SUPPLEMENTAL EIS
RESPONSES TO COMMENTS

GEOLOGY

GEO-100 Geology

1. What I am concerned about is the samples for public viewing. Where are the drill cores and samples of these ores? (S6705)

Response: Sterling maintains possession of all drill core samples. The cores are not available for public viewing. DEQ has a few samples it had tested to confirm prior analyses.

2. ... tailings impoundment,... have a good site specific seismic risk study. (S6740)

Response: The applicant has provided the agencies with a seismic analysis. The Agencies have reviewed that analysis and it has been reviewed by at least three different third party contractors. The analysis is part of the applicant's original baseline assessment, and is available for review. This report is available for public review at the DEQ office in Helena, Montana, and the Kootenai National Forest Supervisor's office in Libby, Montana.

3. Page 4-13: Estimated copper and silver production should be consistent and verified.

Page 4-16 (Geologic Resources): The anticipated extraction ratios reported in the EIS should be consistent. (S146)

Response: Deposit size and extraction or recovery rates are estimates based on geologic mapping and drilling that typically change somewhat as analysis continues. The supplemental draft EIS provided both the original ore body size and recovery rate as reported by the applicant in its 1987 plan of operation as well as updated Sterling information. The applicant changed its estimate of the size of the ore body from 144 million tons to 136 million tons after an updated analysis of the Rock Creek deposit. The applicant also believes that the original 75 percent extraction rate was over optimistic based on known recovery at the Troy Mine. They now estimate that a 65 percent extraction rate represents the best estimate of recovery. The actual size of the ore body and mine recovery rates could range between the applicant's two sets of estimates. Therefore, the analysis in the final EIS is based on the following deposit characteristics and ranges (all numbers are approximate).

Ore body size:	136 - 144 millions tons (this range and other characteristics are subject to fine tuning as the project progresses)
Average copper grade:	0.68 percent
Average silver grade:	1.65 ounces per ton
Mine recovery rate:	65 to 75 percent
Mill recovery rate:	85 percent

4. Page 4-18 (Subsidence): It is stated for Alternative V that, "ASARCO has modified the mine plan by dropping their option to remove support pillars. These mitigations could require that ASARCO leave more ore in the ground for support. The amount of ore left underground would amount to several percent or less." We would like to verify understanding of the phrase, "several percent or less." (S146)

Response: Sterling's commitment to not remove pillars would have no effect on the estimate of the rate of ore extraction. These estimates were based on pillars remaining in place. Should Sterling or Agency review of underground mine plans require additional pillars or larger pillars be constructed to provide additional ground support, the Agencies estimate that up to several percent more of the ore body would remain unmined. That is, instead of 35 percent remaining, perhaps as much as 38 percent would remain unmined.

5. Underground mining operations, worker safety, land subsidence, water treatment systems, tailings impoundment, slurry pipes and other aspects of the mining and milling operation may be subject to serious upset from any earthquake activity in the immediate or surrounding area. The potential impact, consequences and any mitigation must be thoroughly described and considered before an operating permit is granted. (S6312)

Response: As stated in Chapter 2 and 3, the maximum credible earthquake (MCE), or design earthquake, was calculated to be a 7.0 earthquake generated along the Bull Lake Fault (18 miles to the northwest). The Bull Lake Fault shows evidence of movement within the last ten thousand years. All tailings facility preliminary designs have been, and all final designs would be designed to withstand this size of earthquake. Several third party reviews have verified this criteria and all are in agreement. Additionally, Agency mitigation requires review and approval of final designs by a technical review team. These measures are described in Chapter 4.

6. Careful consideration should be applied when designing the mine adits, and if for any reason ASARCO or it's workers should come across new information concerning potential leakage, contamination, subsidence, or earthquake related activities, ASARCO should be required to inform the DEQ immediately and postpone further development until further study is conducted. (S5159)

Response: Under Alternatives III, IV, and V, Sterling would be required to submit for agency approval a rock mechanics monitoring plan to ensure all available information is incorporated into designs. See Chapter 2, Alternative III for more information regarding this requirement. Under Alternative V, an Evaluation Adit Data Evaluation Plan, would be developed and implemented. The analysis of the rock mechanics data collected from the evaluation adit would be used to modify the initial mine plan which would be further modified by monitoring data collected during mine construction and operation. Sterling is required to maintain a 1,000-buffer zone around Cliff Lake and the outcrop areas until such time that Sterling provides adequate information that would allow the buffer zone to be reduced.

7. Page 3-10. "Between 1918 and 1971, there were several other relatively large earthquakes ranging from about 15 to 45 miles away. They all rated IV to VI on the Modified Mercalli Intensity Scale. All of these, as well as the two mentioned above, were probably perceptible at the project site, but not damaging (ASARCO, Incorporated 1987-1994; Noranda Minerals Corp. 1989)." It is a conflict of interest to include ASARCO and Noranda conclusions here. Has anyone else evaluated this information? And can it be concluded that because they were probably perceptible but not damaging at the project site, they would not be damaging to the project itself? (S3462)

Response: This information has been reviewed internally by the Agencies and at least four times by independent third party reviewers. The Agencies do conclude that because of the nature and location of the past earthquakes, which we believe were probably perceptible but not damaging at the project site, should they occur again they would not be damaging to the Rock Creek Project.

8. Page 3-12 - Geology of Tailings area: bedrock outcrops concern: Bedrock outcroppings can serve for seepage water to descend into ground water. (S5093)

Response: We agree generally that water can seep into bedrock. However, water will take the path of least resistance. If water first is intercepted by lower permeable materials that overly bedrock, which is predicted, the water would not then seep into bedrock. The agencies have required permeable materials to be covered with low permeability materials which will be removed from unstable portions of the tailings storage footprint.

9. Page S-17 1st paragraph "The potential for spills ... burial ...". Does not consider underground rupture - what is seismic activity in vicinity? How is this addressed? (S4832)(S4833)

Response: Seismic activity would not likely have any impact on buried pipelines unless a fault directly below or adjacent to the pipeline were to move. There are no active faults along the pipeline route. See Chapter 3 - Geology, for a description of seismic activity in and surrounding the project area.

10. Page 3-84. "About 20 trains travel the local track daily ....." There has been no discussion in any of the documentation about the potential seismic effects that this and a greater number of trains per day might have on this facility. Klohn-Crippen report identifies the possibility that a higher than expected phreatic surface may exist within whatever impoundment. The tailings impoundment is a little more stable than a bowl of jello, but just barely. Twenty, 5,000 ton trains is the equivalent of many little earthquakes, this scenario has not been considered. (S614)

Response: Granted, trains do generate small vibrations in soil and bedrock which are probably equivalent to extremely small micro-seismic events. They don't even register 1 on the Richter Scale. Therefore, any effects would be extremely small and very local. These vibrations would have no cumulative effects on any of the alternative tailings designs or other project structures. Klohn-Crippen found that the bottom-up construction method of Alternative V - Paste Tailings - (this is the Agencies' preferred alternative) could be safely built and maintained.

11. Copper mining is inefficient. A study performed by the EPA shows that copper mining generates 731,065 thousand metric tons of waste, yet only produces 1,765 thousand metric tons of copper. (S3631)

Response: The agencies are aware of EPA's reports regarding ratios of mine waste volumes versus the volumes of metals extracted. This "inefficiency" is true for all large scale metal mining, including copper and silver mines such as proposed by Sterling. Mine waste comes in two general forms. One type is the waste rock derived by uncovering, exposing, or otherwise accessing ore deposits. The other is waste from milling processes (tailings). Considering the waste rock that Sterling would generate by accessing the ore deposit (approximately 659,000 tons to 1,059,000 tons depending on the alternative) the Rock Creek Project is a relatively efficient operation as compared to many other mining methods. Other types of mines, particularly open pit mines, generate huge volumes of waste rock that would dwarf the waste rock generated by Sterling. So, the amount of waste rock generated by accessing the ore deposit is a function of the geometry of the deposit, its position in the ground, and the mining method. Looking at the ore waste, or tailings issue, the high waste to metal ratio is a function of the rarity of metals. That is, when the valuable minerals account for only about one or two percent of the deposit, a very large amount of rock must be removed, crushed, and processed in order to liberate the valuable minerals. In the future, as metals become more rare, mine waste-to-metals extracted ratios of metal mines will likely increase. Based on current and foreseeable technology, only very minute improvements in these ratios can be obtained.

GEO-101 Subsidence

1. The SDEIS does not have sufficient data to determine the potential for land subsidence and draining of wilderness lakes. (S140)

In addressing the potential for dewatering of wilderness lakes, the SDEIS identifies the likelihood as remote, based upon in excess of 900 feet of thickness and the characteristics of the overburden [SDEIS p. S-17]. However, the agencies still require additional data prior to mining. The public is asked to assess the impacts without benefit of the data. This approach allows the agencies to make a crucial decision without public input.(S188)

To mitigate wilderness surface impacts, 100 feet of overburden would be required as a minimum [p. S-17]. In the area of springs, seeps, creeks, etc., the thickness of the overburden, inherent strength of the rock, and existing geophysical characteristics, could easily produce significant effects on surface water in exceeding those identified or implied by the SDEIS. The impacts on wilderness wetlands cannot be adequately predicted because the rock strength and other existing conditions are presently unknown. Unidentified mitigation is proposed in the event of subsidence. However, if a subsidence-related reduction in surface water levels did occur, the impact to aquatic resources (and wilderness values) would be significant and possibly irreversible [SDEIS p. 4--71]. This points out the inherent inadequacy of after-the-fact permitting approaches. (S188)

Given the fact that ASARCO will be allowed to mine within 100 feet of the ground surface in the wilderness area (page S-17 p. 2-119), and the potential to dewater surface or ground water resources, the Agencies should require the Rock Mechanics studies during the public review process. Instead, they've chosen to review that information outside the permitting process. Page 4-18 notes that "the Agencies' underground design reviews would effectively preclude subsidence or other surface effects related to mine-induced fracturing."

Therefore, the rock mechanics data should be presented during the public review process. One way to help achieve this would be to permit the evaluation adit first in order to allow ASARCO to collect this much-needed information. Additionally, the Agencies should require ASARCO to backfill the 40 million tons of tailings that will fit back into mine workings. This is a practicable alternative that would help reduce and/or mitigate impacts from subsidence in the wilderness area. (S6318)

Response: The agencies and the public are evaluating subsidence using available data. The EIS provides a summary and additional details are provided in Sterling's application and scientific literature. A detailed rock mechanics study cannot be undertaken without underground access. Thus "public review" and a decision must be based on analysis of existing data. If Sterling is permitted for underground activities, underground data collection could begin. There is no "disturbance-free" way to refine the data to the level the agencies want used for final design. Data submitted by Sterling would be available to the public in annual reports submitted to the agencies.

Almost all regulated activities including mining are subject to ongoing data collection and review "outside the permitting process." The purpose of this review is to ensure that as additional data becomes accessible it is used to validate previous analysis and that unexpected impacts are not occurring.

The agencies have recently collected more data on the hydrology of Cabinet Mountain Wilderness lakes, streams, and springs and have applied mitigations to reduce the risk of impacting surface water resources. These mitigations have been incorporated into the EIS.

During final design, Sterling will be required to submit more detailed analytical and monitoring data on the hydrogeologic regime surrounding the wilderness lakes. This will be used, in part, to assist

with development of a more detailed mitigation plan for the wilderness lakes than can be developed now.

Sterling has two applications before the agencies, one for exploration and one for mining. The agencies are required by law to make timely decisions. If the data are determined adequate to make a decision, as is the case with subsidence, the agencies may not arbitrarily delay decision-making.

2. Page 2-108. "Potentially significant, short-term impacts to wetlands and aquatic life associated with Cliff and/or Copper Lakes would be mitigated in accordance with a mitigation plan if subsidence occurred." Would the mitigation plan be written after subsidence occurred? How is the reader supposed to determine whether or not this future mitigation plan is adequate? Shouldn't a mitigation plan for this potentially significant impact be created now? (S3293)(S3462)(S4832)(S4833)(S4865)(S6348)

Response: A mitigation plan would be drafted as part of final design and as part of the Rock Mechanics monitoring plan, prior to mine development. The agencies are responsible for ensuring the adequacy of the plan, and often enlist the assistance of professionals in the discipline to help with the review. The final design along with any mitigation/monitoring plans would be available for public viewing.

3. Do we really know what will happen to the wilderness lakes, seeps, springs and creeks above the proposed mine? (S4645)(S3392)(S4429)

In addition to the potential for reduction of surface water in springs, lakes and wetlands, there is a potential for subsidence, and a planned mine adit within the wilderness area. There are no adequate mitigation or contingency measures for impacts to wilderness values. (S5124)

The inability to predict the potential hydrogeologic effects of mine development also leads to inability to predict the effects on surface waters such as wetlands and lakes. The site to be mined lies within the Cabinet Mountains Wilderness, and within this site are two wilderness lakes that could be affected by the changes in the hydrogeology of the area as the result of mining. The lake levels could conceivably be lowered, or possibly they could be completely drained. (S5130)

Creating large underground cavities creates the possibility of surface subsidence. Surface subsidence could not only affect the surface contours of the area, it could destroy the lakes as well as the springs and seeps that are a valuable resource within the wilderness. The SEIS discusses the probability that subsidence could occur and also discusses the measures that are proposed to diminish this probability. The conclusion stated in the SEIS is that the probability is remote, whatever that may mean in this instance. It is also stated that the probability for dewatering the lakes is remote. However, in neither case is it contended that the probability is zero. (S5130)(S6312)

Response: The analysis in the EIS has determined that it is highly unlikely that there will be any impact to the wilderness lakes from mining if buffer zones were required (MT DEQ 2001a).

Alternative V places a 1,000 foot buffer zone around Cliff Lake and the outcrop areas. The buffer zone cannot be mined until such a time that it is demonstrated that such activity will not significantly impact the wilderness characteristics of the lakes, or produce mine water discharge into the wilderness.

Potential of subsidence is discussed in Chapter 4, Environmental Consequences.

4. Please conduct detailed geochemical, seismic, and subsidence studies to ensure that there will be no acid-mine leaching, bedrock fracturing due to overburden pressure release and no lake subsidence. (S5159)

Response: Alternatives III through V include provisions for additional rock mechanics monitoring during mine development and operations to further assess on an ongoing basis the surrounding rock's

response to mining. If the monitoring indicates there is an adverse response in the surrounding rock which could lead to excessive fracturing and/or subsidence, mining would be curtailed in the area, and mitigations would be implemented. Appendix K describes the monitoring plans for geochemical, rock mechanics and water quality.

