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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
1595 WYNKOOP STREET
DENVER, COLORADO 80202
http://www.epa.gov/region8

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April 4, 2007

CERTIFIED MAIL:
RETURN RECEIPT REQUESTED

Mr. Jon Nickel
ASARCO East Helena Plant
100 Smelter Road
P.O. Box 1230
East Helena, MT 59635

RE: Design Analysis Report, ASARCO East Helena Smelter Corrective Action Management Unit (CAMU) Phase 2 Cell, January 2007, and Supplemental Information Submitted in February and March 2007

Dear Mr. Nickel:

EPA Region 8 and the Montana Department of Environmental Quality (MDEQ) have reviewed the above referenced document. Following submittal of this document, ASARCO supplemented the CAMU Phase 2 Cell design with Appendix D, the Sampling and Monitoring Plan, Appendix E, the Operation and Maintenance Plan, Appendix G, the Construction Quality Assurance Plan, and additional information in an email response.

EPA must evaluate the design and ensure the CAMU meets standards pursuant to relevant regulations and guidance including, but not limited to, 40 CFR 264.551, 40 CFR 264.552, 40 CFR 264 Subparts F, G, and N, and 40 CFR 258. Based upon our review and the discussions held in a meeting on March 6, 2007, we have the enclosed comments which ASARCO must address in a revised document.

To maximize work during Montana's construction season and accommodate ASARCO's projected demolition work in 2007, we request that you first revise and resubmit the design, construction and construction quality assurance portions of the CAMU cell, which would be responding to Items I and II in the attached comment package. Upon approval, each revised component of the plan and its associated requirements and specifications will become an enforceable component of the federal Consent Decree, CV 98-3-H-CCL.

Additionally, all notification and sampling requirements of the federal Consent Decree are applicable to the CAMU Phase II Cell design, construction, operation, maintenance, closure, and monitoring. The requirements for operation of the cell, maintenance of the temporary cap, construction and maintenance of the permanent cap, verification monitoring, and long-term

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operations and maintenance procedures may be submitted and approved in a later phase, pursuant to a proposed schedule submitted with the revised design and construction plan.

We wish to emphasize that approval of the construction and design phase of the CAMU will be conditioned on the following:

1. ASARCO must establish adequate financial assurance via an EPA-approved mechanism prior to commencement of construction of the cell. A detailed cost estimate supporting the proposed financial assurance amount must be submitted with the revision of the proposed design and construction procedures and construction quality assurance plan.

2. ASARCO is prohibited from placing bulk or non-containerized liquid hazardous waste or free liquids contained in hazardous waste in the CAMU. ASARCO is also prohibited from placing any liquid which is not a hazardous waste in the CAMU, exclusive of liquid used for dust control measures under an approved EPA plan.

3. The 2007 demolition work should facilitate installation of the Dross/Speiss Area slurry wall.

4. ASARCO is responsible for ensuring the selected construction personnel are familiar with and adhere to the EPA-approved design, which may differ from the bid documents.

5. ASARCO must submit a final construction report for the CAMU Phase II Cell within sixty (60) days of construction completion.

6. ASARCO must specify the post-closure care period for the CAMU is 30 years to be extended indefinitely based on the integrity of the CAMU cell components, as verified by long-term monitoring, inspection, and maintenance. ASARCO is required to follow the requirements of 40 CFR Subpart G.

7. A condition of approval is that all QA/QC must be overseen by an independent third party geotechnical engineering firm, including construction of the final cap. ASARCO must submit a statement of training and qualifications of individuals designated by the selected firm to provide such oversight of installation of liners, geonet, geotextiles, construction of the leachate collection and leak detection systems and permanent cap, for EPA review and approval. The field QA/QC oversight personnel shall have the authority to require field testing at locations of their choice. They shall also have the authority to require re-work or removal and replacement for areas that do not meet the QA/QC specifications. If 10% or more of the field QA/QC test fail, EPA shall be notified immediately. The Construction Quality Assurance Plan (CQAP) shall be revised to reflect this requirement.

