removal options and designs. This has not been sufficiently investigated and additional characterization is needed prior to selecting any alternative that considers leaving waste in place and/or using the proposed West Impoundment Repository site in the Beartrap drainage. Therefore, Montana does not believe that Tailings Impoundment Option 3 and Option 4 can be considered at this time.	Five monitoring wells have been completed along the west side of the impoundment since completion of the draft EE/CA for the purpose of better defining groundwater conditions in this area. These are in addition to the three wells drilled at the toe of the dam in 2001. Information obtained from the wells is included in Section 3.1.5 and in Section 3.5 of the Final EE/CA, and was heavily relied upon in finalizing the impoundment removal options. We are confident that we now have adequate information for selection of a removal action for the impoundment, particularly in light of additional information to be collected during dewatering of the impoundment in 2007/08.
DEQ-28	Page 4-1, Section 4.0, 2nd paragraph, last sentence: The State does not agree that groundwater is not at risk at this facility. In Section 3 of the EE/CA it clearly demonstrates that groundwater is impacted by mine waste in specific areas and, in turn, that groundwater may be impacting surface water…	See our response to DEQ-8 and DEQ 30. Groundwater was also not evaluated in the risk assessment because it is not being used as a domestic water supply, nor is it suitable for future domestic use in part because of historic contamination in the area that is outside the scope of this removal action.

ID	Comment	FOREST SERVICE Response
DEQ-29	On page 4-2, Section 4.2.1, 2nd paragraph, line 5, the statement is made that "this risk assessment does not assess risks associated with ongoing water and sediment quality." In addition, on page 4-8, Section 4.3.2.1, 1st paragraph, line 5, the statement is made that "there are upstream sources of release of metals that are expected to continue impacting many of the surface water bodies considered in the EE/CA. For this reason, fisheries impacts are not a (*sic)* primary assessment endpoints for this EE/CA." Fisheries impacts and impacts to water quality are definitely a concern in the UBMC, and must be included in this risk assessment	See also responses to DEQ-8 and FWS-1 above. Forest Service shares the State's concern for its fisheries. Section 4.3.2.1, Aquatic Assessment Endpoints, opens by recognizing the importance of the Blackfoot River as a fishery. While ambient water quality criteria are not included in the risk assessment, they are included in the development of ARAR-based removal action goals for surface water (Table 5-1). This approach provides information about what parameters may be of concern to aquatic life and provides for their consideration within a long-term adaptive management approach. Furthermore, the referenced text in the comment is taken out of context. The full text on page 4-8 reads: "Moreover, there are upstream sources of release of metals that are expected to continue impacting many of the surface water bodies considered in this EE/CA. For this reason, fisheries impacts are not a primary assessment endpoint for this EE/CA. Rather, an adaptive management approach is to be used. Metals which leach from the historic mine material can enter both the surface water bodies and their respective sediments. The removal of the mine materials will reduce the amount of metals that are available for leaching into surface water and sediments. Within the context of the adaptive management approach, water quality will continue to be monitored after the removal of mine materials. Any additional actions needed to improve fisheries will be considered at a later phase of the remediation efforts within the area which gives due consideration to upstream water quality improvement needs and possible natural sources of impaired surface water quality." The grammar error has been corrected.

ID	Comment	FOREST SERVICE Response
DEQ-30	Page 4-1, Section 4.0, 4th paragraph: The State does not agree that the use of the "generic" *Risk-Based Guidelines for Abandoned Mine Sites* (Tetra Tech, 1996) and the *User's Guide: Risk-Based Guidelines for Abandoned Mine Sites* (Tetra Tech, 2004) documents is appropriate for all of the removal options presented in the EE/CA. The State believes that conventional human health and environmental risk assessments are more appropriate for determining risk and setting appropriate risk goals	See responses to DEQ-8 and DEQ 28. The EE/CA does not state that groundwater is not impacted; rather, it states that existing and future potential human exposure to groundwater on lands within the National Forest is unlikely. While mining-related sources addressed in the EE/CA may impact groundwater quality, the source removal concept which the EE/CA is based on is intended to respond to these impacts. Furthermore, the adaptive management approach described in Section 4.3.2.1 allows for further assessment of surface water quality upon completion of the proposed remedial actions and leaves open the possibility of additional remedial actions at a future time.
DEQ-31	Page 4-8, Sections 4.3.2.1 & 4.3.2.2: As previously stated, Montana believes that a conventional environmental risk assessment is more appropriate for determining ecological risk and setting appropriate ecological risk-based goals. The need for a conventional environmental risk assessment is highlighted by considering the degree and frequency in which the HQ of 1 (presented in Tables 4-9 to 4-13) is exceeded for the various contaminants and their receptors.	As stated in the prior comment, the degree and frequency by which contaminants are identified as a potential concern would not change in a more detailed risk assessment unless the assumptions used in the Tetra Tech guidance are changed.
DEQ-32	Page 5-1, Section 5.2, 1st paragraph, 2nd sentence: Based on the findings for groundwater in Section 3 of the EE/CA, please include groundwater as a primary media of concern.	See responses to DEQ-8, DEQ-28 and DEQ-30. Groundwater was not included as a primary media of concern within the context provided by the text and bullets that follow the use of the term "primary media of concern." The context describes future potential for exposure and risk. The Forest Service recognizes that groundwater is a concern within the context of Montana's water quality laws. Therefore, groundwater will be added as a media of concern. Groundwater assessments involve considerable resources and the results of modeling and future projections involve considerable uncertainty. The adaptive management approach taken to address groundwater responsibly allows the Forest Service to address "sources" to groundwater as a higher priority, while continuing to monitor and evaluate the benefits of these measures to water quality and any future actions that may be necessary to achieve long-term, risk-based groundwater (and surface water) quality needs.
DEQ-33	Page 5-2, Section 5.2, 1st paragraph: Removal action objectives on page 5-2 must include prevention of dam failure and uncontrolled release of tailings sediments.	This change has been incorporated into the Final EE/CA on page 5-2.

ID	Comment	FOREST SERVICE Response
DEQ-34	Page 5-4, Section 5.4, 1st complete paragraph: Although this is a non-time critical removal action, it is likely to be the final action for the area being addressed. Therefore, in addition to considering risk-based soil cleanup goals, it is appropriate to consider soil cleanup goals that prevent contaminants from leaching to groundwater. Montana will require a complete fate and transport evaluation for the entire UBMC facility at some point in the future. In order to ensure that additional work will not be required on Forest Service land, we recommend that the soil cleanup goals include an evaluation of leaching to groundwater	As noted above, the Forest Service respectfully disagrees with DEQ's conclusion that the present EE/CA will necessarily lead to the final cleanup actions on NForest Service lands onsite. Indeed, in its own comments, the State identifies that it intends to complete an additional evaluation (RI/FS) of the site.
DEQ-35	Page 6-1, Section 6.1: ARM 17.50.505 requires a demonstration that there is no potential for leachate migration to any underlying formations that have a hydraulic continuity with any state waters. This demonstration is typically done through leaching tests and analysis of the continuity with state waters. In addition, ARM 17.50.506 (1) requires that new landfill units, which include repositories, must be constructed with a design approved by DEQ- that ensures certain concentration values are not exceeded or with a composite liner and a leachate collection system that meets certain specifications. Please explain compliance with this ARAR	Compliance with this ARAR would be done in the design phase for the selected removal option. We disagree that the repository design, if located on Forest Service lands, would need 'approval' by DEQ for reasons explained in DEQ-12 above, however, we will seek out DEQ's review and comment on conceptual and design documents.
DEQ-36	Page 6-2, Section 6.1.1, Off-site Location, 1st paragraph, 2nd sentence: Based on the Forest Service Repository Siting Investigation (Appendix E), it is inaccurate to state, "No on-site repository sites with adequate storage capacity to handle … Option 5 were identified …." While it is acknowledged that further investigation is required to determine suitability, Site 8 does have the greatest potential (> 10 acres in size) to receive all of the waste removal proposed in the EE/CA. Note that with the exception of site 4 (current site of the Paymaster repository), the other proposed sites (sites 1-3, 5-7, 9,10) will also require the same extensive investigation required at site 8 to determine suitability as repository sites	Section 6.1 and Appendix E include potential repository sites and evaluations. Sites that were excluded from more detailed evaluation, and the rationale, are explained in Appendix E.
DEQ-37	Page 6-3, Section 6.1.2, 2nd paragraph. The 12-inch soil cap option does not comply with State ARARs. ARM 17.50.530 requires a 24 inch final cover system	This change has been made in the Final EE/CA in Section 6.1.3.