5. ASARCO should be required to collect and analyze data to substantiate the assumptions about ground and surface water flow and develop a subsidence control plan prior to completion of the final environmental impact statement. ASARCO's proposed monitoring program to detect and evaluate changes in the wilderness lakes water levels should: Include monitoring of additional wilderness surface waters within the project area such as springs and streams. Describe the "requisite actions" that ASARCO and the Agencies will take in response to changes in lake water levels. Describe monitoring procedures, employing the "minimum tool principle" as outlined in the Wilderness Act. Additionally, the Forest Service should require ASARCO to post a separate bond for damage to or loss of surface waters in the wilderness. (S161)

Response: Fixed stations on the surface would be monitored using conventional and satellite equipment. Underground monitoring would utilize an array of strain and stress measuring devices. Possible mitigations in response to effects on the lakes include: lining, grouting fractures, and limiting further mine development under the lakes. Monitoring of lakes is discussed in Appendix K.

6. ASARCO has not done any analytical rock mechanics studies for the Rock Creek site. Before any mine adit drilling is performed detailed seismic studies should be conducted to show the extant of any joints or fractures to reduce the risk of subsidence and/or lake drainage. (S5159)

Response: The development of the exploration adit will be the best source of information regarding underground conditions and the potential for future impacts from mining. At present, the data supplied by the applicant has been sufficient to satisfy DEQ's completeness criterion. Preliminary modeling suggests subsidence from mining will not affect the wilderness lakes. Ground water drainage stresses may however affect the lakes. Detailed information gathered during the exploration adit phase will help refine the modeling. Appendix K describes the monitoring plans for geochemical, rock mechanics, and water quality.

7. Page S-17. There is a "potentially significant" impact to wilderness lakes, wetlands, and associated aquatic life from subsidence. Page 2-120 - a contingency plan would be developed to mitigate impacts to the lakes... concern: Such plan is not available for public review and comment. This should be upfront-most other permit/developments required all this information upfront, complete, and acceptable, otherwise the Corps would deny the permit. (S3462)(S4832)(S4833)(S5093)

NEPA requires full disclosure of the mine's potential impacts, and subsidence in the wilderness lakes is one of them. Additionally, the Army Corps of Engineers 404(b) permit process requires a contingency plan and mitigations for subsidence. (S6318)

Response: Mitigation plans for the wilderness lakes fall under the purview of the Corps of Engineers. This plan(s) is developed as part of the 404(b)(1) permitting process (see Appendices L and F of the final EIS). Mitigations have been developed that include buffer zones near faults, under lakes, and at outcrops.

8. Page 4-17 para.2 There exists the minor possibility that these areas could experience some surface subsidence under Alt. II....." Explain this, is a different method of mining proposed for alt. 2 vs alt. 5? If not then it is conceivable that all alternatives might experience some surface subsidence, correct? This statement is misleading. (S614)

Response: Remarks regarding subsidence and the potential impacts from subsidence are relevant for all alternatives, except Alternative I (No Action).

9. Page 4-29 para. 1 Two wilderness lakes in the CMW…" Has anybody determined why these area lakes retain their water? Are they located in impermeable bedrock? Do they sit above a perched system of ground water that keeps them from draining? Does the possibility exist that by creating a sink such as the mine will develop, ground water supporting the lakes will gravitate towards the sink and with it the water in Cliff and Copper lakes? (S614)

The impact to existing springs and seeps from underground dewatering and post-closure filling is uncertain, as is the proposed but unidentified mitigation after- the-fact for the dewatering of wilderness lakes and wetlands. (S188)

Response: Reports by Thompson (1990) and DEQ (2001) indicate that Copper Lake is fed by snowmelt and is not connected to ground water. The source of water for Cliff Lake is in part derived from springs associated with the Copper Lake fault. Static water levels in exploration boreholes near Cliff and Copper Lakes were frequently at several hundred feet below ground surface.

A hydrologic characterization conducted on Cliff, Copper, and Rock Lakes (MT DEQ 2001) determined that ground water is stored primarily in the vertical fractures and faults with some shallow perched ground water tables. The report concluded that Copper Lake is not connected to the ground water system and would not be affected by the proposed action. The effects to Cliff Lake are discussed in Chapter 4, Hydrology section.

10. On page 4-18, the SEIS states that "should subsidence occur in the mine area, the consequences at the surface would be significant." Given the unknown potential of land subsidence, the agencies should require Asarco to construct an extensive database of analytical rock mechanics for the Rock Creek site prior to the issuance of an operating permit, and NOT "within 2 years of operation," as described on page 4-18. (S6312)

Response: Alternative V requires a 1,000-foot buffer zone around Cliff Lake and the outcrop areas to lessen the potential subsidence. Appendix K lists the Evaluation Adit Testing and Monitoring requirements for rock mechanics that would apply to subsidence.

11. Please conduct detailed geochemical, seismic, and subsidence studies to ensure that there will be no acid mine leaching, bedrock fracturing due to over burden pressure release, and no lake subsidence. (S5159)

Response: The agencies have collected data in ARD and some rock mechanics data. More detailed data collection and its interpretation will be part in final mine design and will continue to be part in the ongoing mine operations requirements. Appendix K lists and describes all the required monitoring, and evaluation plans that would be required for Alternative V.

12. p. 2-14. Among the mitigations listed for Alternative III is "rock mechanics studies." What action will come from these studies? (S3462)

Response: Rock mechanics would be evaluated by studying the rock characteristics as Sterling drove the evaluation adit. The results from these studies would give Sterling information to modify their underground mine design to take into account specifics of the local rock characteristics. The study results would allow the Agencies to determine if the impacts predicted in the EIS are accurate or if more analysis is needed.

13. The mine will cause …. potential subsidence/land impacts to wilderness surface and lakes. There is insufficient rock mechanics and other data for any conclusions at this point, especially given that the SDEIS acknowledges that impacts from subsidence would be serious. (SDEIS at 4-17 and 4-18). (S2034)

Response: See above responses 9, 10, 11, and 12.

14. There are documented examples of underground mining over 1000 feet below the surface causing surface subsidence. A 100 foot buffer (i.e. crown pillar) is not likely to provide enough support to insure that subsidence would not occur.

The issue of subsidence should be more fully examined in the EIS. This examination should: (1) include calculations that show the minimum crown pillar height necessary to insure that surface subsidence will not occur; (2) document the effects of backfilling the mined-out spaces with concrete stabilized tailings & waste rock. If supplying this analysis requires additional information on rock strengths, etc., then this information should be collected in order to perform this essential analysis. (S6328)

Response: A minimum crown pillar height will be determined during final design using data collected during the development of the evaluation adit. Changing ground conditions may require changes in crown pillar height and these changes are best determined once development has begun and real-response data can be collected. The Agencies' analysis of the potential for subsidence is adequate for estimating relative risks of mine induced impacts to the wilderness. That analysis is discussed in Chapter 4 of the final EIS. Refinement of this assessment can only come from information derived from the evaluation adit and actual mining of the deposit. The 450-foot vertical buffer between the ground surface and the mine workings required under Alternative V to reduce impacts to surface waters from mine seepage would also help minimize the rest of subsidence near area outcrops. The analysis on backfilling tailings may be found in Chapter 2, Alternatives Considered but Dismissed.

15. Particularly with the potential impacts from land subsidence on the Wilderness, the SDEIS must, but does not, consider the impacts from earthquake activities. The SDEIS simple discussion does not eliminate the issue. (S2034)

Response: As discussed in the final EIS, Chapter 4, Geology, Subsidence, subsidence is the observable topographic change from collapse of underground openings. The discussion of the potential for subsidence does not address itself specifically to any one causative action, but considers the probability based on rock type, overburden thickness, size of opening, etc. The discussion in the final EIS is fairly detailed, but there is no way to eliminate the issue, though the probability of having subsidence is considered remote. Earthquake analysis was conducted on the tailings facility but not on the effects to the underground openings. In the event of an earthquake, subsidence as a result of the void created by mining would not be reflected to the surface.

16. An operating permit for this facility cannot be granted under the conditions of MMRA 82-4-335 (3) (I) "Prior to receiving an operating permit...a person...shall submit an application....containing the following information, (I) a plan detailing the design, operating and monitoring of impounding structures.....sufficient to ensure that the structures are safe and stable." This question in light of any plan is dependent on the foundation stability of the site. Those studies have not been done. (S614)(S5092)(S6312)

Response: Information and material testing data regarding the foundation of the tailings impoundment site has been gathered and submitted to the Agencies as part of the application process. The Agencies determined that this information was sufficient in quantity and quality to proceed with an analysis of the suitability of the site and of the applicant's proposed design. An independent third party engineering firm reviewed this information at the request of the Agencies, and identified issues pertaining to the foundation that in their opinion, required a refinement in design and at a minimum additional data testing to confirm certain design assumptions. The Agencies will require additional on-site data collection, materials testing and analytical work as part of the final design process. Design assumptions will be either confirmed or modified based on this work. The Agencies will also require final design by a panel of independent engineers experienced in tailings impoundment design for all alternative except the No Action alternative and the applicant's proposed action (Alternatives I and II, respectively). There is sufficient information submitted to determine if the structures can be built in a safe and stable manner.

GEO-102 Tailings Facility Stability

1. I found no evidence in the SDEIS that any thought has been given to the effects of heavy snowfall between and during depositions of paste tailings on the stability of the tailings pile. It seems to me you would end up with lenses of compressed snow turning to ice during a winter such as that of 96 - 97, causing voids, or lubricated fault zones on sloping surfaces when they melt. The composition of paste tailings (sits moisture content), no matter what it is coming out of the pipe, will vary dramatically if it is raining hard when it's deposited from what it would be on a dry day. What's to keep it from reabsorbing water once it's deposited? (S625)

How will the paste react to precipitation above ground? (S6606)(S6656)

The risk analysis that has been done for the proposed paste facility addresses the paste before it sets up. What is the risk to the environment in the event of frequent, and sometimes intense, precipitation hitting the paste that has previously set up? Is there any possibility that this set up paste could become unstable enough through heavy precipitation to create a hazard? (S6721)

Response: It is true that the paste will absorb some moisture during rain or snow events. However the permeability of even unamended paste has been measured at 3.0×10^{-5} to 4.0×10^{-5} cm/sec which would retard wholesale infiltration. The addition of cement would decrease the permeability even further. The incorporation of ice lenses or soft saturated surface zones would not compromise the overall stability of the impoundment, rather they would contribute to a chronic condition of slumps and settled areas which would be a source for ongoing maintenance and repair. Certainly during final design the management of paste placement during high precipitation times (e.g., spring and winter) will be resolved in a comprehensive tailings management quality assurance and quality control plan.

2. It's hard to comment on the tailings deposit scheme when the final design is not in this document. I was under the impression that giving the public some concrete plans to comment on was why a supplement was issued. (S625)

Page 4-50 - tailings facility underdrain concern: design not disclosed for public review and comment. (S5093)

Page 2-3 Issue 3 "Phreatic surface location ...". Shouldn't a technical review of the impoundment design have been already completed/approved? When is this expected? After permit approval? And again ASARCO doesn't know the effects on surface waters. How can one estimate this? (S4832)(S4833)

Response: The Agencies determined that there was a sufficient level of information regarding the paste design with which to proceed with the EIS. The evaluation of the quantity and quality of that information is the purview of the EIS. The level of detail provided by the applicant has satisfied the statutory guidelines contained in the Metal Mine Reclamation Act (MMRA). Should a permit be granted, the applicant would need to submit more detailed final design plans for Agency approval, and as always, these documents are open for public review. The supplemental EIS was issued because there was a new alternative that had impacts not disclosed in the draft EIS and there was some new data that affects the analysis of some resources. It was not issued to provide a review of final designs.

3. We'd like the agencies to require Asarco to add cement or fly ash to the paste tailings that will be left in the surface impoundment. This paste technology is also experimental, and adding the cement will help reduce seepage through the impoundment, and help increase the likelihood that this 300 foot high pile of tailings and water will be geotechnically stable in the long-term. (S3391)(S3392)(S3465)(S3971)(S4377)(S6745)(S6740)(S4797)

Page 4-28 (1st paragraph): The Supplemental DEIS states that paste deposition would allow for the addition of seed, fertilizer, organic amendments, cement and other additives as needed operationally to control erosion, enhance stability, or enhance reclamation. It is our understanding that ASARCO has indicated that they do not intend to add cement to the paste, since cement addition significantly adds to the cost. While we are pleased that the Agencies would require that the reclamation plan contain provisions to include appropriate amendments to adequately control erosion and facilitate interim and final reclamation, we want to state that we believe the USFS and MDEQ should require appropriate amounts of cement to be added to the paste to increase stability and erosion resistance, decrease permeability and subsequent tailings seepage, and generally improve paste leachate water quality. (S146)

Response: The addition of cement, fly ash, or some other additive to enhance stability and impermeability are options to be reviewed during the final design phase or at any time during mine life. Alternatives III-V all have a technical panel review process in which a group of third-party professional engineers review the final design. During this review, determining the appropriateness of paste additives will be a high priority. There are seepage collection devices designed into the tailings storage facility. The addition of fly ash, cement or some other additive is an option to reduce permeability and to tie up the entrained water.

4. Will contaminants flow out at a higher percent? Will this paste liquify as sand does during earthquakes? Will it supersaturate during a 100-year (winter snowfall or rain fall) spring melt off and begin to flow? And, finally, what types of runoff will be occurring on a daily basis for the life of the tailings impoundments? (S3490)

The instability of the mine waste as proposed in the EIS is of grave concern to us because we see this as a potential future disaster if this waste transports due to saturation, seismic activity, or for other reasons. Nothing short of a fail safe" system is acceptable. (S3536)

Response: Analyses (Golder 1996) conclude that the seepage from the paste tailings disposal facility will be similar to what could be expected from the other alternative impoundment designs which were analyzed in the draft EIS. The paste can liquefy in response to a seismic event provided it is in a saturated state, however, owing to the inherent post-liquefaction residual strength of the paste and the fact that only a portion of the paste pile would be in a saturated condition at any one time. The paste pile would not super-saturate during a 100-year event. There will be surface diversions around the tailings disposal facility to prevent surface run-on, and there will be collection basins at the toe of the tailings disposal facility to collect direct surface run-off from the paste.

Stability analyses (Golder 1996, Knight-Piesold 1997, and Klohn-Crippen 1998) suggest that failure of a paste tailings disposal facility would not occur in the catastrophic manner due to the physical strength characteristics of the paste medium. Should a seismic event occur which was large enough to initiate liquefaction, there may be slumping, deformation of the paste slopes, or modest surface flows but not a catastrophic evacuation of the entire paste tailings disposal facility .

5. On page 4-21 we found the following statement: Foundation sliding. Soft clay... While it is absolutely essential to assess the engineering aspects of the foundation soils, we do not believe that there was any intent to remove any significant portions of the clay materials under the Alternative IV plan. (S3917)

The tailings dump will continue to be a risk forever, especially because there is so much unstable clay below it. (S4490)

Response: Alternatives II-V all propose to remove deleterious materials such as soft clays from under the tailings embankments or starter dams and use them to line permeable portions of the tailings area footprint.