8. Future evaluations of groundwater flow direction (potentiometric maps) would benefit from an additional well or piezometer installed in the area to the southwest of what is referred to as "the subsequent cell" located southwest of the current Phase I Cell and northwest of the proposed Phase II Cell. Since there is currently no well or piezometer

located in that area, installing one would aid in defining groundwater flow direction in the CAMU area for both the Phase I and Phase II Cells. This is a requirement for the groundwater monitoring system for design for the Phase II Cell.

9. ASARCO must place restrictions on the deeds for both CAMU cells by October 1, 2007.

If you should have questions on this or any related matter, please contact me at (303) 312-6503.

Sincerely,

Linda Jacobson

Linda Jacobson
EPA Project Manager

Enclosure

cc: Denise Kirkpatrick, MDEQ
Robert Miller, ASARCO
Charles Figur, EPA-L
Randall Breeden, EPA-HP

COMMENTS
on the
ASARCO East Helena Smelter
Corrective Action Management Unit (CAMU)
Phase 2 Cell Design Analysis Report and Supplemental Submittals

I. Landfill Components

A. General Conditions

1. As reflected in EPA's conditional approval letter for construction of the CAMU Phase II cell, ASARCO must establish acceptable financial assurance prior to commencement of construction of the CAMU cell. This financial assurance shall include adequate funds for construction, capping, and operation and monitoring of the CAMU cells into perpetuity.

2. Since the CAMU will be the final storage and disposal location for hazardous waste, ASARCO must consider 40 CFR 264.18 Location standards. 40 CFR 264.18 specifies seismic considerations that require compliance demonstration pursuant to 40 CFR 270.14(b)(11). ASARCO must provide additional information to demonstrate compliance with this standard.

In addition, ASARCO is required under 40 CFR 264.301(c)(1)(ii) that the liner be constructed of material that has sufficient strength and thickness to prevent failure due to pressure gradients. Language in the solid waste regulations more clearly explains seismic requirements. 40 CFR 258.14(a) requires all containment structures, including liners, leachate collection systems, and surface water control systems, be designed to resist the maximum horizontal acceleration in lithified earth material for the site.

ASARCO must demonstrate to EPA that engineering measures have been incorporated into the cell's design to ensure that the integrity of the structural components of the landfill unit will not be disrupted. The design should include seismic stability studies for designing the failure along the critical liner interface and for the cap cover stability over the geomembrane.

ASARCO has not provided slope stability analyses under static and dynamic (seismic) conditions in the design report. The analyses should include the worst case conditions.

3. 3.1, Site Selection cites "Montana DEQ siting guidance." ASARCO must include in the report the specific name of this guidance.

B. Leachate Collection and Leak Detection System

1. 2.3, Leachate Collection and Removal System cites 40 CFR 265.301(c)(2) and (c)(3) as design performance standards. This citation is incorrect and should be 40 CFR 264.301(c)(2) and (c)(3).

2. 2.3, Leachate Collection and Removal System: ASARCO states that the leachate collection and removal system shall be constructed with a bottom slope of one percent or more.

ASARCO also states that the CAMU Phase 2 Cell is designed to comply with the Administrative Rules of Montana (ARM) 17.50.506. ARM 17.50.506(6)(b) states that a leachate collection and removal system must be designed and constructed to ensure that the minimum slope at the base of the overlying leachate collection layer is at least 2% and side slopes do not exceed 33% when a compacted soil liner or recompacted natural lithology is used as the barrier layer. ASARCO must clarify whether the design will comply with ARM 17.50.506(6)(b).

3. 3.5.2, Leachate Systems: ASARCO states that the HELP 3 model indicated the designed leachate collection system capacity will be exceeded during a 25-year, 24-hour storm when the fill in the cell is less than 60 inches. The design work plan stated that during construction, the construction contractor will be required to have pumps ready in case of a significant rainfall event. The MDEQ received through their attorney an electronic copy of the Bid Solicitation and Construction Documents, 2007 Cleaning & Demolition Project and CAMU, Phase 2 Cell Project. This document was not submitted to the MDEQ by ASARCO for review and comment. The bid document does not include the requirement that the contractor have on-site pumps to manage water in the event of a storm. ASARCO must clarify how water from a storm event prior to final closure of the CAMU will be managed.