ID	Comment	FOREST SERVICE Response
DEQ-38	Page 6-6, Section 6.2.3, 3rd paragraph: The channel for option 3 will be placed on native ground but it will not be at the low point of the original ground surface and tailings will remain in place below this level. This ensures that the lower portion of the tailings will remain saturated, since they can't drain to the channel. One adverse effect of the saturated tailings is the potential to generate leachate that can discharge lower in Beartrap Creek. A second concern is that the saturated tailings base is an unsuitable foundation for the tailings left in place and the West Impoundment Repository. A third concern is that the left (west) wall of the channel will be built on tailings material that could potentially be saturated and too weak to allow construction of a permanent, rip rapped channel. Another concern is that bedrock aquifers may discharge to the tailings and maintain saturation, in which case they will probably be unstable at a 3:1 slope. Even if there is no continuing source of water to cause saturation of the tailings, the tailings will need to be dewatered to achieve the strength necessary to maintain a 3:1 slope. Although dewatering of excavated tailings is discussed in Section 6.2.6, there is no discussion of the methods for dewatering tailings that will remain in place. Given these potential problems with Option 3, a discussion of dewatering method for in-place tailings and a demonstration of the stability of the designed configuration are required. In addition, placement of the relatively narrow channel next to tailings could potentially result in tailings releases in the future. Although the channel is sized for the 500-year flood, it could be easily blocked during a flood by trees carried down the channel or mass failures on the steep slope on the east side (shown as steep as 1:1 on Drawing 3 in Appendix F). If the channel is blocked, water could rise above the riprap, erode the cap, and release tailings..	Current information suggests that groundwater flow through the tailings may be limited in magnitude and aerial extent (see Section 3.5 of the Final EE/CA) and that excavation into the tailings, followed by the capping system, should not result in long term seepage from the west excavation wall. Diversion of Beartrap Creek and dewatering the tailings which is scheduled to be initiated in 2007 will provide additional information that would be included in a detailed design. A stability design analysis that was performed for the tailings, summarized in Section 6.2.1.7 of the Final EE/CA, identifies that cut slopes no steeper than 3.65:1 would be proposed for construction sideboards. The tailings would be dewatered prior to construction of the West Impoundment Repository. Dewatering is discussed in the Final EE/CA in Section 6.2.1.6 and in Appendix H. Specifics of this activity would be developed during engineering design of the diversion and dewatering steps for this site. The stability analysis shows that saturated tailings will be stable at slopes of 3.6 to 1. The drawings have been changed to show side slopes of 3.6 to 1 or less in the Final EE/CA. Engineered controls are available to prevent plugging of the engineered channel with flood debris. These may include over-widening of the channel, raising the height of riprap, or inclusion of a debris catchment basin at the head of the engineered channel. These provisions would be addressed during final design.

ID	Comment	FOREST SERVICE Response
DEQ-39	Page 6-7, Section 6.2.3, 1st full paragraph: The proposed repositories are considered Class II landfills under State ARARs. ARM 17.50.531 sets forth post closure care requirements for Class II landfills. Post closure care must be conducted for a period sufficient to protect human health and the environment. Post closure care requires maintenance of the integrity and effectiveness of any final cover, including making repairs to the cover as necessary to correct the effects of settlement, subsidence, erosion, or other events, and preventing run-on and run-off from eroding or otherwise damaging the cover and comply with the groundwater monitoring requirements found at ARM Title 17, chapter 14, subchapter 7. Please address these requirements in the monitoring requirements and include the appropriate cost associated with compliance in the cost estimates. In addition, please indicate that financial assurance for the O&M would also need to be resolved. This comment applies throughout the document where monitoring and O&M requirements associated with a repository are discussed	The Forest Service understands its obligations with regards to Class II landfills and the ARARs in Appendix D incorporate these measures. Due to the uncertainty of the performing entity for the removal actions identified in the Final EE/CA and Action Memorandum, we can make no commitments as to who will be conducting post closure care. Estimated costs for post closure care for 100 years are included in Appendix I.
DEQ-40	Page 6-7, Section 6.2.4, 2nd paragraph: The placement of the channel in Option 4 in the original channel location has several advantages over Option 3 besides the more natural channel configuration with its advantages of fish passage and biological linking of upper and lower Beartrap Creek. With Option 4 there will be no tailings below the channel invert so there will be less potential for saturated tailings remaining in the vicinity of Beartrap Creek. The less confined floodplain will reduce the danger of channel blockage during a flood with its adverse consequences. However, the presence of tailings adjacent to the west side of the channel is still a concern for stability of the rip rap protection and potential discharge of leachate to surface water. There is still potential for the tailings to remain saturated due to bedrock aquifer discharges and potential for slope failure if saturated materials are present. Note that Drawing 4 in Appendix F shows a 2.5:1 slope on the west side of the channel, not the 3:1 mentioned in the text. This steep a slope will only be sustainable if the tailings are well consolidated and not subject to saturation, and the engineered cap is carefully designed to remain stable. The slope for the West Impoundment Repository also appears to be 2.5:1 in this drawing. It is questionable whether the West Impoundment Repository can be built at all if the 2.5:1 slopes cannot be shown to be stable. A gentler slope may result in so little volume that the repository is not feasible	Option 4 has been redesigned in the Final EE/CA, Drawing 4, to address the issue of tailings near Beartrap Creek and slopes. See responses to DEQ 38 above.

ID	Comment	FOREST SERVICE Response
DEQ-41	Page 6-8, Section 6.2.5, 2nd paragraph, 6th sentence: No figure has been provided for Options 1-5 that delineates the surface area extent of the tailings in the tailings impoundment. Without such a figure, it is hard to visualize the areas of removal that are necessary for each option. It is of particular concern with Option 5 because there may be a potential borrow source in upstream (south end of the impoundment) sediments that are clean and/or minimally impacted by the tailings in the impoundment. If there is such a potential source, it could significantly change the estimate regarding the quantity of off-site borrow soil required and, in turn, significantly change the cost required for off-site borrow material	The approximate surface area extent of tailings has been added to Drawing 2, Appendix F.
DEQ-42	Page 6-10, Section 6.2.6, 1st paragraph: Not only will excavated tailings need to be dewatered but tailings that remain in place in Options 3 and 4 will need to be dewatered to sustain 3:1 or steeper slopes. For excavated tailings, there must be a discussion of the likely need to dry or lime them to improve strength before placement. Also, please note that the addition of lime may not be feasible based on the arsenic content of the tailings and the potential for creating arsenic leachate due to the amendment with lime	See responses to DEQ 38 and 40 above. Conventional drainage dewatering methods will be initiated in 2007 to determine the extent of dewatering that will occur with this method prior to considering the need for amendments such as lime.
DEQ-43	Page 6-12, Section 6.3.3. 3rd paragraph: Natural stream bank materials will probably not prevent migration of the stream into intermixed tailings under flows greater than approximately the 10-year flood. A low-flow channel should be shaped within the 100-year flood channel to maintain stream integrity during low flow periods. Otherwise water will be dispersed over too wide an area with loss of suitable habitat for aquatic life. It is not clear how the rip rap placed outside the 100-year flood channel will function. If it is simply placed outside the floodplain as shown on Drawing 6 in Appendix F, then it probably will be undermined during a flood and provide an uncertain level of protection. A more protective solution would be to install riprap banks to a depth below the scour level behind the 100-year channel natural banks to prevent a flood from accessing remaining intermixed tailings in the floodplain.	The configuration of the channel with respect to rip rap in Drawings 3 and 6 is conceptual in nature. Detailed drawings to address the concern for undermining would be done during the engineering design phase following the selection of a removal alternative.

ID	Comment	FOREST SERVICE Response
DEQ-44	Page 6-16, Section 6.4.3, 5th paragraph: If a 100-year flood channel is constructed, it should contain a low flow channel that prevents water from dispersing and becoming unavailable to aquatic species or wildlife. The logic of tying an alternative natural channel only to Option 5 at the Tailings Impoundment is not apparent. If the logical connection is that Option 5 will have a natural channel and therefore Lower Mike Horse Creek should as well, then Lower Mike Horse Creek should also be tied to Impoundment Option 4, which also has a largely natural channel. There should be at least one Lower Mike Horse Creek option that restores a natural channel to promote aquatic and wildlife values	We agree that a low flow channel could be a necessary feature of a selected option. These type of features would be included in a detailed engineering design for a selected Option. The inclusion of an alternative natural channel for Beartrap Creek for Option 5 of the Impoundment is based on its basic concept as a complete removal option with opportunity for a pre-mining natural valley bottom for Beartrap Creek. However, the transitional area where Mike Horse Creek intersects Beartrap Creek (Figure 3-2 shows this area in oblique view) is problematic as there may continue to be contaminants moving through this drainage from Upper Mike Horse Creek. We are concerned about the potential for recontamination of Beartrap Creek below its confluence with Mike Horse Creek. Resolution of this issue is not apparent in the short term, thus, a further argument for adaptive management as a concept for selecting removal options on Forest Service lands for this site.
DEQ-45	Page 7-1, Section 7.1.1, Option 1 & Option 2: Options 1 and 2 do not meet ARARs for the Montana Dam Safety Act. Option 2 should be rated low for effectiveness unless voids are found and grouted and the spillway is placed off fill material	These changes have been made in the final EE/CA, Table 7-1. However, Option 2 rates low-moderate for effectiveness due to the many other criteria associated with ARARs, the fact that the spillway would significantly reduce the potential for catastrophic failure of the dam, and due to the fact that a spillway as a means to convey excess flows is a typical design feature of dams in the State of Montana.
DEQ-46	Pages 7-1 and 7-2, Section 7.1.1, Option 3 & Option 4: The potential for tailings to saturate, especially if a soil cap is employed, reduce effectiveness of Options 3 and 4 to low to moderate	A soil cap only is not longer being considered as a capping option. Thus, the effectiveness ratings for these options are moderate – high (Table 7-1.)
DEQ-47	Pages 7-3 and 7-4, Section 7.1.3: The discount rate of 7% is unrealistically high because the present worth calculations do not account for inflation. A more realistic number for the net discount factor (discount rate minus inflation) is in the 2 to 3% range. This results in much larger series present worth factors; for example, for the thirty year series at 2.5% it is 20.93 instead of 12.41. The present worth of O&M for no action at any area becomes $627,909 instead of $372, 272 with a net discount factor of 2.5%. Please revise to more accurately reflect present worth values. This comment applies throughout the document when comparing alternatives and estimating costs	Comment noted. The Final EE/CA includes a present worth discount rate of 4.86%. See Appendix I.