6. Asarco talks about tailings impoundment. They say they can hold 40 million tons but what happens if it goes over the limit, what will they do then. (S3932)

Response: Sterling is limited by the amount of tailings specified in their permit. They cannot exceed this limit without getting approval from the Agencies. That limit is 100,000 million tons.

7. What are they gonna do with all those tailings? (S4016)

Response: The action alternatives proposed in the EIS call for disposing of them in a tailings facility on the surface and not underground. See the alternatives description in Chapter 2 for more detail.

8. There should be a short term and long term plan to dispose of the tailings so an inordinate build up does not occur. (S4018)

Response: The action alternatives proposed in the EIS call for placement in a tailings facility on the surface as the tailings are generated. While the mill and paste plant have a surge capacity to accommodate tailings for several days without depositing them, there is no short- or long-term plan other than placement in a constructed impoundment or paste facility. Other methods and locations for tailings disposal were considered as part of the analysis but for various reasons were dismissed. Please see Chapter 2, Alternatives Considered but Dismissed.

9. The site should also be investigated further to substantiate assumptions about ground water flows and stability of the underlying soils. (S4046)

Response: During final design, further sub-surface investigations and modeling will occur to confirm the preliminary design assumptions. In Alternatives III-V there is also the provision that an independent third-party engineering panel will review the data and final design.

10. I am also very concerned with the unproven and experimental technology they propose to use to handle the 100 million tons of mining waste they plan to leave permanently along Rock Creek and just 1/4 mile from the Clark Fork. (S4334)(S4355)

Response: Paste technology is not untested, unproven, or experimental technology. Paste has been used for a number of years in underground applications and because of its positive characteristics is starting to be used for surface placement of tailings. During final design a technical panel comprised primarily of DEQ and U.S. Forest Service technical staff and third-party consultants (if needed) as well as some technical staff from other interested federal, state, and tribal agencies will review the additional data collected during the final design phase and review the final design analyses. If for any reason design assumptions are deemed invalid or the design flawed in some manner, modifications will be made. If the modifications deviate from the design analyzed in the EIS, the public will have the opportunity to be involved under a new MEPA/NEPA process.

11. What if the tailings pond overflows or cracks? What will happen then? (S4484)

Response: If the tailings impoundment overflowed or cracked with the designs proposed in Alternatives II-IV, there is the very real likelihood that tailings and water would flow out of the impoundment and into nearby rivers and streams. If this happened using the Alternative V design, the amount of tailings would be less because it is an unsaturated paste facility. There would be slumping, slope deformation, or modest surface flows and the tailings would be unlikely to reach Rock Creek or the Clark Fork. The reader is referred to the Failure Mode Effects Analysis completed on the paste alternative and summarized in Appendix P.

12. ... like todays solid waste sites, require significant clay and earth caps on top of the mine tailing piles. (S4628)

Response: The agencies have reviewed the proposed reclamation plan in Alternative II and have increased soil replacement depths to 24 inches to address the commentor's concerns for alternatives III, IV and V. Updated plan details would be submitted prior to final reclamation.

13. Another point that hasn't been addressed is the seepage rates from the tailings. Regardless of the paste back fill method used to solidify the tailings, the impoundment must dewater itself over time in order to stabilize. A review of Asarco's proposed seepage rates done by CDM (A mining engineering research firm) indicated the impoundment seepage rates were underestimated. As the impoundment water level reaches its maximum elevation at year thirty and beyond, the seepage rates could double Asarco's projections. This more accurate projection indicates thirty year seepage rated of at least 700 gallons per minute. This has not been adequately addressed. (S4719)

Response: Sterling is bound to protect water quality from contamination through seepage from the tailings disposal facility. They have submitted seepage collection designs to capture as much of the seepage as possible. The current analyses indicate that water quality laws will not be violated under the current projections and designs. If seepage rates exceed projections, Sterling will be compelled to implement additional capture and treatment measures. Alternative V with its disposal of tailings as a paste is estimated to reduce seepage as compared to the other alternatives to 30 gpm for the entire area. Please see Chapter 4, Hydrology for details on seepage.

14. Has enough work been done to give us a relative assurance that there will not be a mass failure? What assurance level is associated with this assessment of soil stability? And on what basis is this assessment made on? What is the overall geologic stability of the tailings area? Is there any potential for faulting? How well has this been examined? (S5091)

I don't think it has been proven that this pile will be totally stable enough to be trouble free in the future. (S5123)

Asarco has acknowledged that the paste treatment of mine waste above ground is an experimental, unproven process. Every confidence that this system is safe and effective should be assured before approval of the plan. (S6588)

Response: A detailed review of the geologic information on this area has determined that the closest fault which would impact the tailings area lies 18 miles away. The tailings area is seismically stable. Two engineering firms employed the current engineering standard of care in the review of this data.

The analysis of the design for Alternatives II-IV has undergone a rigorous review by the applicant, the Agencies and an independent third party engineering firm. While Alternative V has not undergone as rigorous a review, the design assumptions (e.g., size of the local seismic event) used in the analysis of Alternative V are the same as for Alternative II-IV. In addition to the current level of review, in Alternatives III-V, a technical panel will review the additional data collected as part of the final design phase as well as the analytical techniques used in the final design.

15. Will the paste technology in Alternative V include pipes that can withstand this greater pressure? An impoundment alternative that introduces considerable new risk is not acceptable. Especially when its proved benefits are not to be found in the document. (S6342)

Response: The piping network for Alternative V would be selected to withstand the design pressures and would be specified during final design. Alternative V does have enhanced benefits over the designs offered in Alternatives II-IV: namely reduced seepage and increased inherent material strength.

16. Please insist that a more responsible solution is found to the tailings problem. (S6608)

Response: Alternatives development and analysis for tailings deposition has gone through the process prescribed by law, namely NEPA and MEPA. The analysis contained in this EIS presents the review and rationale for choosing an appropriate design alternative.

17. The tailings from the proposed mill are to be placed near the Clark Fork River utilizing a concept called Paste Technology which is relatively new in the United States. This technology involves dewatering the mill tailings and stacking the tailings as a paste on an unlined area located approximately 2,300 feet from the Clark Fork River. As mentioned in the draft SEIS, emphasis must be placed on monitoring the seepage and/or runoff from the facility. Long-term erosion of the reclaimed tailings stack and its impacts on the downstream waters is an important consideration. Both short and long-term stability of the tailings stack is a concern for Idaho. Catastrophic failure of the tailings stack, as remote as it may seem, would certainly have devastating impacts on downstream waters. These possible failures of the paste tailings stack emphasize the need for carefully thought out contingency plans prior to the approval of the project. (S6686)

Response: Should a permit be awarded, Sterling would need to submit a detailed quality assurance and quality control (QA/QC) construction and monitoring plan for the paste tailings disposal facility . As part of this QA/QC plan, monitoring of the tailings disposal facility for stability and trigger levels for mitigative actions and a description of possible mitigations would be identified. The risk from catastrophic failure is very remote. Please refer to the Failure Modes and Effects Analysis (FMEA) report for further information (Klohn-Crippen 1998). The Soils and Reclamation section discusses how soils will be salvaged and replaced to minimize long-term erosion potential. A summary of the FMEA report is described in Appendix P of the final EIS. The document is available for review at agency offices. The agencies investigated several alternate locations for the tailings facility as described in the Alternatives Considered but Dismissed from Further Study section in Chapter 2 and in Appendix G. All alternate sites would have had greater impacts than the selected location and so were not considered further.

The agencies typically have more than one person reviewing major facility designs so the formal acknowledgment to use a team or panel is not out of line with standard practices. We wanted to ensure that other interested agencies, such as EPA, Idaho DEQ, and the tribes, also had an opportunity to participate; so that criteria was added even though it is not typically a formal practice. There is no set review time specified in the MMRA regulations for review of final designs. The review of some relatively simple designs, such as a waste rock dump might be turned around in less than a month, while complex design, such as an impoundment design, could take several months with several sets of agency reviews and company responses that could entail meetings, requests for additional data or redesigns, and field inspections. The agencies have to take time to adequately review each final design being submitted and the use of a technical panel for specific facility reviews should not add that much additional time to the review process. It is not unknown for a review to determine that the facility design or plan would result in impacts outside the scope of what was disclosed in an associated Environmental Assessment or EIS. The change would require that the design or plan be submitted as a revision and if considered to be a major amendment it would be subject to additional MEPA/NEPA analysis which would take additional time before the final design or plan changes could be approved and implemented. The agencies have acknowledged that this is a possibility in the EIS and throughout the comments and responses sections so that the public is aware of it (see the Evaluation Adit Data Evaluation Plan in the Alternative V description in Chapter 2 and Appendix K for an example of this disclosure)

18. The terms in the text on page 2-55 (3rd paragraph) should be consistent with the terms used in the paste plant process schematic diagrams (Figures 2-25 and 2-26). For example, the text references dewatering tanks and an agitated storage tank, however, neither of these units is so labeled on the paste plant schematic diagrams in Figures 2-25 and 2-26. (S146)

Response: Thank you for pointing this out. The appropriate changes have been made to Figure 2-30 in the final EIS.

19. Figure 2-25 has a coarse tails tank, and Figure 2-26 has a coarse tails silo. Should these units (tanks and silos) be named consistently? Is the coarse tails tank or silo in the Figures the same as the agitated storage tank that is referred to on page 2-55? (S146)

Response: The silo and the tank refer to the same device and should be named in a consistent manner. The agitated storage tank is one in the same with the silo and tank referred to on page 2-55 of the supplemental EIS. These changes have been made in the final EIS.

20. Figure 2-25, What is the purpose of the apparatus shown under the 200-ton capacity Cement Silo that may be a motor-driven mixer? (S146)

Response: This device distributes the cement to the various Maxon mixers.

21. In Figure 2-25, what substance is added to the Maxon mixer feed that is not identified? (S146)

Response: Fertilizer and seed could be added at this point.

22. Figure 2-26 does not indicate the process equipment requirement for recovering dredged tailings, nor does it or the narrative describe how the tailings are directed into the 7-acre contingency pond. A valved line from the "Tailings Emergency Dump Site" routes flow to a "Tailings Surge Tank". (S146)

Figure 2-26 also indicates a second "Tailings Emergency Dump Site " flow. Why are there two "Tailings Emergency Dump Site Flows? It is our understanding that the "Tailings Surge Tank" can be circulated with the "Emergency Dump Tank" and/or pumped to the cyclone cluster inlet. (S146)

Response: Figure 2-30 in the final EIS has been modified to match the narrative. Final schematic drawings or equipment have not been developed for the paste plant. These conceptual drawings are meant to provide a general idea of the process flow and equipment selection. During final plant design, more detailed drawings and equipment selection would be provided.

23. Page 2-55 (Paste Production): It is stated that the 7-acre contingency tailings slurry feed containment pond design (5th paragraph) "would be lined with low permeability native materials (clay-type soils) to control seepage". Hydraulic conductivity criteria for the low permeability clay-type soils should be specified. (S146)

Response: A hydraulic conductivity would be specified during final design. It would be consistent with commonly accepted industry standards for containment facilities like landfills, and as such, would be on the order of 1×10^{-7} cm/sec.

24. Also, as designed the low permeability clay soil liner would, most probably, be recovered with the dredged tailings, requiring frequent clay material replacement. This design is questionable because timely replacement of the clay material may be problematic and, lacking the liner, seepage is almost certain. We suggest that the Agencies consider an alternative design or procedure for recovery of settled tailings slurries. There appears to be a need for an appropriate thickness synthetic liner below the clay liner that will withstand dredging abuse for this 7-acre slurry feed containment pond. (S146)

Response: The Agencies would require a synthetic liner be used in the contingency pond to reduce seepage. Specifications regarding liner type (HDPE, PVC, etc.) and quality assurance and quality control protocols for dredging slurry from this pond would be part of final design.

25. Page 2-55 (Paste Production): It is stated that, "Tailings paste usually has a moisture content within the range of 20% to 25%. If the moisture content of the paste increased appreciably, it is conceivable that the stability of the paste embankment would be reduced" (page 4-22, 2nd paragraph). On page 4-23 (4th paragraph), it states, "Strict moisture content control during processing and placement will be required if the paste is to exhibit the physical characteristics which were modeled as part of the stability analysis." We emphasize, therefore, that it will be very important that the paste landfill design be reviewed by the technical panel, and that the paste landfill adhere to the approved design, and that moisture content of the paste be closely monitored. (S146)

Response: A strict quality assurance and quality control program would be required as part of any action Alternative. For Alternatives III-V, the technical review panel would be integral to any final design.

26. Page 2-58 (Toe Buttresses): Is the amount of waste rock to be used for paste deposit toe buttresses in Alternative V (estimated at 1,360,000 cubic yards) equal to the amount of waste rock to be used in tailings impoundment starter berms for Alternatives II through IV? If not, where will Alternative V excess waste rock, not used in the mill site construction or paste landfill toe buttress construction, be placed? (S146)

Response: Approximately 735,000 cubic yards of borrow will be needed for starter dams in Alternatives II-IV. Alternative V would use all development waste rock not used in the construction of the mill or other facilities for the key buttresses.

27. Page 2-62 (Paste Landfill): It is stated (2nd paragraph) that manipulation of the paste to vary side slopes could be done more easily during construction under the top-down construction option than under the bottom-up option. We note that the FMEA summary recommendations state that the bottom up option could be flattened to a 5H:1V slope to reduce visual impact, and that the outer slope of the tailings could be recontoured on a local scale to reduce visual impact (page 55 of FMEA report). It might be helpful to make it clear in the narrative of the EIS that the bottom-up option does allow for side slopes of the paste landfill to be flattened. This is noted on Figure 2-27. (S146)

Response: The text of the EIS has been modified.

28. Page 2-62 (last paragraph): The paste facility unlined finger drains as described are to be filled with crushed rock. What is the specified crushed rock mineral character? It will be important that this rock not have metal leaching characteristics. (S146)

Response: The physical or chemical characteristics of the finger drain material will vary with possible sources. This will be done during final design. Nonetheless, this drain material will have crushing, slaking, and chemical reactive characteristics which will preclude it from breaking down physically or chemically.

29. Page 2-62 (last paragraph): It is noted that water collected in the paste tailings deposit blanket and finger drains will be directed back to the paste plant or mill for reuse during mine operations. It is our understanding that this water will be directed to the water treatment plant after mine closure. We suggest describing the fate of paste deposit drainage at mine closure also in this section of the EIS. (S146)

Response: Thank you for your comment. Every effort has been made to clarify the fate of post-mine closure seepage collection. All waters emanating from the mine site would need to meet water quality standards and MPDES permit limits prior to discharge for as long after closure as necessary to meet these standards. Text has been changed to show paste closure seepage handling.