ID	Comment	FOREST SERVICE Response
DEQ-48	Page 7-6, Section 7.3.1, Option 4: It is unclear how overall protection of human health and the environment would be moderate to high since some waste is still left in place with this alternative and there hasn't been an evaluation to demonstrate that leaving that waste in place will not adversely affect the environment. Please clarify	The Final EE/CA identifies that overall protection of human health and the environment for Option 4 for the impoundment would be high because virtually all waste would be removed and capped (Section 7.1).
DEQ-49	Table 7-2. Compliance with ARARs for Option 3 is moderate because the rip rap channel does not address several natural channel ARARs including natural stream provisions of the Fish and Wildlife Coordination Act, Natural Streambed and Land Preservation standards, or Montana strip and underground mine siting Acts	Comment Noted.
DEQ-50	Appendix A: Hydrologic Calculations. The channel design table (second table) presents typical values but does not appear to take into consideration the wide range of channel slopes proposed on the drawings. Steeper slopes will require larger rock sizes to be stable and flatter slopes may require larger channel dimensions. For Beartrap Creek, the average slope is about 4% with slopes as steep as 6%; however, the calculation appears to have assumed a slope of only 2%. For Mike Horse Creek, the slope ranges from 6 to 15% with an average slope of 9%, which appears to have been used in the calculations. Accounting for this variability is important during design.	The table has been revised to show typical riprap sizes for Beartrap Creek using an average slope of 4% instead of 2%. The riprap design table represents typical values, actual riprap size will be determined during final design.
DEQ-51	Appendix A: Methods of estimating peak flow have been revised. Although the effects on the analysis are minor on the 100-year flood flow estimate, there is a 200 cfs difference on the 500-year flood estimate on Bear Trap Creek. The most recent methodologies are contained in "Methods for Estimating Flood Frequency in Montana Based on Data through Water Year 1998" (Water-Resources Investigations Report 03-4308)	These calculations have been revised for the Final EE/CA (Appendix A) to incorporate the identified methodologies. As a result, the peak flow estimate for a 100 yr flow is 294 cfs and a 500 yr flow is 756 cfs.

ID	Comment	FOREST SERVICE Response
DEQ-52	Appendix F: Preliminary Engineering Design Drawings. The tailings impoundment drawings as they now stand are dependent upon an inferred natural ground surface to determine the channel location, cut slopes in the dam and tailings, and volume of materials. What information was used to develop the natural ground surface? The natural ground elevation presented in the drawings of the impoundment (Drawings 2 through 5) seems to be contradicted by cone pentrometer data from CPT2, which places apparent natural material at elevation 5434 feet and bedrock at 5430 feet (Romero, 2005, p. 2). Drawings 3 through 5 indicate that native ground is at about 5425 feet at this location. The native ground sections on the drawings also show a rather wide valley with steep walls, especially at the dam location. The east abutment area in particular is quite steep (1:1), although the native ground in the area immediately upslope from the dam and reservoir is gentler (1.5:1 to 2:1). The west abutment area is shown as being about 1.8:1. Although this configuration is conservative in the sense that it produces a larger total waste volume than other assumptions, it also affects the position of the channel in Option 3. If the east abutment slope is gentler than 1:1, the channel will move to the west, increasing the volume of waste requiring removal, and limiting the area available for the West Impoundment Repository. The shape of the native slope probably has lesser effects on the feasibility of Options 4 and 5 although it still could produce very significant changes in volumes of material and costs. Please explain	The natural ground surface has been inferred based on fairly good ground control, including monitoring well data at the base of the dam, bedrock outcrops on the east abutment, bedrock intercepts from the five west impoundment groundwater wells, and the upstream channel elevation. We agree that there are remaining unknowns that could result in changes. The drawings presented are conceptual in nature and items such as those identified in the comments would be addressed during detailed design and the data collection that would accompany design work.
DEQ-53	Appendix H: Engineering Cost Estimates: Costs do not appear to allow for any inflation that may occur before construction. Construction costs have been increasing at about 6% per year recently. Costs for rock for channel/spillway construction are reasonable if the material can be generated near the site; if taken from an existing commercial source, they are probably low. It is not clear in the composite cap options if a geocomposite (geonet plus geotextile) will be included as a drainage layer at all locations. Specific comments on costs follow. Please clarify	As stated in Section 7.3, cost estimates for these options are based on inherent uncertainties in material volumes and actual construction costs, and that in keeping with conventional cost estimating guidance, they should be considered to within +50%/-30% accuracy as the EPA guidance suggests.

ID	Comment	FOREST SERVICE Response
DEQ-54	Mike Horse Mine Impoundment. Option 3b: The text in Section 6.2.3 (5th paragraph) indicates that the impoundment cap will encompass the West Impoundment Repository, as well as the tailings and the portion of the dam left in place. This is an area of about 60,000 sy and is about twice the area considered in the cost estimate. The note on the Option 3b cost estimate indicates that the dam will not be lined but there is still a large discrepancy in the areas. The West Impoundment Repository would require about twice the amount of liner listed. Presumably benches and top slopes are tailings material and will need to be capped. The amount of cover soil also appears deficient, even with only one-foot of cover. The cover soil over lined areas should be 24-inches thick as stated in Section 6.1.2, 3rd paragraph, to allow more moisture retention for plants and to meet ARARs. Although costs are included for pond dewatering, there are apparently no costs for dewatering and drying tailings. Finally, costs for advanced water treatment (if necessary) are not provided. Please clarify	The liner and cover soil volumes for Option 3b have been revised in the Final EE/CA. The cost of dewatering and drying tailings is included in the cost for excavation and hauling. The need for advanced water treatment is not anticipated at this time. Therefore water treatment costs are not included in the final EE/CA. The 25% contingency included in the engineering cost estimates is intended to address additional items that may be required such as this.
DEQ-55	Mike Horse Mine Impoundment: Option 4b. Similar comments to those presented for Option 3b apply with Option 4b. However, it is not possible to do much quantitative analysis of the deficiencies in cap areas and cover volumes because the Paymaster and West Impoundment repositories are not segregated and the configuration at the Paymaster Repository is not presented.	Note that Option 4 has been revised in the final EE/CA to include complete removal at the impoundment. Therefore, this comment is no longer relevant.
DEQ-56	Mike Horse Mine Impoundment. Option 5b: Land Acquisition costs appear low for gentle ground near a highway. Cover soil cost appears high considering that it is available at the site. Additional costs may be incurred dewatering and drying tailings that are not apparent in this estimate. Monitoring well costs at the repository are missing. Post-closure maintenance must include tree removal at the repository. Please clarify	Land acquisition costs are based on recent acquisitions by the Forest Service in that area . Diversion and dewatering will be initiated in 2007, thus the costs for that work item may actually be overstated in the costs for the final EE/CA. See DEQ 54 for further explanation of costs. Monitoring and maintenance costs in the draft EE/CA include water level monitoring, vegetation monitoring, storm water monitoring, weed control and groundwater sampling for years 1-30 (Appendix I). Installation of 3 monitoring wells to an assumed depth of 80 feet has been added to the final EE/CA O&M costs.
DEQ-57	Appendix H: Institutional controls to protect the integrity of the repository must be included as part of the removal action and there is a cost component associated with implementing and maintaining these controls. Please include these in the cost estimates	These costs are considered incidental as the Forest Service does not foresee the need for industrial style controls at this site, in order to complement those natural surroundings to the extent practicable. A typical Forest Service gate costs approximately $2,500 for initial installation.