30. Pages 2-84 to 2-89: EPA compliments the Joint Agencies on well researched and written discussions regarding backfilling of tailings and paste backfilling of tailings. We do, however, recommend that the text writers explain the difference in comparing "dry tailings" and "paste tailings." It is stated (page 2-87) that paste production dewaters tailings to 20 percent water by weight. What is the comparative water content of "dry tailings"? (S146)

Response: Effective dry tailings circuits commonly achieve moisture contents in the 17 to 18 percent range. The text has been modified to show the moisture content.

31. The EIS briefly mentions that supplemental binder (Portland cement, fly ash, or slag cement) "... may be added as needed." [EIS, page 2-55] There is, however, no explanation of the conditions under which these supplements might be required. (S6328)

Response: During final design additional stability and paste analyses will be conducted. If the Agencies and the technical panel reviewers determine that an additive is necessary to meet the design objectives of the tailings disposal facility and to achieve the level of environmental protection described in the preliminary design and the final EIS, then an additive would be required.

32. If the top-down option is chosen over the bottom-up option, the EIS must contain much stronger technical justification for such a choice. The material presented in the EIS clearly makes the bottom-up approach technically superior (S6328)

Response: The EIS presents an analysis of the data available to the Agencies: the level of data is reflected in the level of analysis, and vice-versa. If any of the Action Alternatives are chosen, more detailed design and analysis would be conducted, as well as having the engineering work scrutinized by a technical review panel (Alternatives III-V only).

33. The paste system of handling the tailings does, on the surface, appear to be an improved means of handling the material. However, strong evidence is lacking to support the use of the approach, especially when one considers the massive scope of the operations and the resources, especially water, that could be severely impacted if the systems were to fall short of the advertisements or to simply fail. I would expect the U.S.F.S. and regulatory agencies to demand further testing before approving the approach. Furthermore, I do not believe that the documentation provided, so far, meets the standards required by NEPA. (S6681)

Response: The agencies have conformed with the requirements of NEPA, as described in 40 CFR 1502.22. Additional ongoing analyses are part of all action alternatives, and in alternatives III-V, a technical panel review of all designs is incorporated.

34. Appendix C -8, paragraph 3, last line – The conclusion that tailings permeability would be less than that of native soil is questionable. The lacustrine clay soils that underlie much of the tailings area have similar or lower permeability than the tailings. C -12, paragraph 6 - See permeability argument above. (S5)

Response: The hydraulic conductivities for the lacustrine soil underlying the impoundment are less than the hydraulic conductivities for the paste as reported by Klohn-Crippen (1998). In light of the above reference in the supplemental EIS, the recharge to downgradient wetlands should not be adversely impacted.

35. Page 2-75, last paragraph – Although the paste system may allow for inclusion of seed in the paste mix, it is not a proven method. (S5)

Response: The low cost of incorporating an annual cover of grasses in the tailings paste ensures that any seed that is exposed will have a chance to germinate and grow. These plants will help provide erosion control, help dry out the tailings mass, provide organic matter in the subsoils, etc. all for minimal cost to the proponent. This a cheap and effective best management practice regardless of the ultimate density of plants that germinate. The Troy tailings impoundment demonstrates that seed germination is possible in this type of tailings material.

36. Page 4-21, paragraph 2, last sentence – Asarco has not proposed removal of foundation clay. Foundation soils will be assessed during final design. (S5)

Response: Should Alternative V be chosen detailed engineering plans and additional analysis would be undertaken. Unsuitable foundation clays will be removed from under the tailings embankments in Alternative V if they are deemed to contribute to an unstable condition. The clay would be used to seal more permeable portions of the tailings storage footprint.

37. In various places of the SDEIS the tailings seepage is identified as relatively non-toxic, with nitrate being identified as the primary constituent of concern [SDEIS p. 4-51]. Alternative V is identified as better able" to meet Montana water quality standards, but this does not actually make clear if Alternative V is totally able" to meet the required standards. The ultimate toxicity of tailings seepage is evidenced by information contained in the SDEIS indicating that tailings decant water from the Troy Mine is highly toxic, resulting in >50% mortality in 25 of 28 most recently conducted tests due to elevated levels of ammonia, copper and other metals {SDEIS p. 4-67]. Based on this information, the non-toxic nature of the tailing seepage appears to be refutable, and justifies additional consideration of liner alternatives. (S188)

Response: Whole Effluent Toxicity (WET) testing of the Troy effluent has demonstrated toxicity to aquatic organisms. The toxicity of a substance is a function of the magnitude and duration of exposure. The toxicity of 100% effluent to aquatic organisms has little or no value in determining the need for a liner for the tailing storage. Seepage from the facility will be chemically transformed in the soil and diluted to non-measurable levels by the time it potentially reaches a receptor.

38. The agencies in the SDEIS have suggested that a technical review panel be formed to evaluate the detailed design of the paste tailing impoundment. While this is a good technical and ethical consideration, it is not an acceptable substitute for inclusion of detailed information and the findings of the technical review panel in the EIS. This is crucial to identifying and addressing potential impacts, and allowing for meaningful consideration and comment by the public.

Technical Panel Review. According to the SDEIS, a technical panel review of the design would contribute to further reduce the risk of paste facility failure [SDEIS p. S-30]. The make-up of the technical review panel is critical to the end result, and should include qualified representatives from state, federal and tribal government, industry, and public interest groups.

The scope of the technical panel should be expanded beyond that of the tailings pond and include assessment of rock mechanics and geochemistry following evaluation adit completion and prior to production development. It should also include review of the water treatment design and operating plan, and review of monitoring, action alert and response plans, and involve itself in public education and participation throughout the various stages of mine life. Participation in the technical panel by qualified representatives of public interest groups should be facilitated. (S188)

For the record, we support the proposal to have a technical panel review the final tailings impoundment design and reclamation plan. However, we believe the technical review must occur as part of the EIS process, not outside of it with no opportunity for public input. Additionally, we believe the technical panel should include experts from a broad range of interests and disciplines. As part of the technical panel review, we would like to see several unresolved issues addressed, including: 1) uncertainties regarding the use of paste deposition in a surface impoundment; 2) whether a binder material will be used to amend the paste tailings; 3) detailed design plans for the tailings impoundment drainage system, and 4) the more specific information on the final reclamation plan for the impoundment. (S6318)

Response: The make-up of the technical panel is yet to be determined. The intent of this provision, however, is to provide another level of technical review to provide a design that ensures and maintains environmental safety. The panel would be staffed by technically proficient, objective

professional engineers with demonstrated experience in tailings disposal facility design as well as other technical specialists. The panel would be comprised of staff from DEQ and the U.S. Forest Service (USFS), third-party contractors, if needed, as well as technical staff from other federal, state, and tribal agencies. The geochemical data would be used by the panel in its review of tailings facility design if the data indicated a real potential for acid rock drainage. If during agency reviews of designs for other mine facilities and plans it was believed additional input was needed, the responsibility of the panel could be expanded. The public is always allowed to review agency files including those pertaining to final designs but it is not likely that the public would be involved directly in those reviews. It could not be allowed by the USFS under the Federal Advisory Committee Act.

39. Potential Failure of Paste Technology. As with the use of any novel technology, there exists a reasonably foreseeable potential that the technology will not live up to its full potential, or might altogether fail. And in the event of failure, the likelihood for impact to surface waters and aquatics/fisheries is significant. The paste technology may prove to be ineffective in consistently producing tailings without excess moisture, and may necessitate the use of alternative techniques including pressure or vacuum filtering. Seasonal precipitation may result in free water causing a phreatic level in the tailings, requiring more effective seepage removal by incorporating drainage layers within the tailings. According to the conclusions and recommendations of the FMEA report, preliminary seepage modeling of the tailings indicates that, even with blanket and finger drains, the phreatic level in the pile could be higher than expected, particularly during operations. (S188)

Response: Final design of a paste tailings disposal facility would be under the review of DEQ and U.S. Forest Service personnel and possibly an independent third-party reviewer. Details regarding the conditions mentioned in the comment would be investigated, analyzed and resolved at that time to ensure the design confirmed with the limits set out in the final EIS.

40. Water Storage in Tailings Impoundment. In discussing the agencies preferred alternative, reference is made to water stored in underground workings and/or the tailings impoundment." [SDEIS p. S-24, 2-130] Water stored in the tailing impoundment would possibly create an increased phreatic water level in the tailings, and increase seepage, and significantly negate the benefits of paste technology. Water stored in this context might also refer to water stored as seepage from the tailings. However, storage in this context, in order to recover it and to limit its potential impact, implies the need for a lined tailing pond. (S188)

Response: There would not be any storage of water in the paste facility under Alternative V. The need for a lined tailings disposal facility was evaluated in the final EIS from a water quality point of view and it was determined that seepage from the tailings disposal facility would not violate state water quality laws provided the conditions of the MPDES permit is met. Please refer to the Hydrology section of the final EIS and the MPDES permit in Appendix D.

41. Stormwater falling onto unreclaimed portions of the paste tailing impoundment will result in sedimentation of runoff. Where annual precipitation exceeds evaporation, as at the proposed tailing impoundment area [p. 3-5], stormwater can infiltrate the tailings and potentially lead to the creation of a phreatic head in the tailings impoundment. Tailings, because of its contained clayey fines, can act to prevent seepage down-migration. This has led similar operations utilizing similar technologies, such as the Kensington project near Juneau, AK, to adopt the use of temporary storm covers over unreclaimed tailings, and require the installation of drainage layers within the tailings impoundment. It is strongly recommended that further study of similar facilities be undertaken, and that additional features such as temporary storm covers and drainage layers be required for the proposed Rock Creek project. (S188)

Response: During the final design phase of the tailings impoundment or paste facility design, details such as those mentioned would be reviewed and addressed, if necessary, so that impacts would be no greater than disclosed in the EIS and for compliance with conditions of the permit. Provisions such

as temporary covers over unreclaimed portions of the tailings disposal facility and binders are entirely possible if it is determined that this be necessary to ensure facility stability.

42. According to the SDEIS, tailing impoundment slope reclamation will be conducted using slopes varying from 2:1 to 5:1. In general, steeper slopes are more susceptible to erosion, particularly when considering fine tailings reclamation. The SDEIS identifies that surface erosion could present a chronic on-going maintenance problem, and these type events would require an ongoing maintenance commitment on the part of the proponent [SDEIS p. 4-21]. Elsewhere, the SDEIS provides that the agencies would require that the reclamation plans contain provisions to include appropriate amendments to the tailing paste to adequately control erosion and facilitate interim and final reclamation [SDEIS p. 4-28]. The potential for erosion would be decreased for shallower slopes, with 3:1 recommended as a maximum slope angle. The addition of cement or another binder to surface tailing materials would make revegetation problematic, without the addition of a suitable and erosionally stable seedbed. Bond assurance should include consideration of maintenance of tailing pond slopes in perpetuity. (S188)

Response: The agencies agree that fine tailings on slopes would be more susceptible to erosion. The commentor refers to the chronic erosion mentioned in discussing the Geotechnical Engineering section in Chapter 4 for Alternative V. This section deals more with operational maintenance of the paste facility. The paste facility would have operational sediment control best management practices in place. The proponent has also committed to adding an interim seed mix to the paste as it is deposited.

To avoid long-term maintenance the agencies have modified the reclamation plan and will cover the paste facility with 24 inches of soil. Fine textured lacustrine soils will not be placed on slopes over 8%. Alluvial or colluvial soils with significant rock fragment contents are required on all slopes over 8%. This reflects the natural soil conditions in the area today. In this way, the agencies have addressed the potential for fine tailings erosion long-term on slopes of the deposit.

At the present time the agencies are only considering the use of cement additions to tails to reduce the erodibility of drainage channel areas where water will collect and gather force that could blow out vegetated rocky soils placed over fine tailings.

43. In various places in the SDEIS the addition of a binder to the tailings paste is described "if necessary," and "as needed." [SDEIS p. 2-11,55] The addition of binder, which is generally considered integral to the paste production process, would reasonably and practicably further minimize environmental impacts related to water quality, reclamation and aesthetics. Seepage would be decreased because most binders react by rehydration, literally soaking up water in the formation of their solidified chemical composition. Water quality would be improved because binder would decrease permeability and provide an alkaline buffer to minimize potential for contamination of seepage, and would minimize erosion of sediment from the tailing surface both short- and long-term. The use of binder would allow for increased and longer-term stability of contoured slopes, and allow for greater variability. Tailing "rock" can be constructed to blend with surrounding topography, including the cliffs and vegetated benches predominant in the existing local landscape. Inert dyes could be added to the paste to allow vertical cliffs to blend with regional rock coloring. Binder usage should be identified as a mitigation and required in order to minimize environmental impacts. (S188)

Page 2-55. "Supplemental material such as a binder (Portland cement, fly ash, or slag cement) or seed and/or fertilizer to facilitate reclamation may be added as needed." What would the species composition of the seed be? What kind of fertilizer? (S3462)

If the Agencies have already decided that a binder material will not be added, the EIS needs to disclose that fact to decision-makers and the public. It is disingenuous to suggest that binder material is still being considered if in fact the Agencies' are making impact predictions based on the assumption that it won't be.

In addition to addressing these compaction, stability, and reclamation issues, using a binder material would also help reduce the potential for seismically-induced liquefaction, and minimize the volume of seepage through the tailings deposit.

The binder issue must be resolved during the EIS process because adding a binder material is likely to change the overall footprint and height of the impoundment, and the rate and chemical composition of seepage it discharges. Those potential impacts must be disclosed during the EIS process. (S6318)

Response: The agencies plan to cover the tailings disposal facility with 24 inches of soils including soils that have enough rock to resist erosion. The use of binders is only envisioned at this time to armor drainages where water will collect in the post mine drainage pattern. If environmental problems arise over the course of the 30 year mine life, such as geochemical analyses showing tailings to be acid producing, the agencies can impose the use of binders, etc. to address problems at that time. Please refer to Appendix J of the final EIS for the details of the seed mix and fertilizer.

44. Page S-21, paragraph 7. "The Alternative V construction of the paste tailings impoundment panels phased-in throughout the 34-year project would delay the direct and indirect impacts to the wetlands, particularly those located directly under the impoundment." Does this make sense? What are "paste tailings impoundment panels"? (S3462)

Response: In Alternatives II-IV, the entire footprint of the impoundment (and hence any wetlands) would be disturbed in the first few years during the construction phase. In Alternative V (paste alternative), an area within the tailings disposal facility footprint would be disturbed only when needed to begin laying down a new layer or "panel" of paste. Due to the paste viscosity, more control over lateral spreading is possible thus the amount of new ground that has to be disturbed at any given time is limited. Under this scenario, the disturbance of wetlands would not occur up front during the first few years.