ID	Comment	FOREST SERVICE Response
AR-1	some of the removal action objectives identified on page 5-2 are unrelated to the presence of hazardous constituents and therefore should not be used to drive removal action under CERCLA. The identified goals that are unrelated to hazardous constituents include all the secondary objectives (i.e, minimize effects to significant historic features at the site; enhance future recreational opportunities for the site; and improve site aesthetics) as well as the objective to improve watershed functionality in the Blackfoot Headwaters area to promote a more stable, natural hydrologic system.	Some of the identified goals (Final EE/CA Section 5.0) are not specific to a particular release of a hazardous substance, but they relate nevertheless to any construction project implemented on lands within the NFS. For example, researching any historic features onsite is necessary to substantively comply with the Archeological and Historical Preservation Act and the Historic Sites Act. These and other similar statutes have been identified as ARARs for this site.
AR-2	the removal action objective for improving water quality in Lower Mike Horse and Beartrap Creeks and the Upper Blackfoot River (listed on page 5-2) recognizes the limitations imposed by other upgradient sources; but we believe this objective should be further clarified to identify that the goal is to improve water quality to the extent "practicable" rather than to the extent "possible"… it would be appropriate to identify in Section 5.3 and in the individual alternative's compliance witb ARARs discussions that a Technical Impracticability Waiver of surface water ARARs is likely to be required under all alternatives	The Forest Service agrees that the correct objective is to improve water quality to the extent practicable as provided for in the NCP. The agency does not presently believe that any waiver of an ARAR is appropriate at this time, but it will continue to evaluate compliance with water quality ARARs as the response action is implemented.
AR-3	Tables 3-1,3-5,3-9 and 3-13 show summary statistics for the soil/waste datasets used in the EE/CA.. These tables include something called UC95, defined in a footnote as 'upper 95% confidence limit (95th percentile)". Based on this definition, it is not clear what these values are because a 95thpercentile is different than an upper 95% confidence limit. It also is not specified if the UC95 is a confidence limit on the mean or on some other value. The definition of this statistic should be clarified	The tables have been revised to clarify that the statistics presented are simply the 95^{th} and 75^{th} percentile values of the dataset. References to upper confidence limits have been removed.
AR-4	The arithmetic mean soil/waste concentrations presented in Tables 4-2 through 4-6 are sometimes inconsistent with the mean values shown in Tables 3-1, 3-5, 3-9 and 3-13. Additionally, in cases where multiple subsets of data are presented in Tables 3-1,3-5, 3-9 and 3-13, no rationale is provided regarding which subset of data was selected for use as the point of comparison with risk-based criteria in Tables 4-2 through 4-6. The concentration values in Tables 4-2 though 4-6 should be checked against those shown in Tables 3-1,3-5,3-9 and 3-13. Section 423.1 should also include discussion of the datasets selected	A footnote has been added to Table 4-2 specifying that these values represent the combined Blackfoot drainage concentrations from Table 3-13. A footnote has been added to Table 4-3 specifying that these values represent the combined Beartrap Creek drainage concentrations from Table 3-9. A footnote has been added to Table 4-4 specifying that these values represent the combined lower Mike Horse Creek concentrations from Table 3-5. Footnotes have been added to Tables 4-5 and 4-6 to specify that they represent impounded mine waste/soils and embankment face soils from Table 3-1 respectively. Language has also been added to Section 4 explaining the use of different datasets in the streamlined risk evaluation.

ID	Comment	FOREST SERVICE Response
AR-5	The text of Section 4.2.3.1 states that the risk-based criteria used to assess soil waste concentrations are based on a risk level of 1 x $l0^{-5}$. This risk level is also noted in the footnotes of Tables 4-2 through 4-6. However, it appears that the risk-based criteria presented are actually a risk level of 5 x 10^{-6}. The text and table footnotes should be revised to include the correct risk level.	The text and tables have been corrected to indicate a 5 x 10^{-6} risk level.
AR-6	Section 4.2.3 (Risk Characterization) and Tables 4-2 through 4-6 present "hazard quotients (HQs)" based on comparison of soil/waste concentrations with risk-based criteria This is inconsistent with USEPA (1989) guidance for human health risk assessment, which specifies that HQs are calculated by comparing estimated daily doses or intakes with reference doses for noncarcinogenic effects of chemicals. HQs are not used in assessing carcinogenic effects of chemicals The values presented in these tables do convey information about the magnitude of difference between the concentrations and the risk-based criteria; however, important information may be lost with this approach., For example, failure to sum cancer risks fails to present a more complete picture of potential incremental cancer risks.. In this case, estimated cancer risks are dominated by arsenic and other chemicals contribute very little incremental risk. Thus, the risk-based criterion for arsenic may be overly conservative because it has been reduced to account for possible contributions from multiple carcinogens	The choice of the HQ term is admittedly potentially confusing to some people. Perhaps the term ratio should be used to minimize confusing those accustomed to EPA terminology. However, we believe the approach used is adequately explained. The observation that arsenic provides most of the risk is correct. By halving the acceptable risk level from 1 x 10^{-5} to 5 x 10^{-6}, the present approach assumes significant exposure to other carcinogens. The risk assessment indicates that cadmium is not significant relevant to arsenic; however, some may point out that a complete list of metals was not tested for. Regardless, experience at mine sites indicates that arsenic is frequently the most significant metal of potential concern for human exposure. Text has been added to Section 4.2.3.1, in the Final EE/CA within the Risk Characterization section, to address these considerations with arsenic. In particular, it is pointed out how conclusions about risk acceptability would change based on a 1 x 10^{-5} risk level and a 1 x 10^{-4} risk level. A review of Tables 4-2 through 4-6 indicates there would be no changes in conclusions at the 1 x 10^{-5} risk level. Importantly, Table 5-3 establishes a recommended goal based on background concentrations of arsenic (which approximate a 1 x 10^{-5} risk level under the present risk assessment model assumptions). Therefore, considerations of additive risk from exposure to multiple carcinogens do not change the basis for the present proposed remedial actions.

ID	Comment	FOREST SERVICE Response
AR-7	The risk-based criteria for arsenic are based on exposure assumptions from Tetra Tech (2004). These include quantification of dermal exposures using an outdated reference for dermal absorption of arsenic from soil. Recent studies have demonstrated negligible dermal absorption of arsenic from soil (Lowney, et al. 2005). If the dermal exposure route is removed, the arsenic risk-based criteria would be increased almost two-fold. For the oral exposure route, the relative bioavailability of soil/waste arsenic compared to arsenic dissolved in water is assumed to be 100%. USEPA Region 8 has conducted many studies of mine site soil and waste Olrcp://www.epa.govlRegioii8/r8ris~-rba"h~) and generally finds RE3A for arsenic in these materials to be less than 50%. These are just two assumptions that illustrate the conservatism of the risk-based criteria derived for the streamlined risk evaluation conducted for the EE/CA. Due to these overly conservative assumptions, the conclusion that unacceptable human health risks exist due to potential exposure to arsenic is not correct. Such streamlined approaches are only adequate as a basis for determination of whether or not to conduct additional evaluation. They are not an adequate basis for a determination that removal actions are needed. Similar considerations can be applied to the analyses of risks from potential exposure to manganese and lead.	Regarding dermal exposure, Tetra Tech guidance does use an out-of-date reference (EPA, 1992, provided on page 24 of the Tetra Tech guidance). However, the dermal absorption value of 3% was not revised in the most recent EPA guidance (EPA, 2004; Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment). Certainly, different studies will provide a range of values. As stated in Section 4.2.3.1, an exceedance of an HQ only indicates a potential for an adverse effect "because several conservative assumptions are used to protect against uncertainty inherent in the risk assessment process." The Lowney reference and the implications identified in the comment will be included in this discussion as a concrete example of how the risk conclusions may change with different assumptions. However, we believe it is necessary to rely on EPA guidance that represents a collective professional judgment on the appropriate model inputs. This approach ensures consistency in the basis for decision-making across sites. Regarding relative bioavailability from oral exposure, it is recognized that mine related materials often have less than 100% bioavailability. However, data collection plans did not provide for the kinds of information necessary to derive a site-specific relative bioavailability value. In considering the merits of such site-specific exposure assumption, the value of this information to the overall program must be considered. Table 5-3 provides a summary of considerations for arsenic risk-based goals for both human and ecological assessment endpoints. The ecological criteria are likewise subject to criticism as default values, and depending on what new information is sought the values may increase or decrease. In summary judgment, we believe putting resources into cleanup and applying an adaptive management approach is more prudent than initiating perhaps several more years of study to narrow uncertainty in risk estimates.
AR-8	The streamlined ecological risk assessment to support removal action evaluation is based on conservative screening values, and lacks much in the way of site-specific data (other than media concentrations).	See responses to FWS-1 and DEQ-8 above. Again, the Forest Service believes putting resources into clean up and applying an adaptive management approach is more prudent than initiating perhaps several more years of study to narrow uncertainty in risk estimates.