45. Page 2-9 "(3) Pumping paste from a paste production plant would be done under higher pressures than piping tailings slurry from the mill to the impoundment site (500 pounds per square inch [psi]). Stream crossings and long distance of pipeline could increase the potential for pipeline ruptures and greater potential for impacts than from a ruptured tailings slurry line." This quote is from the section on choosing possible tailings impoundment sites, but the higher pressures required for paste technology deserves appropriate safety measures in Alternative V. Will the paste technology in Alternative V include pipes that can withstand this greater pressure? An impoundment alternative that introduces considerable new risk is not acceptable. (S3462)

Page 2-52. The paragraph on Tailings Transport does not mention the higher psi in the pipes used to transport paste as compared to the psi in pipes used to transport slurry. This new risk deserves evaluation. (S3462)

Response: Paste pipelines would be specified to withstand the anticipated (operating and surge) pressures anticipated. The paste plan was specifically located near the paste facility to minimize the length of high pressure pipe.

46. Page 2-11 "The second method involves depositing the tailings on the ground as a paste, much like building a free-form concrete structure." How is it like building a free-form concrete structure? Will it be impervious to rain and snow? And if it is like concrete, how will it be possible to reclaim it with vegetation after the 30-year life of the mine? What, specifically and scientifically, are the proven benefits of the proposed paste technology? They certainly are not outlined here. (S3462)

Response: The benefits of paste over conventional wet tailings are that it can exhibit greater strength characteristics. In addition, it does not have as much free water associated with it which would need to be collected and perhaps treated prior to discharge. While it is not impervious to rain or snow, its grain size distribution on placement precludes a high rate of water infiltration, thereby preserving its strength characteristics. It has a physical consistency similar to thick mortar. Once deposited and as

it dries it can be shaped by earth moving equipment to enhance the visual aspects of the tailings disposal facility. It can support vegetation with adequate soil application.

47. Page 2-31: schematic of tailings impoundment pump-back system proposes total recollection of ground water? How does this work? (S3462)

Response: Seepage water from the tailings disposal facility would flow through the underlying alluvium towards pumpback wells placed down-gradient of the tailings disposal facility. The pumps would extract seepage water from the alluvium. These pumps would be required under alternatives III and IV but are only considered potential mitigations for Alternative V due to the lesser amounts of seepage through the paste facility. If seepage quality exceeds permit limits and could not be reduced, pumpback wells would be installed under Alternative V to bring seepage back into compliance.

48. Page 2-55, paragraphs 4 and 5. "A 7-acre contingency tailings slurry feed containment site would be near the paste production plant to contain approximately 6 days of tailings production should the paste production plant be totally disabled or in the event of a major failure beyond the control of the plant design." Why has the time period of 6 days been established? Why wouldn't the mill be shut down if the paste production plant was totally disabled or in the event of a major failure? How will seepage from this containment site be monitored? This contingency site is lined. Why isn't the main tailings impoundment afforded the same safety measure? (S3462)

Response: Given the confines of the paste production plant, a contingency pond with 6 days capacity could be constructed without excess additional disturbance. If the capacity of the pond were exceeded or there was a pipeline rupture or other major failure, then the mill would be shut-down to avoid exceeding holding capacity and to minimize environmental impacts. There would be ground water monitoring wells downgradient of the contingency pond to monitor for discharges from the paste plant and the tailings feed contingency pond. The contingency pond would be holding wet tailings, and the possibility for seepage from these tailings is greater than with paste. So, the holding pond would be lined in order to prevent seepage from the wet tailings entering the ground water system.

49. Page 2-55. "The tailings stored in the containment pond would be dredged from the pond and reintroduced into the plant for disposal as a paste after the plant resumed operation." Will the paste plant be able to handle normal mill operations and the simultaneous addition of this extra material? (S3462)

Response: Yes. The amount of dredged material introduced into the mill circuit would be minimal and well within the capacity of the mill even when processing tailings under normal conditions.

50. Page 2-84. "Following release of the draft EIS, Asarco provided additional information on methods of transporting tailings from the surface to the underground mine and disposal throughout the mine. These methods mostly centered around the disposal of tailings using recently developed paste handling technologies (Golder Associates, 1996) but also included conveyor transport of dry tailings into the mine. This information eventually lead to the surface paste disposal concept which is detailed in Alternative V." How and why did examining backfilling methods lead to the development of the surface paste disposal concept? (S3462)

Response: Backfilling with dry or wet tailings would still require there to be a surface tailings disposal facility for the tailings which were unable to be placed underground. Paste backfill with whole tailings was one of the backfill methods examined. It was estimated that approximately 40% of the tailings at the most could be placed underground under the best of circumstances. This is due to the increased volume of the tailings over and above the volume of intact rock. Given that it was necessary to have a surface disposal option, and addressing the desirability to decrease the amount of potential seepage from the tailings, a design was developed to use surface deposition of tailings paste.

51. Page 4-50 - tailings seepage rate concern: how was the estimated 30 gpm arrived at? (S5093)

Response: The estimate of 30 gpm was arrived at using a seepage modeling program. This program used the measured hydraulic conductivities of the foundation materials at the proposed tailings disposal facility site, and values from the paste and various precipitation and infiltration estimates. The analyses are presented in the Failure Modes Effects Analysis (Klohn-Crippen 1998).

52. Based upon our review of the proposed paste facility, and the discharges from it, we still believe that the SDEIS fails to disclose the magnitude, duration, and significance of environmental degradation that will be caused by seepage from the impoundment. More importantly, the Agencies' preferred alternative in the SDEIS fails to include reasonable alternatives that will minimize and/or prevent those impacts.

Our areas of concern include: 1) the lack of design specifications for the paste impoundment; 2) the absence of geochemical baseline data on tailings that will be stored in the impoundment, and waste rock that will be used to construct it; 3) lack of detailed information on ground water quality and flow regimes for the impoundment area; 4) the failure to disclose potential impacts to water quality and aquatic life in Rock Creek caused by seepage from the impoundment; 5) the failure to ensure that the mixing zone associated with seepage from the impoundment meets the requirements of Montana's Nondegradation and Mixing Zone rules, and 6) the failure to include tailings backfill to minimize impacts as part of the preferred alternative.

The SDEIS still fails to present the adequate design information needed to allow the public and decision-makers to make an informed decisions on ASARCO's proposal. Statements from the Supplemental EIS, the Review of Tailings and Acid Rock Drainage for the ASARCO Rock Creek Project by Klohn-Krippen, 1998(Klohn-Crippen), and the draft MPDES permit demonstrate that the paste tailings impoundment proposal, and it's associated reclamation plan, are still a conceptual plans that will likely be subject to significant changes in the future. (S6318)

Response: (1) Final design would occur within these parameters. Paste facility design is described in Chapter 2, Alternative V. If significant changes were necessary, additional MEPA/NEPA review would be conducted. Seepage from the paste facility would occur at a projected rate of 20 to 30 gpm until equilibrium is reached and will not cause significant degradation. Prior to any development, final design would occur, and Alternatives III-V provide for a technical panel to review the appropriateness of the assumptions and the final design analyses. (2) The static and kinetic tests which have been performed on the Troy Mine and Rock Creek material were not conclusive enough to rule out acid rock drainage as an issue at Rock Creek. A geological and geochemical comparison was completed between the Troy Mine ore and Rock Creek ore. This report concluded that acid rock drainage is a remote possibility and explains why the tailings at Troy after eighteen years have a basic pH. The Failure Modes and Effects Analysis suggests additional testing should be done to get a more representative sample, and this being incorporated into Appendix K. Therefore, the Agencies have determined that preliminary results are sufficiently accurate to make an informed decision. (3) Impacts to aquatic life from tailings disposal facility seepage have been disclosed in the EIS. (4) Please refer to the MPDES permit application contained in Appendix D of the EIS. (5) Tailings backfill has been presented in the EIS and a rationale why it was dismissed is included.

53. One of the significant changes to ASARCO's mine plan presented in the SDEIS is the proposal to use the paste technology for tailings disposal. We recognize that paste tailings is a newly developing technology that could help improve the long-term stability of tailings deposits, and reduce the volume of contaminated seepage it discharges. However, we also recognize that paste deposition in a surface tailings impoundment has rarely, if ever, been used on a project of this size. The relatively unproven nature of this technology is also recognized in the SDEIS, and in Klohn-Crippen's 1998 review of the Rock Creek project... We believe the EIS document should better reflect the uncertainties raised by the experimental nature of this proposed technology. (S6318)

Response: Surface disposal of paste is an emerging alternative to traditional (wet) tailings disposal. While the technology may be relatively new, if one considers the issues most closely associated with tailings disposal, namely ground water quality and impoundment stability, paste disposal addresses these two issues by reducing potential impacts. Paste tailings exhibit improved strength characteristics, thereby providing a more stable structure. The low moisture content of the paste eliminates the amount of seepage and discharge water which needs to be collected and treated. These two modifications are potentially significant improvements over the traditional design approach.

54. Another engineering aspect critical to the final design of the impoundment is the proposed drainage system, and its ability to reduce and/or eliminate the buildup of phreatic water in the tailings deposit.

Although the SDEIS recognizes the importance of minimizing the moisture content in the paste deposit, it provides almost no detailed information on the impoundment drainage system needed to achieve it. While we appreciate ASARCO's commitment to include finger and blanket drains as part of the final design, more detailed information on the drainage system must be presented.

To help address these concerns, we recommend that the Agencies require ASARCO to present a more detailed design information on the paste facility and drainage system for technical review. As part of that design, we recommend that the Agencies require blanket drains, finger drains (as proposed by ASARCO), as well as a series of internal drainage layers between lifts in the paste impoundment. (S6318)

Response: The agencies would require Sterling to present a more detailed final design wherein assumptions are confirmed, additional analytical data are presented and a review conducted by a technical panel. Finger and blanket drains would be part of any final design. Internal drain layers may or may not be part of the design depending on what is necessary to maintain the standards outlined in this final EIS.

55. Given the size and type of this project, it's proximity to adjacent creeks and the Clark Fork River, and the potential catastrophic effects to human health and safety, as well as the environment in general, it is unconscionable to base the design limits for impoundment failure on regional averages instead of the site-specific extremes. (S1417)

Response: The National Oceanic and Atmospheric Agency data is specific to this region of Montana. The baseline data for the Rock Creek site would only account for, at best, 10 years of site specific collected data (the length of time since a permit application was submitted).

56. Page S-20 6th paragraph "While likelihood of failure … is considered negligible (less than 1 in 1 million chances …". Is this the tailing pond that is ostensibly engineered for a 100 year flood/runoff event? This is 1 in 100 chances, not 1 in 1 million. However, note Appendix M, page 3 where it is stated that "The pond underdrain containment pond will be … and sized to contain the 10-year, 24-hours storm event … spillway sized to pass the 100-year 24-hour event." This indicates that this is closer to 1 in 10 chance of premature, untreated discharge of waste materials, including stormwater, etc. - not 1 in 1 million. There is a difference between paste tailing confinements and stormwater discharge, however, it is not clearly stated if materials in stormwater have any toxicity, or could possibly be deleterious to aquatic habitat, ground - or surface water quality. See Fact Sheet page 6 and Table I-1. (S4832)(S4833)

Response: The tailings impoundment is sized to accommodate the Probable Maximum Precipitation (PMP), and the likelihood of failure of 1 in 1 million refers to the tailings impoundment only and is not based solely on a 100-year event. The pond underdrain system referred to is for the mill site, not the tailings impoundment. Stormwater is not considered to have any toxic constituents and could be discharged directly without treatment under the Montana stormwater laws. If surface run-off from a

storm event picked up contaminants from coming in contact with mining related activities, then this water would be treated prior to discharge. A storm water control plan is intended to ensure these criteria are met.

57. Page 2-5 3rd paragraph under (4) "Tailings locations …". Does the location have foundation conditions that could be 'reasonably expected' to support …? Is a reasonable expectation likely to violate the law? (S4832)(S4833)

Response: A review of the foundation conditions was conducted by an independent third-party engineering firm. The foundation conditions were identified as needing additional investigation and perhaps special design treatment, but not to the exclusion of using the site as a tailings disposal facility location. If a permit is approved, additional sub-surface investigations will be undertaken and additional stability analyses will be conducted and overseen by a technical panel to ensure the tailings disposal facility characteristics are consistent with preliminary design and evaluation.

58. Page 2-77 1st incomplete paragraph "Rocky swales …". How can rock and cement produce a 'naturalized swale' (given the "massiveness of the deposit")? (S4832)(S4833)

Response: Earthmoving techniques would be used to create as natural a look as possible. Certainly this will not look the same as if the site were not disturbed by mining. Cement may be added to tailings to harden the foundation of a planned drainage. Swales would be constructed and armored prior to the plant establishment phase. Rocky soils would be placed on steeper slopes as it would be less susceptible to erosion. After revegetation is successful the swale becomes "naturalized."

59. Page 4-23 1st incomplete paragraph "However, as the moisture content …". Have studies been done to assess great precipitation variation in NW MT? It is common to have significant rainfall in a short period of time. Consider evaluating impact of excessive rainfall (which seems to be the "norm" lately) on potential for greater flow in event of failure. (S4832)(S4833)

Response: Data on precipitation events was obtained from the National Oceanic and Atmospheric Agency. Their data records precipitation events and volumes. For Alternatives II-IV, the impoundment is designed to contain the 100-year/24-hour Probable Maximum Precipitation event. For Alternative V, one or two lined storm water ponds would be constructed at the base of the facility to handle the same size event as Alternatives II through IV.

60. Discussion in the SDEIS lacked any mention of the fact that Noxon, MT is the highest precipitation area in the state, that rain on snow events are numerous during the winter quarter, and what effects those events combined with freezing and thawing would have on the paste and its supposed stability factor. Was failure modes effects analysis (FMEA) done based on the 100-year precipitation event?

We see no discussion of the freeze thaw effects on the tailings paste. It is our opinion that the expansion, contraction, and effects of frozen fluids could substantially alter the stability of the tailings pile. Joints, fractures and shear planes will likely increase instability and will certainly increase the permeability of the material for water movement. (S614)

Response: The stability analysis performed in the Failure Modes and Effects Analysis (FMEA) assumed both 10 inches and 20 inches of precipitation. These values represent the estimate drainage of actual infiltration over the course of a year from the average annual precipitation of 30 inches. The 100-year event was not modeled. When a 100-year event occurs, there would be a great deal of surface run-off as the top few inches of the paste became saturated; the entire volume of the 100-year event would not infiltrate the paste pile. The FMEA estimated that from 40% to 60% of the volume of direct rainfall could expect to infiltrate in the absence of any kind of cover. The stability of the paste pile would not be compromised even if the 100-year event were to occur during the life of the mine. There would probably be surface slumping, but not a catastrophic failure of the entire paste

pile. The paste pile would be graded to prevent any ponding of water to minimize the amount of slumping. Similarly, freeze thaw effects on the paste would most likely manifest themselves as areas of soft paste which could be prone to settlement and slumping but would not result in a catastrophic embankment collapse. Freeze thaw effects are not expected to differ from existing freeze thaw effects on in-place soils. However, part of the required quality assurance/quality control plan for the paste repository, the agencies and Sterling will develop management controls to minimize/monitor freeze thaw effects.

61. Page 4-19. Para 4. Specifically……..issues pertaining to liquefaction and seepage are substantially reduced." This issue has not been discussed, developed nor looked at in the detail that it merits. Not only have the poor foundation soils been dismissed, but so have the artesian features within the proposed impoundment area. It is even quite possible that the poor foundation soils have some connection with the artesian features. The area is also the source of one of the tributaries of Miller Creek which will either contribute water to the bottom of the paste pile or provide a convenient discreet conveyance for effluent to leave the tailings impoundment. (S614)

Response: Additional field investigation would be conducted as part of final design. Artesian features, poor quality foundation materials, or any other naturally occurring features which could have an adverse effect on the tailings disposal facility and its performance would be fully investigated and appropriate design features incorporated (with a prior review by a technical panel) to ensure that there would be no adverse environmental impacts that have not already been disclosed in the EIS. If there are, then redesign would be needed until impacts were reduced or the final design would be subject to additional NEPA documentation and public review.

62. Page 4-21. Overtopping. A one inch rainfall on the surface area of the tailings impoundment calculates out a @ 8,000,000 gallons of water. What are the implications of this amount of moisture seeping into the paste? (S614)

Response: The Failure Modes Effects Analysis assumed both a 10 inch and 20 inch infiltration scenario. Under both situations, the factor of safety against failure was greater than 1.0. The paste facility is not designed to store water, thus it is not subject to overtopping. Storm water on the active face would be sent to storm water ponds at the facility base.

63. Page 4-22-23. Risk Analysis. It is apparent that Klohn-Crippen did not have access to all the quantitative impacts occurring in, around and at the proposed tailings impoundment site. The FMEA analysis is deficient in regards to the location of the adjacent BN/ MRI, rail line. The socioeconomic impacts associated with a dam failure should also include the potential loss of life that was indicated in the heated discussions associated with the agencies first engineering consultant Steve Vick. If $10,000,000 is considered a barometer for an extreme event, this does not bode well for the minuscule proposed bond of $12,000,000 that the state proposes to require on this project.

Page 4-30 para,..3 Under alt. V, the probability of catastrophic failure..." This worst case scenario has not even begun to be explored. While the possibility of its occurrence is substantially reduced utilizing paste technology, it cannot be discounted. Witness the cascading events across from the town of Troy, MT last year that created a mass wasting scenario that blocked almost half the flow of the Kootenai River. An impoundment failure at Rock Creek within that narrow reach of the river could have serious consequences for the operation of the Noxon Rapids Dam. (S614)

Response: The Failure Modes and Effects Analysis (FMEA) looked only at the likelihood of paste facility failure, not at other associated impacts such as the rail loadout area. With regards to the socioeconomics, 'loss of life' was a realistic outcome from paste facility failure.

A failure of the paste facility would not occur as a catastrophic event, evacuating the entire impounded paste deposit and sending it towards the Clark Fork. The physical characteristics of the

paste and its viscosity are such that at failure it would not travel very far. The worst case scenario alluded to has been analyzed and estimated in the FMEA, where failure were it to occur would involve slumping and deformation of the paste, but not widespread flow failure.

64. The impacts from mine facilities is not adequately assessed. Particularly, the impacts from the tailings ponds, pipelines, roads, and underground workings are not fully assessed. By example, the stability of the tailings impoundment has not been adequately proven. This includes foundational materials, phreatic surface, and materials densities. The Tribes laud consideration of paste technologies, but it is a newer technology applied as proposed. Therefore, details such as engineering/design/stability, adding amendments, failure(s), and seepage/infiltration must be considered. All mine-related facilities must be examined before permitting, not based on post-permit conditions and stipulations. (S2034)

Response: The Agencies determined that the level of detail for the paste alternative was sufficient to proceed with the MEPA/NEPA process. Please refer to 40 CFR 1502.22 for additional rationale. Prior to any development, final design would occur, and alternatives III-V provide for a technical panel to review the appropriateness of the assumptions and the final design analyses.

Final design will include additional material testing and stability modeling to confirm assumptions made during the preliminary design phase. Changes in design and mitigations can be implemented to conform to the environmental impact analysis carried out in the EIS. The conceptual and preliminary designs and their associated performance whether it be in response to a seismic event, seepage or reclamation success, have been presented and reviewed under the guidelines established through NEPA and MEPA.

65. Page 4-61 para.4: Saturated soils are caused by shallow perched water in surficial clays. Static water levels in nearby monitoring wells indicate that the water table is about 20 feet beneath ground surface." Is this the condition that causes the that causes the foundation stability issue? Is it probable that this relatively shallow perched water table caught between clay and paste pile (with water being added from the paste at a rate of 30 gpm) will homogenize within the intervening 20 ft. and create an unstable situation? (S614)

Response: Yes, this is the same condition that influences the impoundment embankment stability for the "wet" impoundments. In the case of Alternative V, the paste facility, the presence of a soft clay horizon can also create an unstable condition. In the case of the "wet" impoundments, most of the initial strength for the impoundment was being provided by the embankment, hence the concern that the soft clays were eliminated from below the embankment portion, as was specified in the mitigations for Alternatives III and IV. For Alternative V, the strength of the past pile is coming principally from the paste itself, and consequently, it is imperative that what underlies the paste is also stable. It may well be that all of the soft clays within the footprint of the paste pile will need to be removed and not simply those under the perimeter embankment. This issue will be addressed in the final design phase and by the technical review panel.

GEO-103 Mineral Rights

1. Asarco has a legal property right to mine minerals on their property. This property right is protected by the US Constitution. A legal right can not be taken away by an environmental right in campaign. In other words, the rights of a minority cannot be taken by a possible majority. (S3277)

Why should Asarco have the right to tunnel under public lands that are valuable for other uses? (S4010)

Response: Sterling's rights to access, construct, and operate their proposed mine are provided under a number of Montana and Federal statues. However, the project must also comply with other applicable laws, regulations, and rules. Forest Service regulations provide that project impacts be minimized while giving due consideration to mine development.

2. Standards set for patenting claims under the Hard Rock Mining Law have not been met and that the Process of approving these claims for patent should be further studied. (S5)(S4333)(S4865)(S6741)

Response: Ninety-nine of the applicant's lode mining claims were patented by the U.S. Department of Interior, Bureau of Land Management (BLM), in May, 1989. BLM found that all standards for patenting claims under the 1872 mining law had been met. The mineral deposit that underlays those claims became the property of Sterling. There is no provision in the patenting process that would allow for a re-evaluation of that decision. The degree to which the project would or would not comply with future mining laws is not a question that can be answered until such time that a new law is enacted by Congress. Sterling's land ownership position is discussed in Chapter I, in Chapter II under Alternative II's Introduction, and in Chapter 3, Geology, under Mining History.

3. On page 4-19 the SEIS states, "Construction and operation of both mines would likely result in more stringent requirement on other mineral activities in the area in order to ensure sufficient undisturbed habitat for several wildlife species. The result would be a slowdown in potential mineral exploration and permitting of potential future mineral developments in the area during the life of these projects." On what basis did the agencies decide that the development of Rock Creek should proceed before a "slowdown" policy is implemented? (S6312)

Response: Any "slowdown" in future, of as yet unknown mineral activities would be due to the fact that permitting them may become more difficult because the Rock Creek and Montanore projects were already in place. This is not a new policy. Any future proposal would have to consider both Montanore and Rock Creek as cumulative impacts along with the associated problems of developing appropriate mitigations for any new project. It is the inevitable outcome of balancing environmental protection and development and cumulative impacts procedures.

4. ASARCO's holdings and the proposal need to be carefully evaluated in the context of the November 7, 1997 memo from Interior's Office of the Solicitor to the Director of the BLM regarding the legal ratio of patented millsites to mining claims (1). According to this memo: "The Mining Law of 1872 provides that only one millsite of no more than 5 acres may be patented in association with each mining claim.... Our confirmation of the limits on millsite patenting may to some extent limit the acquisition of federal land for milling and mining purposes under the Mining Law." A formal finding of consistency with this opinion should be made prior to issuance of any permits and should apply retroactively. (S6312)(S6337)

Response: The U.S. Department of Interior's solicitor's opinion and Bureau of Land Management (BLM) policy referenced is called the "5 for 1 rule." The policy limits patenting of mill sites to no more than 5 acres for each lode or placer claim. The policy further instructs the BLM to not approve plans of operation where the mill site acres-to-claim ratio exceeds the 5 for 1 rule. The applicant has more than enough valid claims/patented claims to provide for enough mill site claims to cover their proposed activities. The Forest Service regulations 36 CFR 228.3 allows for mineral activities on or

off of mining claims. The patenting of a mining claim falls under the responsibility of the Bureau of Land Management and is not a requirement in obtaining approval to proceed with mineral exploration or development.

5. Much of the discussion in the SDEIS is based on the assumption that the Forest Service's authority to regulate, and even deny mining activities on public lands is limited by the applicant's "rights" under the 1872 Mining Law. This position is unsupported by the facts and the law. Based on information presented in the SDEIS, there is no substantial evidence that the lands encompassed by the claims slated for the tailings, water treatment, and other facilities contain a valuable mineral deposit (i.e., no substantial evidence that the claims are valid under the mining laws).

In this case, the Forest Service assumes that the Forest lands slated for most of the project facilities contain a valuable mineral deposit. Unfortunately, this assumption is incorrect on the facts and the law. While ASARCO owns the patented ore body, those lands are the only lands that can be credibly argued contain valuable minerals. The lands along the Rock Creek corridor and below clearly do not contain such deposits.

This is not a case where the issue of claim validity would be a needless exercise. For example, if the value of the mineral deposit on federal land far outweighed the costs to extract, market, process, transport, and meet environmental requirements (i.e., a valuable mineral deposit was discovered), then it might not make sense for the agency to go through the validity determination. However, in this case, the evidence is clear that the "valuable" portion of the local mineralization is on private, not federal, land (i.e., ASARCO's patented ore body).

There are essentially two types of mining claims at issue at this site. The first set of claims are those covering the actual ore body to be mined. In this case, those claims have been patented. The second, and often more numerous, set of claims are those that are proposed to be utilized for the millsite, tailings, treatment facility, pipeline corridor, and other non-extraction activities. The ones covering the ore body has been determined to contain valuable mineral deposits. There is nothing in the record to support an assumption that any other claims contain valuable mineral deposits.

As a practical matter, if the number of claims utilized for the mill, tailings, treatment, pipelines, etc., if all filed as millsite claims as they should be, exceed the number of mining claims covering the ore body, an applicant would have to revise its proposed Plan of Operations to "fit" its operations onto the millsite claims. Indeed, "the Bureau [BLM] should not approve plans of operations which rely on a greater number of millsites than the number of associated claims being developed unless the use of additional lands is obtained through other means." Leshy/Babbitt Millsite Memorandum (Nov. 1997) at p. 2. It should be noted that the Interior Department requirement regarding millsite claims is applicable to the Forest Service due to the Interior Department's authority over claim validity issues. See Clouser v. Espy. (S6318)

Response: The commentor's contention is based on the premise that since the Federal government has the authority to, at any time prior to patenting inquire into the validity of Sterling's mining claims, validity issues, should they exist, must be resolved prior to completion of the Forest Service's NEPA and approval processes. Forest Service regulations at 36 CFR 228, Subpart A, specifically allow for approval of mining related activities (prospecting, exploration, development, mining or processing of mineral resources and all uses reasonable incident thereto, including roads and other means of access) associated with a plan of operation whether said operations take place on or off mining claims. Sterling does not have enough mill sites to exceed the 5 for 1 rule. Therefore, the Department of the Interior policy on mill sites does not apply. Mill sites by definition need to be located on grounds which are not mineral in nature.

6. Forest Service regulations require that the Forest Service ensure that operations "shall be conducted so as to minimize adverse environmental impacts on National Forest surface resources"…we do not feel that the plan of operations under Alternative 5 meets the intended purpose of this regulation. (36 CFR 228A). (S6312)

Response: The quoted regulations do set a high standard for mitigation of potential impacts from mineral development activities on National Forest System lands. However, the regulation does not require that impacts be eliminated. It requires that they be minimized using reasonable means of mitigation.

GEO-104 Rock Characterization and Geochemistry

1. Have we even figured out the potential for acid rock drainage before the digging even begins? (S4016)

Require further testing for the potential of acid runoff before any permit is granted. (S177)(S805)(S4628)(S347) (S1905)(S4016)(S4347)(S4359)(S4363)(S4364)(S4393)(S4424)(S4427)(S4481)(S4633)(S4636)(S4651)(S4653) (S4655)(S4658-S4663)(S4710)(S4714)(S4716)(S4816)(S4830)(S4871)(S4878) (S4891)(S4912)(S5051)(S5088) (S5555)(S5763) (S5790)(S5857)(S6340)(S6523)(S6526)(S6312)(S6613)(S6672)(S6677)(S6679)(S6806)

Aside from these technical design issues, the SDEIS fails to present sufficient geochemical data on the ore tailings, and waste rock to make meaningful predictions on impacts mine discharges will have ground and surface water quality.

The SDEIS assumes these impacts will be negligible, and bases that assumption primarily on data collected from ASARCO's Troy mine. Using that assumption, the SDEIS concludes on p. S-17 that "under all action alternatives, only nitrates and dissolved manganese would exceed Montana standards within the mixing zone." However, the SDEIS fails to present statistically reliable data upon which to draw this conclusion.

We believe more definitive data on acid mine drainage and metals leaching potential needs to be presented in the EIS process. Even the best geochemists recognize there are considerable uncertainties in predicting acid mine drainage and metals leaching potential for ore bodies from which you have abundant, site-specific geochemical data. Relying almost solely on data from the Troy mine is scientifically indefensible, and the amount of site-specific data on the Rock Creek ore, tailings, and waste rock is insufficient to make accurate predictions.

We recommend the Agencies require ASARCO to collect more comprehensive geochemical data, and to present that data in the EIS process. As with all examples of insufficient data and/or analysis in the SDEIS, the public must be afforded a full opportunity to review and comment upon new information during the draft stage of the EIS process. (S6318)

Page 30, Kinetic testing on one ore sample does not indicate net acid generation or significant metal leaching..... No data or calculations were provided to show metal loading over time which may be relevant in the event of a pre-mature closure and residual stockpiles, or long-term underground water chemistry predictions.

Page 36, No kinetic testing has been reported for the Rock Creek or Spar Lake waste rock..... No specific data were discussed for drainage from the waste Rock at the Troy Mine..... Static tests cannot predict ARD potential and water quality with any certainty, as this is correctly stated in the DEIS (p.4-56).