ID	Comment	FOREST SERVICE Response
AR-9	Apparently, this EE/CA is violating a key tenet of the EPA Soil Screening L.evels (SSLs), which is not to use them as cleanup levels. This tenet is recognized in the Ecological Risk Assessment under the discussion of SSLs in Section 4..3, but then Table 5-3 completely contradicts this and considers the generic SSLs as cleanup goals. A more defensible approach is to calculate site-specific cleanup goals (birds, mammals only) based on knowledge of the site and assumed percentages of use by certain receptors (such as feeding birds and mammals) and their home ranges (which for some can be large). The SSLs can be the point of departure for these calculations, but should not be proposed as cleanup goals per se without modification	The implication of the comment depends on the choice of assessment endpoints considered for ecological health. While risks to larger birds and mammals can vary depending on territory size, there are various plant, invertebrate, microbiological and smaller bird and mammal endpoints where territory size is not a consideration. Moreover, the potential for the areas under consideration for remediation to sustain localized populations of threatened and endangered species should be considered. These considerations are described in Section 4.3.2.2. Moreover, Section 4.3.4 describes the complexity involved in assessing the impact of the contamination to the overall ecological integrity of the region. Here again, the Forest Service believes putting resources into cleanup and applying an adaptive management approach is more prudent than initiating perhaps several more years of study and debate on complex ecological interactions to narrow uncertainty (and possible exacerbate the debate) of risk estimates.
AR-10	A discussion of background samples for all study area media (soil, sediment, surface water, and groundwater) is generally absent from Section 3 (mention is made of some very old soil samples only). Section 3 should be significantly clarified in this regard and background values added to all tables summarizing media concentrations in the different areas. The locations of background samples for each medium should also be documented on figures as well. Background must also be factored more transparently into the risk assessment and the ARAR discussion. Background is particularly important for determining the usefulness of many of the EPA Soil Screening Levels (SSLs) for metal/metalloids, which are used as comparative benchmarks in the streamlined risk assessment and (incorrectly without modification for site conditions) in the risk-based cleanup goals. The SSL guidance clearly indicates that the values be considered in context with background levels to determine their applicability. This does not appear to have been done.	Where available, background soil concentrations are presented in the tables and are utilized in the streamlined risk evaluation. However, absent site-specific background concentrations for undisturbed mineralized portions of the UBMC, the state-wide background concentrations for mineralized areas are used. This is consistent with the Tetra Tech streamlined risk evaluation guidance.
AR-11	Section 3.5, page 3-13 Conceptual Site Model (CSM) -A conceptual site model showing each of the four subject areas, upgradient sources, their interactions from a fate/transport perspective and the specific receptors tied to each of the media in each area, is lacking from the EE/CA and should be added to provide some unification of the overall understanding of the contaminant communication among the areas to support the decisions under consideration. Currently, it is difficult to understand to what extent the areas all interact and what is driving the removal action alternative strategy presented because each area is discussed separately	The Conceptual Site Model is incorporated in the Final EE/CA in Section 3.5, and described in Figures 3-3 and 3-4. See also response to AR-12 below.

ID	Comment	FOREST SERVICE Response
AR-12	A rather simple hydrologic model of the Mike Horse Tailings Impoundment is provided, and referred to as a conceptual model. However, this does not constitute a conceptual site model of the type that would support any type of risk assessment (streamlined or otherwise). A single CSM depicting all four of the areas of concern, transport and communication mechanisms between them, and the different exposure media and receptors evaluated for each needs to be developed, and presented either at the conclusion of Section 3, or (more appropriately) in the exposure assessment section of the risk assessment	Section 4.2.1 describes the complete exposure pathways for this project. The level of detail provided is consistent with the scope of the streamlined risk evaluation provided in the EE/CA. The comment seems to allude to the need for a CSM figure illustrating the information provided in Section 4.2.1. Such a figure is more consistent with the development of a site-specific risk assessment where a critical assessment of site-specific exposure is needed to support the development of exposure models. This level of detail is not needed in this case because the streamline risk evaluation relies upon health protective, default assumptions about exposure.
AR-13	Page 4-1, Section 4 1 Hazard Identification. -The MDEQ--AMRB CoC selection criteria cited consider background. However, as stated in comments above, background data are sparse, or (it appears) in some cases apparently absent, such that the reviewer must question how the consideration of background was made in the screen for each medium. Where is a supporting appendix table documenting the specific role of each of the four CoC selection criteria presented to the identification of CoCs for each location and medium? This should be added so that the results of the screen can be verified by a reviewer. The text on page 4-2 (top of page) refers the reviewer to Appendix C for a “matrix” summarizing the screen; however, Appendix C documents risk-based cleanup level goals developed for human health using the leadspread model; not a matrix documenting the CoC selection. The hazard identification screen mentioned on page 4-2 must be provided so that the screening can be independently verified, given its criticality to both ecological and human health risk assessments	The table referenced in the Draft EE/CA text actually was not intended to be included in Appendix C, since the screening information is included in Table 4-1 and the Section 3 data tables. Thus, the reference to the COC table being in Appendix C on page 4-2 is in error. However, a matrix table summarizing the screening process has been added to Appendix C of the final EE/CA for clarity.

ID	Comment	FOREST SERVICE Response
AR-14	Page 4-9, Section 4.3.3- It should be recognized in this streamlined risk assessment that the use of Montana surface water quality values (based on total recoverable metals) does not reflect the state of the science with regard to assessing risk to aquatic life. The latter should be assessed using criteria based on dissolved concentrations, as EPA has done in the development of their water quality criteria for surface water for more than a decade. Accordingly, Montana's standards do not reflect actual exposure conditions for aquatic life and therefore may represent overly conservative screening standards	Footnote 9 of Circular DEQ-7 states, "Standards for metals (except aluminum) in surface water are based upon the analysis of samples following a "total recoverable" digestion procedure." Forest Service recognizes that EPA has developed methods for considering bioavailability and other site-specific factors that affect toxicity in a particular water body. In this case however, the stream reach under consideration has low TSS and TDS, and total recoverable concentrations generally approximate dissolved concentrations (see Tables B-2, B-6, B-10, and B-14; lead is the only notable exception where total recoverable is modestly greater than dissolved in more downstream monitoring locations). Because aquatic life is not a primary assessment endpoint in this risk assessment, detailed, site-specific toxicity evaluations are not deemed necessary, and the approach used is consistent with State of Montana regulations and project ARARs. However, Section 4.3.3, Toxicity Reference Values, will be amended to include a discussion of these issues. Also, as previously discussed, development of site-specific screening criteria is not considered to be necessary or appropriate, given the source removal and adaptive management approach to the removal action process intrinsic to the EE/CA. In other words, we believe that immediate removal of identified metals sources, with subsequent monitoring and removal actions (if necessary), is a more expedient and cost effective approach to meeting the EE/CA endpoints; particularly given that the DEQ-7 water quality standards will be an ARAR for the project.
AR-15	Tables 4-9 through 4-13 - Typically, upper confidence limits on arithmetic means (or maximum concentrations for a screen) are used, rather than simply arithmetic means. Footnote 1 of Table 4-9 indicates "arithmetic average" soil concentrations were used to generate Hazard Quotients. Clarify if this is the upper confidence limit (95th percentile) of the mean If the IJCI.. mean is not what was used, then the Hazard Quotients should be updated to reflect use of the UCL mean. Where the IJCL. mean exceeds the highest measured value. risk assessors default to the maximum concentration	The approach used is consistent with the standard of practice for other sites evaluated by DEQ using Tetra Tech guidance. The Forest Service believes this approach prevents undo conservatism in developing risk estimates. The table in Section 3 provides upper confidence limit values that allow the reader to consider uncertainty in the risk estimates due to uncertainty in the mean concentrations in various media.

ID	Comment	FOREST SERVICE Response
AR-16	Table 4-12 - Hazard Quotients for ecological receptors in the Mike Horse Tailings Impoundment) reported in this table cannot be reproduced and may be in error. Specifically, the average concentrations, with the exception of Mn, did not match the average tailings concentrations reported in Table 3-1 and the Hazard Quotient calculations appear incorrect because they do not match the tailings concentrations in the table. Based on the tailings concentrations provided in Table 3-1, the Hazard Quotients for ecological receptors reported in Table 4-12 would generally increase. These should be checked for accuracy	The table errors have been corrected in the Final EE/CA. This has resulted in slightly increased HQs. The only HQ that moved from less than 1 to greater than 1 is copper for birds (presently 0.9). This will not result in changed overall conclusions about risk or remediation needs.

ID	Comment	FOREST SERVICE Response
AR-17	The need for a potential removal action addressing the Mike Horse dam and impounded tailings is largely driven by the conclusions of the Forest Service's "Evaluation of Mike Horse Dam" January 2005 report that: 1) based on the presence of voids internal erosion of the dam has occurred; and 2) the dam would liquefy during 500 and 2500 year return frequency seismic events… the conclusion that the dam is a "compromised structure'' and should be "taken out of service" is, at best, premature, and not consistent with the available data. Additional analysis is required to more accurately determine the current conditions of the Mike Horse dam before definitive conclusions can be made on the expected performance of the various removal action alternatives. Our comments on the EE/CA alternatives listed below consider these data limitations.	The Forest Service respectfully disagrees with Atlantic Richfields' conclusion that there is insufficient information to support removal activities for the Mike Horse dam. Our position is supported by the following evaluations, among others: 1. USFS, February 21, 2006 Draft Concept Alternatives Technical Memorandum for the Mike Horse Dam and Tailings Impoundment at the Upper Blackfoot Mining Complex This report summarized findings of previous investigations into Mike Horse dam and identified and compared five removal alternatives for the dam and impounded tailings. 2. March, 2005, NTL Engineering and Geosciences, Inc Review of Evaluation of Mike Horse Dam. This document is a technical Peer review of Evaluation of Mike Horse Dam. Supported conclusions from this report. 3. USFS, January 2005, Evaluation of the Mike Horse Dam, A Report prepared for the USDA Forest Service by Steve Romero, Missoula, MT. This report provided technical evaluation of cone penetrometer data which found voids in the Mike Horse dam. Evaluation of data included seeking explanation for the voids and tie to reservoir levels as measured in piezometer readings. Also included seismic evaluation. 4. Hydrometrics, August 2001, Mike Horse Mine Tailings Impoundment Investigation (Hydrometrics, August 2001) Report identified that the overflow pipe inadequate to pass ½ the probable maximum flood. 5. Hydrometrics, November 12, 2003, Piping Investigation of Mike Horse Mine Tailings dam Test pits excavated as part of this evaluation did not identify any evidence of piping. Water, however, was observed in two of the test pits. Several weirs and hand dug trenches were also installed along the downstream face of the Mike Horse dam and seepage measured in 2003 and 2004. Thus, even if the dam were not structurally unsound, it is very likely that an extensive response action would be necessary to address the leaching of metals from the impoundment into the headwaters of the Blackfoot River.

ID	Comment	FOREST SERVICE Response
AR-18	A full discussion on the findings of this Forest Service report is beyond the scope of these comments, but specific to the above two conclusions, Atlantic Richfield notes the following: The conclusion that significant voids exist and that these voids are caused by piping or internal erosion is based on limited data and requires further evaluation. Report discussions regarding finding voids in the lower sand layer do not appear to be supported by any “zero” tip resistance readings in CPT 3. Discussions implying that the apparent void at CPT 2 is continuous for about 14 feet is not supported by the CPT log which indicate any void may be much smaller and discontinuous. The assumption that the apparent void at CPT 2 was formed by piping or erosion appears inconsistent with the assumptions about the position of the water table and flow in the fractured bedrock. No surface depressions were noted as would be expected if there was significant downward movement of dam material into the bedrock. Further, the volume of the void reported in the Forest Service report would likely generate visible material on the downstream slope if piping was ongoing, rather than just the local discoloration that was observed. Also, as identified in the “Draft Concept Alternatives Technical Memorandum for the Mike Horse Dam and Tailings Impoundment at the Upper Blackfoot Mining Complex” report, exploratory backhoe pits at the dam toe failed to find any visible sign of piping.	The report (USFS, 2005) simply concludes that voids exist in the embankment structure and makes no attempt to ascertain their extent. The CPT exploration was intended to augment information provided by Dames and Moore (1975) in the reconstruction effort of 1975 since many of the samples gathered in that effort were not tested. The trace of CPT 3 shows the tip and sleeve resistance drops to zero at a depth of approximately 30 feet. Independent technical review of the Forest Service, 2005 report identified that the drop in stress could be due to an extremely soft layer, organics, or simply stopping and starting the CPT in a soft layer. Consequently, we agree there may not be a void in the profile at CPT 3. The void at CPT 2 could have many dimensions and is likely changing with time. Each time the void is exposed to water its dimensions change. At the time of testing it was relatively continuous and deep. On a subsequent check using a hand auger a few weeks later it did not appear to be as deep. Consequently the interpretation of the CPT trace is the actual void is 4-7 feet deep (zero tip and skin stress) followed by approximately 10 feet of debris-zero skin stress with tip stress. In the debris portion of the trace the material has little confining stress because it is basically a pile resulting from the collapse of the void as it migrates up through the embankment. The model results and interpolated phreatic in and around the void at CPT2 indicate that the phreatic does in fact come in contact with the void at pool levels greater than approximately 5484 feet. Anomalies in the piezometric record indicate pipe information in the embankment is occurring when the pool reaches this elevation. The lack of visible deformations in the dam face suggests that small amounts of material are being piped out the embankment intermittently, not continually. Depressions are not readily evident anywhere in the embankment which suggests the void(s) in the embankment are relatively narrow. Soils above the detected voids are dense. Under such conditions, the soil would simply arch over the void. The local discolorations in the downstream face referred to correlated well with the detected void.

ID	Comment	FOREST SERVICE Response
AR-19	The comment that all of the tailings behind the dam will liquefy during a seismic event is not supported by the available data. The CPT data indicate they are at a relative density of about 30 to 60%. However it appears the tailings down to a depth of about 30 feet near the dam are above the water table (as modeled) and therefore would probably be at a moisture content less than 90% of saturation and not likely to liquefy. Cohesionless soils, such as most tailings, having a relative density of 50% or more can have a computed Nl(60) SPT blow count equal to or greater than 15, which would indicate the soils are not likely to liquefy under seismic loads of 0.1 to 0..2 g.	The phreatic drops dramatically through the tailings dam from its origination point behind the dam. Of course the entire impoundment area is full of tailings and most of that is underwater. Therefore, most of the tailings lying below the pond surface should have water content near saturation and near the liquid limit. Since no SPTs or CPTs were conducted in the impounded area, the tailings were not directly tested. However, we believe that the CPT3 trace is an indication of the tailings relative density. The CPT3 trace is believed to be a mix of unconsolidated tailings and compacted tailings used to construct the various dikes used to impound the saturated tailings placed in the pond. Calculated relative densities on CPT3 appear to indicate the method of construction was centerline in nature. The regular intervals indicate the location and height of the dikes constructed to impound the tailings. Figure 4 (USFS, 2005) which depicts the calculated relative density with depth on CPT3 gives the best indication of the relative density of the tailings impounded by the pond. The areas between the dikes, areas of relatively low density, are the tailings over which the dike toes were built. Though this tailings material would have been loaded as a result of the dike construction, it is obvious that density of the tailings under the dike toes is extremely low-approximately 10-20% relative density. This is an equivalent (N1)60 in the 3 to 5 range and a normalized cone tip resistance of 20 to 30. As mentioned, the liquefaction evaluation was conducted using generally accepted practices and the result on CPT3 was that liquefaction would occur in these soft zones. Given typical disposition methods associated with tailings ponds the result verified the assumed position of tailings in the pond area and that they would liquefy during an earthquake. Calculated dynamic soil properties for these soft zones were used in the finite element model for the impounded tailings.

ID	Comment	FOREST SERVICE Response
AR-20	It appears that no cyclic shear testing was done on the tailings to evaluate the response to dynamic loading. The cyclic shear testing could be used to determine not only liquefaction potential but the amount of strength loss. If some of the layers of tailings have some plasticity they would be less susceptible to liquefaction.	Because of the difficulties associated with undisturbed sampling and testing, field tests have become state of the art practice for routine liquefaction investigations. As for strength loss, residual shear strength can and was estimated for the Newmark Analysis using several references in liquefied zones. It is correct that plasticity is a control for liquefaction. A great deal of research has been focused on this topic in recent years to attempt to define materials that are potentially liquefiable at various plasticity's. Those references are listed later in this text. The simplest reference that accounts for plasticity is the Chinese Liquification Criteria which is depicted in Figure 5 (USFS, 2005). Notice grain size is not a consideration in the criteria.

ID	Comment	FOREST SERVICE Response
AR-21	Methods to estimate liquefaction potential are included in Naval Facilities Technical Report TR-2077-SHR, by J.M. Femto, June 1997. Some of the methods compare the cyclic shear stress ratio to the modified CPT tip resistance. It is not completely clear whether the CPT plots in the Forest Service report are corrected or raw, but it appears they have been corrected by some method as they are denoted as "COR. If they are corrected, the lower sand layer in CPT 1 and 3 have an estimated tip resistance of 43 tsf, The estimated cyclic stress ratio is about 0.13. The susceptibility to liquefaction is a function of grain size and percent fines. No grain size data were available for our review, but if the subject layer contains some fines it may not be as susceptible to liquefaction as assumed in the Forest Service Report.	The CPT plots are corrected. The standard in practice for liquefaction evaluations are the procedures outlined in the proceedings from the NCEER 1998 workshop on liquefaction or subsequent summaries (Youd and Sidriss, 2001). The SPT and CPT procedures were followed in the evaluation of the Mike Horse dam. Susceptibility to liquefaction is a function of the material type, plasticity, degree of saturation, void ratio and confining pressure. Recent work by R. Seed, Youd and Idriss (2001), Boulanger and Idriss (2004), and others (see references below) have been directed at liquefaction of fine soil. The latest work in the area of liquefaction indicates that plasticity is a better indicator for predicting liquefaction than grain size. It basically comes down to whether the soil is clay like or sand like in its behavior. If it is sand like, low plasticity material with a water content at or near .9LL, then it is potentially susceptible to liquefaction. Boulanger R.W., and Idriss, I.M., 2004, Evaluating the Potential for Liquifaction or Cyclic Failure of Silts and Clays, Report No. UCS/CGM-04/01. Center for Geotechnical Modeling, Department of Civil and Environmental Engineering, University of California Davis, 129 pp. Prakash S., and Puri P.K., 2003, Liquifaction of Sils and Silt-Clay Mixtures, U.S. – Taiwan Workshop on Soil Liquifaction, November 3-5, 2003, National Chiao Tung University, Hsin-Chu, Taiwan. Youd T.L., and Gilstrap, S.D., 1999, Liquifaction Deformation of Silty and Fine-Grained Soils, Proceedings of the Second International Conference on Earthquake Geotechnical Engineering, Lisbon, Portugal, Vol 3, pp. 1013-1020. Youd T.L., and Idriss I.M. (2001) Liquifaction Resistance of Soils: Summary Report from the 1996 NCEER and 1998 NCEER/NSF Workshops on Evaluation of Liquifaction Resistance of Soils, Journal of Geotechnical and Geo-Environmental Engineering, ASCE, Vol. 127, No. 10, pp.297-313.