Page 37, However, the data available for review would have to be considered insufficient to definitively demonstrate that there will be no ARD or metal leaching issues associated with Rock Creek waste rock. This discussion in it's entirety supports the conclusion that insufficient knowledge is available to determine whether there will be ARD from this facility or the tailings impoundment. (S614)

Page 3-8, Mineral zones. The deposition of waste rock from the galena-calcite zone and the pyrite-calcite zone needs to be monitored by the agencies. This waste rock must not be utilized anywhere in the construction of the millsite or tailings impoundment starter dams and must be returned underground immediately once sufficient storage space is available. A monitoring program designed to detect leachate from this rock must be instigated. It is probable that use of this type of material at Troy for construction of the millsite has led to some of the contamination seen in Stanley Creek. (S614)

Response: The Rock Creek deposit lies almost entirely within the Cabinet Mountains Wilderness, which was designated in 1964. Mining claim location and exploration were allowed until December 31, 1983. The applicant's claim location and drill exploration took place between these two dates.

Drill cores from exploratory drilling on this site are the only Rock Creek deposit rocks that have been used for geochemical analysis. The type of tests ran on these rocks to date, indicate that there is an undeterminable potential for acid rock drainage (ARD). However, the analysis also indicates (this includes information from other similar nearby deposits) that the project would not likely generate significant net acidic drainage and that any ARD that might develop could be mitigated chemically or physically.

Klohn-Krippen, a third-party consulting company for the agencies, found that the geochemical information obtained on this project was insufficient in amount as stand-alone determination of ARD potential for the project. However, they were clear that they believed the data available indicated that the Rock Creek deposit did not pose a significant ARD threat that could not be mitigated, and that adequate data could be acquired during the evaluation and construction portion of the project. ARD and metal leaching geochemical rock testing guidelines are described in Appendix K and summarized in Alternative V.

To supplement this testing data, a geologic and geochemical comparison of the Troy Mine rocks and ore with the Rock Creek ore and rocks was conducted by the Kootenai National Forest. The agencies too 48 additional samples and had multi-element and acid-base (static) testing performed by a third party, at the applicant's expense. Thirty-two of the samples were from Rock Creek Project drill core (22 from the ore body and 10 from adit-area waste rock), and 16 were taken from the Troy Mine. Additionally, the applicant (as ASARCO) conducted on kinetic test of Rock Creek ore. The comparison was needed to establish whether the Troy Mine site could be used as an analogue for the Rock Creek proposal in predicting acid rock drainage potential and water quality mine adit discharge. Analogues can be used and are recommended when static and kinetic testing is inconclusive. The comparison demonstrated that what has occurred at the Troy Mine site is what is expected to occur at the Rock Creek site in terms of potential for acid rock drainage and adit water discharge because the ore being mined is essentially the same from the standpoint of method of origin/mineralization, geochemical composition, and whole rock composition. The comparison of the ore matrix and its geochemical composition demonstrated that the likelihood of ARD is small. Based on additional sampling and analysis, the agencies have revised and expanded the Chapter 3 Geology section describing ore body and waste rock geochemistry.

Alternatives III, IV and V contain additional monitoring and mitigation measures that would further define and help reduce the potential for ARD and metals leaching from ore, waste rock, and tailings. This includes a geochemical program to begin during construction of the evaluation adit and to continue throughout mine operation. It is a possible but undesirable option of the FS to allow further, limited collection of additional data within the wilderness area from the surface. A data evaluation plan required under Alternative V is described in Appendix K that describes how the data collected during evaluation adit construction will be evaluated to ensure that impacts would not be greater than predicted in the final EIS, if they would be greater, the mine designs would be modified accordingly and additional MEPA/NEPA analysis and public review could be required. This data would have to be collected and evaluated by the agencies before mine construction could begin.

The public may comment on any new information at any time. The agencies agree that there is insufficient information to conclude that there is NO potential for net acid generation or metal leaching from the Rock Creek Project. What we have stated is that the ARD potential is uncertain but data to date indicates that if ARD were to occur, it is not expected to occur in significant or

unmitigable amounts. Monitoring would be used to validate these assumptions and, if necessary, to stop mining.

2. Require rock mechanics investigations and conclusions prior to permitting. (F1)(S161)(S177)(S805)(S1687)(S4364)(S4891)(S4912)(S5051)(S5088)(S5555)(S5763)(S6806)

Response: Alternatives III, IV and V in the final EIS include further rock mechanics testing. Chapter 2 Alternative III description includes the detailed description. Not enough rock mechanics can be derived from the core samples to develop a final mine design. The proposed evaluation adit would provide considerable site specific data needed for the final design. Please review response to comments under GEO101 for more information on rock mechanics and subsidence.

3. Additional information from the Failure Modes Effects Analysis conducted by Klohn Crippen Consultants should be included in the FEIS to present a more complete and balanced perspective regarding acid generation and metal leaching potential, and the need for further continuing geochemical assessment, testing and monitoring. (S146)

Response: This has been done. Please see Chapter 2, Alternative V description for an Acid Rock Drainage and Metals Leaching Plan and Chapter 4, Geology, Alternative V, and Appendix K of the final EIS. Please review response to comment #1 above.

4. The EPA, certain States, and at least one Federal land manager (Mr. Eugene Farmer of the USFS) have evaluated the very long term insidious character of oxidizing sulfidic mining wastes, and have come to the conclusion that most acidic heavy metal-bearing effluents from mining waste piles were not predicted using available test procedures that evaluate acid rock drainage. Acid rock drainage occurring over periods of years, sometimes decades, has not been reliably predicted by lab testing over periods of weeks. We think it will be very important for the proposed geochemical and water testing at Rock Creek to assess and monitor metal leaching of waste rock piles, paste tailings, etc., over the very long term (i.e., years). (S146)

Page 4-13, 4-14: It is stated in the 4th paragraph on page 4-14 that, "after 15 years at Troy all affected waters continue to be pH neutral and no other indicators of ARD have been found." This is inconsistent with the statement in the last complete paragraph on page 4-13 that there are, "elevated copper in water from the underground workings in the Troy Mine," and that this may be related to the oxidation of sulfide minerals in pH-neutral conditions.

Page 4-13 to 4-16 (Acid Rock Drainage): We believe the discussion of ARD should include additional information from the FMEA report to present a more complete and balanced perspective regarding acid generation and metal leaching potential. For example, we believe the discussion should include the following from Klohn-Crippen's assessment of ARD potential

While it is reasonable to assume that ARD would not be a major concern, geochemical testing and data available for review are insufficient to definitively demonstrate that there will be no ARD or metal leaching issues (pages, 22, 37 of FMEA report).

Metal leaching characteristics of waste rock strongly vary with the geologic formation from which the waste rock is derived, and the associated mineralization zone. Variability in sulfide and metal content (notably lead and zinc) is seen in the Revett Formation (page 38 of FMEA report).

Rock Creek ore is potentially acid generating, and has a generally higher sulfide content and acid generation potential than the Spar Lake (Troy Mine) ore. The static data indicate a potential for acid generation from the ore, and field monitoring and/or additional sampling and kinetic testing are required to determine if there would be ARD and metal leaching (page 26 of FMEA report).

In conjunction with the proposed static testing of additional Rock Creek tailings samples, an analysis should be carried out to assess potential release of metals as a result of potential oxidation of the sulfides in the tailings (page 29 of FMEA report).

Parameters that should be considered in water chemistry testing for Rock Creek include arsenic, antimony, barium, chromium, copper, lead, manganese, selenium, and zinc. There are metals, such as copper and to a lesser extent lead, which appear to be present in the dissolved form, and whose impact on sensitive receiving waters should be assessed (pages 19, 29 of FMEA Report).

It would be useful in the evaluation of overall acid generation potential from the waste rock to have information relating the ten waste rock samples to the characteristics of the overall waste rock production, i.e., the extent to which these samples are representative of the range of rock types, metal content, and sulfide and alkali content (pages 26, 27 of draft FMEA report).

It is difficult to extend the operational and post-closure mine water chemistry at the Troy mine to the prospective Rock Creek Mine since; detailed hydrogeologic information will not be available until the evaluation adit is developed; there is no direct comparison of the ground water regime of the mine workings for the two sites; and there is no direct comparison of the extent of mine workings in the different rock formations, and therefore, the predicted water chemistry (page 31 of FMEA report).

We remain concerned that oxidation of some of the waste rock bearing pyrite and zinc minerals, the resultant ARD/heavy metals mobility, and the subsequent ARD attack of pillars and mineralized waste rock that is placed underground could provide a major dissolved metals load in the underground mine reservoir, in mine seepage, and to the Rock Creek wastewater treatment plant.

The plan for ARD/metal leaching characterization of mined rock from exploration/pre-development/development/ mining, ongoing sampling, analysis and sample storage, throughout the mine life should be presented in the FEIS. The data must include waste rock from the "halo" pyrite and zinc-rich areas because this rock could be a large part of the abandoned mine back, walls and floor rock.

We also suggest that Klohn-Crippen's recommended ARD/metal leaching mitigation measures be summarized and included in the FEIS. These include: During operation drainage water would be collected for treatment as required; Covering tailings at closure; ABA testing during construction of the exploration adit; Develop criteria for "mineralized" waste rock, and dispose of "mineralized" waste rock underground; Contingency collection and treatment of runoff from areas where waste rock is used for construction (i.e., mill site, paste deposit toe buttresses); Monitoring of dissolved and total metal water chemistry from both Rock Creek and Troy mines during the operation of the Rock Creek mine; Maintain water treatment through operation and post-closure as long as necessary; and Quantify the comparisons between the two sites in terms of hydrogeology and exposure of mine workings. (S146)

Response: The agencies agree that predication of acid rock drainage needs both short-term testing (static and kinetic lab tests) and the evaluation of an analogue for long-term evaluation. The more identical the analogue, the better the predication can be made. A geologic and geochemical comparison of the Troy Mine ore with the Rock Creek ore was conducted. Please review response to comment #1 above. The Troy impoundment can be considered an *in-situ* kinetic test since 1981. The reader is referred to Table 4-12, particularly sulfate values. Acid rock drainage involves low pH water generated from the biochemical process of sulfide oxidation. However, copper salts and sulfates naturally form in these types of deposits from slow weathering of the copper sulfides and have the potential to dissolve and release copper in near neutral pH waters. Please see Appendix K in the final EIS for characterization, monitoring, and contingency plans.

The higher sulfide content in the Rock Creek ore is the result of a higher grade of the copper minerals that will be extracted in the milling process than what is at Troy. The geochemistry of the sulfide minerals that will be exposed during mining (ore) are not as prevalent to acid rock drainage. The halo zones will not be mined and only crossed through by the development adits. We refer you to the Geologic section of Chapter 3 for a more detailed description of the mineralogy and geochemistry of the halo zones and acid rock drainage.

The types of metals to be tested for in the water quality monitoring program can be found in Chapter 4 under Hydrology and in Appendix K.

5. Pages 2-49, 2-50 (Mitigations): Should the placement of "mineralized" waste rock (i.e., with metal leaching potential) underground be specified as an Alternative V acid rock drainage(ARD)/metal leaching mitigation measure, as suggested by Klohn-Crippen (page 37 of FMEA report)? As noted earlier, Klohn-Crippen recommended that there be a definition of "mineralized", and that kinetic testing provide the basis for the definition. (S146)

Response: The placement of waste rock should be listed as an Alternative V mitigation measure in the Acid Rock Drainage and Metals Leaching Plan in Appendix K. Geochemical testing including kinetic tests would be the basis for determining what rock would be considered "mineralized" and is described in the Acid Rock Drainage and Metals Leaching Plan in Appendix K.

6. Pages 2-50 (Mine Plan), 2-58 (3rd paragraph): The selection of waste rock to be used for construction of the mill site, paste facility buttress, and for crushed rock around the finger drains beneath the paste landfill should all be based on mineralogy and ABA and kinetic leaching tests. We suggest specifying that long term geochemical testing of waste rock be used to better ensure that only non-acid generating, non-metal leaching waste rock be used during construction of the mill site (page 2-50), toe buttresses for the paste tailings deposit, and crushed rock around the paste deposit underdrains (page 2-58).

Klohn-Crippen recommended that kinetic testing provide the basis for assessment of rock which should not be used for construction or fill (page 37 of FMEA report). Waste rock with metal leaching characteristics should be placed underground, or in areas where lined, leachate collection and treatment can be provided. (S146)

Response: Under Alternative V the agencies would require that waste rock used for construction of the mill site, paste facility buttress and around the finger drains beneath the paste landfill be thoroughly tested, including long term geochemical testing (kinetic tests) as waste rock is generated. Waste rock would be generated during adit excavations. Evaluation adit waste rock would be end dumped at the portal. Waste rock from the twin mine adits (access adits) would be used in the tailings retaining structures. Evaluation adit waste rock would be produced for at least one year before twin production adits (which provide construction rock) would begin. Once mining begins, waste rock that might be generated, say in ramps that are outside the ore body, would be placed underground in mined out areas as described in Chapter 2, Alternative II, Mine Plan. Mineralized waste rock would be placed underground or encapsulated to minimize the potential for acid rock drainage or metals leaching. Please see Appendix K (Acid Rock Drainage and Metals Leaching Plan) for further rock handling details.

7. Page 3-8: We believe the section on acid rock drainage should clearly state that acid generation in itself is not the key issue - rather drainage water chemistry is the issue. EPA has been concerned that ore, tailings, and waste rock drainage may contain elevated metal concentrations at relatively neutral pH levels and that this metal containing drainage may discharge to the environment. We note that the discussion in Chapter 4 (page 4-13) of the SDEIS acknowledges that drainage water chemistry is the key issue, but it would be helpful to also state this in the Chapter 3 discussion of ARD.

We also believe this section should indicate that assessment of Rock Creek ore, waste rock, and tailings is based on limited test data and comparisons with the Troy Mine, and that additional geochemical testing will be carried out during exploration and operation.

Also, since Timothy Hayes' (USGS) observations on similarities between the Rock Creek and Spar Lake (Troy) ore deposits are described in the Supplemental DEIS, we think the document should also note that similarity of the Rock Creek and Spar Lake (Troy Mine) ore deposits from a geologic perspective is not necessarily sufficient for environmental evaluation (page 17 of FMEA Report). For example, even though Mr. Haye's states that "all available information suggested that the geochemistry as defined by the mineral zonation of the two deposits (Spar Lake and Rock Creek) is essentially the same", Rock Creek ore samples generally had a higher sulfide content and acid generation potential than did Troy samples (page 26 of FMEA Report). The FMEA report (page 31) also states that it is difficult to extend the operational and post-closure mine water chemistry at the Troy mine to the prospective Rock Creek Mine. (S146)

Response: The following information has been added to Chapter 3, Geology, Geochemistry..