ID	Comment	FOREST SERVICE Response
AR-22	The stability and deformation analyses appear to assume that the foundation sand layer will liquefy near the toe and beneath part of the downstream slope and that the tailings behind the dam will liquefy and act as a heavy fluid. No downstream slope borings or test pits data are presented confirming the presence and/or nature of the subject sand layer and the assumption that the tailings behind the dam will completely liquefy appears to be based on very limited current or historical subsurface or laboratory data. It appears, from the preliminary analysis, that if this sand layer is not liquefiable or present, then the dynamic factors of safety would likely be greater than shown and probably greater than 1.0	The model depicted in the report on the Mike Horse dam (Forest Service 2005) is simply a generalization of the tailings dam composition. Several soft layers (relative density 20% to 35%) were encountered near the base of the tailings profile near the contact with the native clay or rock on all the CPTs. Liquifaction susceptibility was determined using procedures outlined in the reference provided in AR-21 above. The layers were assumed to extend along the entire footprint of the dam given their consistency in the CPT traces. Samples were apparently retrieved from this area during the 1975 geotechnical investigation conducted by Dames and Moore but were not tested or were discarded. Figure 6 (Forest Service, 2005) depicts the actual calculations from the final 3 feet of CPT2 before the cone intercepted the native clay material.
AR-23	It appears that the action alternatives were developed only to a conceptual design level leaving many details and specifics that could have significant effects on the implementability, effectiveness and cost of the alternatives to be determined. Specific examples include failure to identify cover soil sources or repository locations (for the total dam removal option) and failure to provide backup supporting the assumed effectiveness of the proposed material dewatering and handling methods. This creates significant uncertainties in the comparative analysis	The Final EE/CA includes two out-of-drainage repositories that could be suitable for containing the wastes for Option 5 for the dam and impounded tailings. At both of these locations, suitable cover soil and volumes have been identified (Section 6-1). Dewatering activities are conceptually described in Section 6.1.2. Please note that the Forest Service will be initiating diversion of Beartrap Creek and dewatering activities in 2007. Additional information from diversion and dewatering activities will be obtained during the field season of 2007.
AR-24	The short term effectiveness discussion and rating for all the “action” alternatives provides insufficient consideration of the significant risks to construction workers, the public and the environment associated with conducting heavy construction activities in a remote, high altitude site where much of the work will occur in floodplains and/or on soft subgrades. This is particularly true for alternatives involving excavation and transport of significant quantities of metals-elevated materials	The Forest Service has worked successfully with many regional construction contractors on numerous mine waste remediation sites within the intermountain area. Working conditions in this environment are well known. Indeed, one of the largest scale removal activities of its kind is currently under construction at a similar type site, the Milltown Dam area, within 50 miles of this site.

ID	Comment	FOREST SERVICE Response
AR-25	Option 2 - In-place Stabilization/Seepage Reduction It is not clear whether this alternative, as developed, fully addresses the two primary stability concerns identified in the Forest Service dam stability report (i.e. presence of voids indicating internal erosion and potential for liquefaction during a seismic event). As noted above, we believe additional analysis is required to determine the validity of these concerns. However, assuming the integrity of the current structure is compromised: a) voids in the dam could be filled, possibly with grout; and b) a toe berm, in-place densification or other feature could be designed to strengthen the dam and improve its stability during a seismic event. The cost of the additional analysis and, if necessary, stabilization may marginally increase the cost of this option though it is likely still to be significantly less costly than the removal options.. In addition, if required and implemented, the additional stabilization may reduce the need for the proposed upstream liner to prevent surface seepage at the toe. The emergency spillway, as proposed, would traverse across the west side of the dam which is constructed with sediments. Proposed placement of a spillway channel at a 12% grade using riprap on this fine-grained subgrade will require very good filters below the riprap and possibly a tough geotextile. Alternatively, it may be more advantageous to either place the spillway to the west of the dam, which could possibly allow placement directly on bedrock, or on the east side of the dam in the compacted fill materials from the 1975 repairs, leaving the existing 54 inch pipe as the primary overflow outlet and resulting in a somewhat shorter emergency spillway channel length. Given, as noted in Section I of these comments, that the cleanup goals are based on overly conservative risk screening levels it is not clear that removal or covering of shoreline and dam face tailings, as assumed in this option and in the two partial dam removal options, is necessary to protect human health. Given the dam would be upgraded to meet current Forest Service criteria, the impoundment water already meets surface water quality criteria and the poor quality seasonal seep at the darn toe would be mitigated, it would appear this alternative should have been rated higher in overall protectiveness, long term effectiveness and compliance with ARARS	The response to the stability concerns is included in our response to comment AR – 18 through 22 above. Based on these evaluations, we believe we have provided an appropriate response concept in Option 2. The west side of the dam was selected for the spillway location because this portion of the dam face has the least amount of slope and the greatest cross-section. However, additional locations for the spillway may be considered during final design. Regarding the conservatism of the risk evaluation, see response to comments AR-6 and AR-7. With this in mind, the risk evaluation does indicate that these soils may pose an unacceptable risk in its current state. Option 2, part of site-wide Alternative 2 in the final EE/CA, ranks low to moderate due to the large volume of mine waste which would remain exposed to the elements, the continued potential for failure of the dam (although it is recognized that the risk of this would be substantially reduced with construction of a spillway), and the continued potential for groundwater flow through portions of the impounded tailings and potential affects on water quality.

ID	Comment	FOREST SERVICE Response
AR-26	Option 3 - Partial Removal with Engineered Channel Option 3 consists of excavating a channel on the east side of the Mike Horse Dam reservoir to allow storm water to pass through the existing pond and dam. The excavation of this channel will involve the removal and disposal of a considerable amount of wet to saturated tailings. As mentioned in the EE/CA, the saturated tailings will have to be dewatered before they can effectively be excavated and moved.. Determination of whether they can be dewatered and excavated as proposed is highly dependent on the material classifications of the sediments. If the soils include elastic silts or clays deposited in the downward fining sequence that is typical of spigotted tailings slimes (and which is further supported by the observed lack of seepage through the impoundment bottom) then dewatering will be more difficult, expensive and take considerably longer than what has been proposed. The final slope constructed through the impoundment will have to withstand earthquake forces and it is not known whether groundwater will enter the sediments from the side and keep them saturated. If the weak sediments will not withstand earthquake forces (including liquefaction) the proposed slopes may not be long-term stable or short-term stable during construction and alternate slope configurations and/or transport with off-site disposal of the removed sediment may be necessary, increasing the cost and impacts of this option. The proposed channel bottom profile appears to be at a higher elevation than the lower tailings which will potentially remain saturated. The channel will have to be fail proof on the west side and the potential for piping below the riprap will have to be considered.. The presence of weak, and potentially liquefiable, soils beneath the newly placed sediment repository may make the proposed option unfeasible in the worst case or may require slope modifications to maintain earthquake stability. The EE/CA mentions that it is preferable to construct the channel for Option 3 on the east side of the impoundment since the dam height above bedrock is assumed to be less than on the west side. However, information from the Dames and Moore investigations suggested the bedrock may be approximately 25 feet higher at the west end of the dam. This would reduce the volume and cost of material excavation; though it would likely be all in tailings rather than in tailings and dam fill from the 1975 repair work.. Further, the channel could potentially be put along the west shoreline of the impoundment and stay more in native soil and rock, reducing channel erosion protection requirements.	See Responses to Pfahl 2 and DEQ 4 above.

ID	Comment	FOREST SERVICE Response
AR-23	Option 4 -Partial Removal with Construction of Functioning Beartrap Creek Channel and Floodplain Option 4 consists of excavating a channel through the Mike Horse dam and pond area similar to Option 3. However the Option 4 channel would be more centrally located and graded to provide fish access and a restored stream bed requiring additional excavation. This alternative is evaluated in the EE/CA as providing improved effectiveness compared to Options 2 and 3 , presumably based on it providing a better hydrologic and biologic link between Beartrap Creek upstream and downstream of the impoundment. However, this is a restoration, rather than a CERCLA objective and therefore should not be part of the EE/CA evaluation. In addition, no discussion is included as to the potential negative impacts associated with loss of the current fish barrier exposing the existing population of cutthroat trout located upstream of the impoundment to increased competition and hybridization The same feasibility concerns expressed above for Option 3 are compounded for Option 4 by the additional removal volume and depth. The larger volume and depth of removed sediments will increase dewatering problems as well as placement problems in a repository if they cannot be adequately dewatered in place. In addition, Option 4 requires off-site repository storage, increasing risks of traffic fatalities and spills during transport. Finally, the extra time required for tailings dewatering would leave the site open for exposure to additional storm water and snow melt runoff events.	See Responses to Pfahl 2 and DEQ 4 above. Removal Action goals identified in the EE/CA (Section 1-2 and 5-1) are tied to protection of human health and the environment as prescribed in the National Contingency Plan at 40 CFR 300.430. The primary goal, as identified in the EE/CA on p. 5-1 includes minimization of migration and mobility of contaminants to the environment. Permanence, or long term effectiveness, is one of the evaluation criteria for each removal option and the Site Wide Alternatives (See Section 6.3 and Table 7-1). Option 4 for the Mike Horse dam and impounded tailings includes disposal of wastes in the Paymaster Repository, an in-drainage repository site.

ID	Comment	FOREST SERVICE Response
AR-24	Option 5 - Complete Removal of Dam and Impounded Tailings: Option 5 involves the complete removal of the tailings and restoration of the original creek area that was buried by the dam and tailings deposition. The concerns about dewatering the tailings prior to excavation are even more serious with this option, since the bottom layers of tailings will be saturated and ground water will likely to be encountered near the base of the tailings., The tailings will have to be relocated to a new site, which means disturbing new ground and increasing the area to be monitored. Off- site transportation will be required, increasing the potential for traffic fatalities, spills and environmental impacts. Option 5 has major uncertainties since the repository location is unknown, haul distances are uncertain and cover soil sources are not identified. Again the condition of the sediments when they are removed will be critical for costing since sediments removed in a wet condition will require drying prior to placement in a repository to prevent settlement of the cap. Total removal volume may also have a high degree of uncertainty since the EE/CA's 371,000 CY volume estimate is substantially less than the 500,000 CY previously estimated in the "Draft Concept Alternatives Technical Memorandum for the Mike Horse Dam and Tailings Impoundment at the Upper Blackfoot Mining Complex" report. It will likely take a minimum of several years to complete this project assuming effective dewatering will not be possible the first year until inflow diversion and initial trenching can be implemented. This will likely result in exposing the excavation work area to multiple precipitation and snow melt events.	Option 5 for the Dam and Impounded Tailings is part of Site Wide Alternative 5 and includes disposal of all of the wastes into a suitable out of drainage repository. Horsefly Creek has been identified as a suitable out of drainage repository (Section 6.1.2, Appendix E). The estimated volume of material to be removed with Option 5 includes approximately 370,000 cubic yards for the dam and impounded tailings only. Approximately 117,500 additional yards would be removed as part of the removal activities for Lower Mike Horse Creek, Beartrap Creek and the Upper Blackfoot River resulting in a total estimated volume for Site Wide Alternative 5 of 490,000 cubic yards. (Table 6-3). See Appendix H for a discussion of construction sequencing. Monitoring and maintenance costs for Site Wide Alternative 5 are not substantially different than Site Wide Alternative 2.
AR-25	Option 2 - In-place Stabilization/Seepage Reduction: The identified cost to haul the tailings excavated to construct the spillway to the paymaster repository site may not be required if the location of the emergency spillway can be moved to either west of the dam or on the reconstructed east side of the dam where the material excavated would be clean fill that could be spoiled locally. Even assuming the potential for some additional costs for engineering, inflow diversion, and if determined to be necessary, dam stabilization, this alternative would still be expected to be significantly more cost effective than any of the dam removal scenarios	Comment noted. Please refer to Table 7.1 for the comparisons of the alternative options against the goals and objectives.

ID	Comment	FOREST SERVICE Response
AR-26	Option 3 -Partial Removal with Engineered Channel It is unclear if the cost of both inflow diversion and tailings impoundment dewatering are covered under the Pond Dewatering cost item daily unit price. However, assuming they are, the pond dewatering cost appears to be significantly underestimated given the difficulties and extended implementation timeframes expected to be required for dewatering and the likely need to design the inflow diversion system for a larger flood. It is likely that trench dewatering will not be fully effective and construction/maintenance of a network of engineered work pads/roadways, and/or use of alternative excavation/dewatering methods will be required increasing excavation unit costs. In addition, the assumed removal volume could increase if eitber: a) additional fill is required to construct roads and work pads on each tailings removal lift and that fill material cannot be efficiently separated and therefore ultimately gets incorporated into the excavation and haul quantities; orb) excavation sideslopes need to be flattened for stability, increasing the total extent of excavation	Diversion of Beartrap Creek and dewatering of the impoundment will be initiated in 2007. This could result in a cost reduction for Options 2-5 for the Mike Horse dam. These comments would be addressed in detail during engineering design. The removal options identified are conceptual in nature and would be refined through detailed design of the selected option. It is understood in identification of costs for “conceptual” CERCLA removal options that the margin for error is +50% to -30% due to the lack of design details at this stage of the project.
AR-27	Option 4 - Partial Removal with Construction of Functioning Beartrap Creek Channel and Floodplain Option 4 has similar cost inflation risks associated with removal of saturated, fine- grained tailings as Option 3 except the greater required excavation depths and larger volumes increase the potential significance of these concerns	See response to AR-26 above.
AR-28	Option 5 – Complete Removal of Dam and Impounded Tailings Option 5 has similar cost inflation risks associated with removal of saturated, fine- grained tailings identified for Options 3 and 4 except the greater required volumes increase the potential significance of these concerns Additional issues with the Option 5 cost estimate are listed below. Total estimated Pond Dewatering line item costs are the same as for the partial removal options which involve removal of smaller quantities of tailings over a presumably shorter timeframe suggesting these costs are likely underestimated for Option 5 . Channel restoration costs may be underestimated if there is a requirement to include significant amounts for habitat features	See response to AR-26 above.

ID	Comment	FOREST SERVICE Response
AR-29	Options with greater amounts of mine waste removal are consistently given higher achievement of the overall protection of human health and the environment, long-term effectiveness and compliance with ARARs evaluation criteria. The explanation provided for this is that additional removal will result in measurable improvements in water quality and stream functioning and reduction in exposure risks. However, this ranking appears to be poorly supported…. No information is provided quantifying the expected effect of additional removal on surface water COC concentrations to defend the assumed improvement in water quality and compliance with surface water standards. As identified in the "Draft Alternatives Technical Memorandum for Mine Waste Removal at the Upper Blackfoot Mining Complex" report, leach tests have shown that the intermixed tailings along the Beartrap Creek corridor (which are removed under the complete but not the partial removal options) are relatively unreactive and therefore unlikely to generate significant loadings of dissolved metals to either surface or ground water. This suggests there may be little difference in post- removal-action water quality between the partial and complete removal options. Further, as noted on page 3-8 of the EE/CA, current surface water metals concentrations are similar at the upstream and downstream stations on Beartrap Creek, suggesting there may be little difference in post- removal-action water quality between the no action and the partial removal alternatives for this subarea. Finally, given upstream surface water metals loading it is unlikely any of the alternatives would fully meet state surface water quality standards. Greater reduction in exposure risks under total compared to partial removal alternatives: a) is largely driven by use of risk based soil cleanup levels that were developed based on very conservative, non-site-specific, risk screening levels that are inappropriate for determining removal requirements; and b) does not adequately recognize that covering mine waste outside the active stream floodplain is as effective as removal/placement in a repository in addressing identified exposure pathways	More discussion of the effectiveness and compliance with ARARs is included in the final EE/CA. Comment is noted and is taken into account for the selection of the preferred alternative. Forest Service disagrees with the analogy that covering tailings in the floodplain is as effective as placing in a dry repository.
AR-30	The assumption, stated on page 3-7 of the EE/CA, that the Beartrap Creek concentrated tailings were likely deposited during the 1975 dam breach is inconsistent with field observations. There are significant differences in observed chemical and physical properties of the materials (e g , impounded tailings samples have near neutral pH and even those exposed above shoreline were only slightly acidic while the concentrated tailings had an average pH of 2)	The difference in chemical composition and acidity may be due to the more highly oxidized nature of the Beartrap Creek concentrated tailings. However, the point is well taken and the text has been revised to say that the concentrated tailings "may have been" deposited during the 1975 breach.

ID	Comment	FOREST SERVICE Response
AR-31	Beartrap Creek Alternatives-Options 4 and 5 involve removing intermixed tailings/alluvium to a depth of 4 feet from the 100-year channel floodplain but no costs are included for the streamflow diversion which may be required to implement stream channel and floodplain sediment removal. The descriptions of Options 4 and 5 identify that following mine waste removal, a new floodplain and stream channel will be constructed for Beartrap Creek. No costs are included for stream reconstruction under Option 4, while the $30 per foot cost for channel restoration under Option 5 may be underestimated if there is a requirement to include significant amounts of habitat features	See Response to AR-26 above.
AR-32	Lower Mike Horse Creek Alternatives - Lower Mike Horse Creek removal alternatives have similar cost underestimation concerns as were identified above including inadequate allowance for stream diversion, material handling and stream reconstruction level of effort	See Response to AR-26 above.
AR-33	Upper Blackfoot River Alternatives - Upper Blackfoot River removal alternatives have similar cost underestimation concerns as were identified above including inadequate allowance for stream diversion, material handling and stream reconstruction level of effort	See Response to AR-26 above.