A third party consultant assessed the acid rock drainage (ARD) aspects of the Rock Creek Project mine development and performed a qualitative risk assessment based on their research (Failure Modes and Effects Analysis [FMEA] - Klohn-Crippen 1998). This analysis cautioned that the similarity of the Rock Creek and Spar Lake (Troy Mine) ore deposits is not necessarily sufficient for environmental evaluation, and that there were some notable differences between the two ores. In particular, the FMEA noted that Rock Creek ore samples generally had a higher sulfide content and acid generation potential than the Troy samples. Due to the location of the project, these uncertainties cannot be satisfied until further, presently unavailable, information can be collected during evaluation adit construction should a decision to permit the Rock Creek Mine be made.

8. The discussion of potential ARD in the Supplemental EIS (SEIS) fails to provide adequate information concerning what corrective procedures will be instituted should further geochemical testing indicate a need for mitigation measures. The following quoted section is from p. 4-19 of the SEIS.

"Additional monitoring and mitigation measures were recommended after the technical review and Failure Modes Effective Analysis (risk assessment) that was conducted on ARD and geochemistry data. Alternative V contains these additional monitoring and mitigation measures. This would include a geochemical testing program to begin during construction of the evaluation adit and to continue throughout mining operation."

However, the SEIS does not state what mitigation measures would be taken should the monitoring indicate a risk of ARD. That information should be available for public review in the EIS. Failure to provide this information for public review and comment is a serious omission. (S5130)

Response: The mitigation measures implemented for the control of acid rock drainage (ARD) will depend on the geochemical testing results. If certain rock tested has a low potential for ARD, measures as simple as encapsulation within less reactive rocks (with or without the addition of neutralization additives such as lime) have proved highly effective at Montana sites. Higher potential for ARD requires more complex methods of control, including modification of mine plan and/or avoid mining the deposit or portions of the deposit.

Data would be collected during construction of the evaluation adit. The conceptual plan is described in more detail in Appendix K and contains components of the Acid Rock Drainage and Metals Leaching Plan, the Rock-Mechanics Monitoring Plan and water resources monitoring. The evaluation adit data would be compared to the data used in analyses in the final EIS to confirm the analyses. The data would be used to fine tune and modify various plans and designs such as the

waste water treatment systems, water handling plans, waste rock handling, the tailings paste facility construction methods, and mine design and operation. Plans and designs would be modified if necessary through the permit revision process that includes some level of MEPA/NEPA analysis so that the environmental impacts would be no greater than disclosed in Chapter 4 of this EIS for Alternative V. If that could not be achieved, then the permit and the change in impacts would be subject to the appropriate level of MEPA/NEPA analysis and public comment and review. The construction of the mine and mill facilities could not begin until the agencies had reviewed the data and the modified plans and designs. The agencies would then have to determine that either no additional MEPA/NEPA analysis was needed or that additional MEPA/NEPA analysis was required and completed and agency decisions were made to approve the revisions to the permit, if appropriate, before mine construction and operations could begin.

9. The data on acid production/neutralization potential was not taken at the Rock Creek site. Instead, acid base accounting data from the Troy Mine, approximately 50 miles away is being applied to Rock Creek. Even given "similar mineralogy," applying data from a site this far removed from the actual mine is unprecedented. (S6328)

Response: This thought was communicated as part of the Klohn-Crippen analysis and has been included in the geochemical discussion in Chapters 3 and 4 within the final EIS. Please note that the Troy and Rock Creek ore deposits are only 12-14 miles apart, and that both are stratabound bornite/chalcocite deposits occurring within the same geologic unit (Lower Revette Quartzite). Geochemical data were collected from both sites and were evaluated for acid rock drainage potential in the Klohn-Crippen report (1998). Please see previous responses to questions in this section for further detail on this report.

10. If the evaluation adit is necessary to determine ore grade, which should be similar to Troy based on similarity or consistency of orebodies, then additional evaluation is equally necessary to determine geochemistry. According to the SDEIS the ore grade is not adequately certain to mine. Therefore, it is equally unlikely that geochemistry is adequately certain upon which to base the environmental assessment and resulting permit. For this reason alone a permit for the evaluation adit is the only reasonable and prudent action that can be undertaken by the agencies. This would provide an opportunity for evaluation and public participation based on obtained geochemical and other significant information, prior to any final decision. The ARD and metals leaching plan identified as a mitigation [SDEIS p. 2-77] would largely be after-the-fact, and would limit the effectiveness of any response plan for collection and treatment of contaminated water.

The conclusions in the SDEIS are largely based on a supposition of no significant ARD potential. However, this is unsupported by the inclusion of adequate site-specific data or other information in the SDEIS. For example, according to the SDEIS, geochemical testing performed to date on the Rock Creek deposit and the Troy Mine is insufficient to demonstrate that there is no potential for net acid generation or metal leaching [SDEIS p. 4-16]. (S188)

Response: Please see previous discussions in this section. Your concerns will be taken into account in this decision.

11. Page 3-8. Re: Acid Rock Drainage. Information in this section is based on a letter from Timothy Hayes, a U.S. Geological Survey research scientist to the DEQ. Is this appropriate? Has this letter been published? (S3462)

Response: The reference to Timothy Hayes' letter is preceded by an explanation that he was summarizing his graduate research for the U.S. Geological Survey on the geologic interpretation of the Troy mine area and drill investigations at the Rock Creek area. His letter is part of the public record.

12. Page 2-27 - ore processing concern: SDEIS fails to mention that 2 lbs of steel balls are used per ton of ore in the ball mines. (see Mine Site Visit, EPA, May 1992, p12). Addition of 20,000 lbs iron per day to tailings could contribute to acid mine reactions in tailings facility. (S5093)

Response: Elemental iron does not contribute to acid mine drainage by itself. It is a biochemical process involving the oxidation of sulfide minerals. The ore flotation process is designed to remove sulfide components from the tailings for further processing. Additionally, Alternative V would require that Sterling use a semi-autogeneous (SAG) mill in place of the two ball mills used in alternatives II, III, and IV. SAG mills use rock (ore) to further crush rock (ore), and so eliminate the use of steel balls.

13. These uncertainties regarding the proposed water treatment system are particularly troublesome considering the lack of detailed baseline information on the volume and chemical composition of the water the system will need to treat. The SDEIS analysis relies almost exclusively on comparisons between the ore bodies at Troy and Rock Creek presented in the "Geochemical Comparison of Two Very Similar Strata-bound Copper Sulfide Orebodies in Northwest Montana" (Miller 1996) to conclude the proposed treatment system will be able to effectively treat discharges from the mine.

The SDEIS understates the potential for acid mine drainage and metals leaching at the Rock Creek project, and may be underestimating the complexity of the treatment system needed to meet MPDES effluent limits. For instance, under the conceptual design, the proposed water treatment system will be designed to remove nitrates because it is assumed metals associated will be removed during filtration.

In addition to these shortcomings, the SDEIS analysis lacks sufficient information on the volume of water requiring treatment, making it difficult, if not impossible to properly size the treatment system. Page 55 of the Klohn Crippen report recognizes this point, stating that "the hydrogeology in the mine area does not appear to be well understood. Preliminary ground water modeling should be carried out to assess changes during operations and closure." These hydrogeologic uncertainties must be addressed during the EIS process. If you don't know how much water you need to treat, it's tough to design a system.

To address these concerns, the agencies should require ASARCO to conduct more extensive geochemical and hydrogeological testing of the Rock Creek deposit, including extensive kinetic testing of ore and waste rock samples. Once those samples are collected and analyzed, they should be presented as part of the NEPA process so the public and decision-makers can consider them. (S6318)

Response: As the supplemental draft EIS was being developed, the Klohn-Crippen report was not yet completed. The agencies incorporated the recommendations of the Klohn-Crippen analysis regarding geochemical evaluation of the Rock Creek Project into the final EIS. Additional hydrogeologic data would also be collected during evaluation adit construction. Please see previous responses in this section. The public will be presented any additional data gained during the NEPA process. All data that would be acquired after the NEPA process is completed would also be available to anyone interested in it.

14. Page 4-41 Waste rock from the mineralized zone would be stored in underground workings." It is assumed that this is waste rock containing high amounts of unwanted mineralization, i.e. leach. This zone of rock will be driven through before there is sufficient storage area in the underground works. Where will it be stored in the meantime, the surface? What efforts will be made to segregate it from the effects of the elements (rain, snow)? (S614)

Response: The waste rock from the evaluation adit would be geochemically tested according to the guidelines described in Appendix K. The waste rock would be stored in a dump outside of the portal, until it can be segregated geochemically. The initial rock encountered would not be heavily mineralized due to distance from ore area. There would be stormwater runoff practices to manage rain and snow effects. The rock encountered during the construction of the evaluation adit and the

development adits outside the ore zone and halo areas is barren rock with respect to containing sulfides in the quantity and type that would have the potential to generate acid rock drainage but the rock will still be tested and characterized to confirm that data. If and when the halo zones are crossed, that rock will also be tested and characterized. Please see details in the Geologic section in Chapter 3 and Appendix K for additional information.

15. Page 4-42 paragraph 1: Waste rock potentially containing residual nitrogen compounds." This sentence is the rational for maintaining Rock Creek on the TMDL list as threatened. The sentence, "resultant water quality impacts on Rock Creek cannot be estimated with certainty" is a crock. The agencies have just to look at Stanley Creek where the original model mine" is located and have an answer. It is interesting to note that where adverse impacts from Asarco operations have occurred the agencies can record such an ambiguous statement. (S614)

Response: A stream can no longer be listed for Total Maximum Daily Load (TMDL) because of an impending mine. There must be actual impairment. Rock Creek will likely remain on the list due to sedimentation impairment. The agencies do not understand reference to Stanley Creek for this argument. As of April 1988, nitrate was 0.14 ppm on middle Stanley Creek. Also, unlike at Troy, the waste rock terrace on which the Rock Creek mill site would be built would not be allowed to remain unreclaimed until mine closure and possibly contribute to nitrate migration. Most nitrate migration would occur within 1 month to 1 year with the balance leached out within 5 years. However, the face of the mill pad and all surface portions not used for traffic, buildings, and other mill facilities would be reclaimed as soon after construction as possible. Also the foundation geology beneath the two mill sites is quite different.

16. Page 2-20 (Evaluation Adit): An amount of 59,000 tons of waste rock and 119,000 tons of ore would be excavated from the evaluation adit, with the waste rock being end dumped near the portal and ore stockpiled for later processing. The Failure Modes Effects Analysis (FMEA) conducted by Klohn-Crippen (ASARCO Rock Creek Project, Review of Tailings and Acid Rock Drainage, February 1998) recommends that kinetic testing be used to provide the basis for identifying "mineralized" waste rock and ore, and that such "mineralized" waste rock and ore be handled to avoid problems with metal leaching from "mineralized" waste rock or ore stockpiles (page 37 of FMEA report). (S146)

Response: Alternative V provides for an acid rock drainage and metals leaching plan to address this concern. Text referring the reader to Appendix K has been added to Chapter 4 and the plan has been expanded in Appendix K.

17. The FMEA report (page 36) suggests a good contingency for handling "mineralized" rock and ore with metal leaching characteristics would be to place the "mineralized" rock underground in the flooded mine. Another contingency would be to provide for collection and treatment of waste rock leachate & runoff where "mineralized" waste rock would be used for construction. The FEIS should clearly describe the proposed contingency in the alternatives for handling "mineralized" waste rock and ore stockpiles in the event of a premature or temporary shutdown, and for collection and treatment of waste rock leachate/runoff. (S146)

Response: Contingency measures are recommended have been incorporated into the Acid Rock Drainage and Metals Leaching Plan in Appendix K.

18. Sulfur oxidation is a major concern, since it will release a variety of contaminants into a receiving water when reduced sulfur species (i.e. pyrite) are oxidized and released. The original DEIS has only a very brief discussion on acid mine drainage potential and an inadequate table on acid-base accounting (Table 4-14). This indicates effectively no acid generation potential, yet other sections of the DEIS indicate that pyrite and chalcopyrite are present in the rock surrounding the ore. Thus, oxidation of the rock is likely, with production of a variety of released contaminants. No data were presented on kinetic tests of the ore or waste rock and the implication is that the Troy mine is identical to the Rock Creek Mine. Every mine is different, and the lack of a rigorous analysis of the

rock at the Rock Creek Mine is a substantial problem. This type of analysis would not be accepted in many other western states, and, in particular, would not be acceptable in Nevada, which is considered a state friendly to mining. It is indeed surprising that the Montana regulators would accept such a superficial treatment of the single most important factor affecting the degree of contamination from a mine. (S6301)

Response: A detailed discussion of the potential for acid rock drainage is presented in Chapter 4-Geology of the EIS. Additional geochemical data was collected for this discussion. Please see previous responses to comments in this section regarding alteration halos around the ore body and data sufficiency conclusions by independent reviewer Klohn-Crippen (1998).

19. Page 2-24 - mine plan: transporting blasted or crushed or ground ore rock between any of 7 major steps of mining including: blasting, 1st crush, 2nd crush, grinding, flotation, concentrate dewatering, tailings storage. concern: spillage of rock particles or rock powder with exposure to weather and infiltration into the ground causing release of nitrates and metals into waters of U.S. Alt V (p 2-52) has some improvements on this process with secondary crushing being changed to a wet process, but the other processes remain and the concern still exists. (S5093)

Response: Please see Appendix K for the Acid Rock Drainage and Metals Leaching Plan for rock characterization. Ore processing is a contained procedure with contingency in place for any spills.

20. Page S-23 6th paragraph No waste rock dump for Alt V - need waste rock soils composition analysis to be used for mill pad and impoundment starter dams. Any potential for leaching? (S4832)(S4833)

Response: All waste rock geochemical assessment is described in Appendix K, Acid Rock Drainage and Metals Leaching Plan. Alternative V does not require impoundment starter dams due to the paste tailings technology.

21. Page 4-53 - surface water quality impacts - waste rock: Table 4-17 from DEIS omitted here. concern: The Table does not indicate where the three samples were taken. It is known that the ore body is enclosed in surrounding zones of mineralized rock (p 3-11); the first zone is mostly copper, then lead, then iron. These are not considered part of the ore body. Therefore, they would be considered waste rock. These are likely the source of some of the problems at the Troy mill site, although additional metals were contributed to Upper Stanley Ck from blowing, spillage or rinsing of crushed and ground rock from the numerous rock transport systems in use and the rock particles were then washed into or around the patio and eventually arrived in the stream. This is expected to occur at Rock Ck. Also, for table 4-17 it is a simple matter to convert a percent value to ppm. All values should be in ppm. (S5093)

Response: Table 4-17 is included as Table 4-23 in the final EIS. Best Management Practices with respect to controlling storm water run-off would be required at the mine site. This would include silt fencing, collection system and retention ponds. The mill site at Rock Creek would be reclaimed in progress. More intensive storm water controls would be required for all mine site area.

The halo zones outside the ore zone will not be mined. The outer halos will be crossed through only at the point of the evaluation and development adits. The rock produced at these point will be "waste rock." This volume of rock is expected to be very small. The halo zones at the Troy Mine are not the source of elevated copper levels in the neutral pH mine waters.