4. Page 3-23, storm water management for precipitation events: the text should be expanded to further discuss management of water pumped from the cell during construction and waste placement, providing specifics on the construction of a temporary structure for precipitation management, storage, and transport to the HDS system or offsite TSDF.

5. 3.5.2.1, Primary Leachate Collection and Removal (PLCR) System and 3.5.2.2 Leak Detection, Collection, and Removal (LDCR) System: ASARCO's PLCR and LDCR design includes a geonet layer. For better leachate collection and drainage, additional liner protection, and seismic stability, we strongly encourage ASARCO to use a geo-composite drainage laminate. The geo-composite drainage laminate must be comprised of an 8 oz. non-woven geotextile below and above a geonet.

6. Page 3-22, Section 3.5.2.1, please provide the construction specifications for the leachate system and leak detection system, including the materials of construction for the pumps, sumps, geonet, riser pipers, methods to join and connect these materials.

7. Pages 3-25 and 3-26, for the PLCR and the LDCR, please provide the capacity calculations and design size.

C. Compacted Clay Liner

1. Page 3-4, Section 3.2.1, EPA disagrees with ASARCO's statement that the effective permeability of $1*10^{-7}$ can be achieved using site borrow soils. Our evaluation of the geotechnical engineering characteristics of the soils indicates that they do not have the properties necessary to consistently meet the performance standard for the hydraulic conductivity. Asarco must revise the text. If a GCL is used in combination with 3 feet of clay liner, EPA will require that all borrow soils used for the clay liner meet a minimum hydraulic conductivity of $1.0 * 10^{-6}$.

2. If a GCL is used with the clay liner, the design report must be updated to include additional information on the GCL design specifications. EPA will require that the geosynthetic clay liner be needle punch reinforced GCL comprised of a uniform layer of granular sodium bentonite encapsulated between a scrim reinforced non-woven and a virgin staple fiber non-woven geotextile. The needle punched fibers should be thermally fused to the scrim reinforced non-woven geotextile to enhance the reinforcing bond. All seams must be overlapped a minimum of 12 inches and sealed with powdered bentonite sealing compound. Seams must be oriented parallel to the line of maximum slope.

Appendix G should be modified to include the specification requirements for the GCL and conformance testing. If a test result is in non-conformance, all material from the lot represented by the failing test should be considered out of specification and rejected.

3. Page 3-8, Table 3-1, Geotechnical Test Pit Sample Summary, Hydraulic Conductivity, please amend the text to indicate that the required hydraulic conductivity was not achieved even after an increase of effective stress to 22 psi and resulting consolidation.

4. Page 3-12, second paragraph. EPA disagrees with ASARCO's assessment that the site soil is suitable for use in construction of the compacted clay liner. A major concern for the proposed CAMU Phase II Cell is related to the on-site soils that are to be separated out and used for the compacted clay liner. Evaluation of the geotechnical engineering characteristics of the soils indicates that they do not have the properties necessary to consistently meet the performance standard for the hydraulic conductivity. Soils data contained in the Geotechnical Investigation Report (Hydrometrics, Inc., October 2006) indicate that the soils are borderline with regard to attaining the performance standard. Table 2 of that report indicates that none of the soil samples from the Phase II Cell area submitted for hydraulic conductivity testing attained the performance standard after standard compaction. None of those soils had been tested at an effective stress of 22 psi, which will simulate consolidation and can lower the conductivity. However, for comparative purposes, Table 2 also contains the results for nine soils that were tested at the effective stress of 22 psi, for the Phase I Cell, five out of nine (56%) of those soils failed to attain the performance standard. Therefore, from a comparative standpoint, similar results would be expected from the soils proposed for use at the Phase II Cell. This is especially poignant given that they exhibit higher pre-stress conductivities than the Phase I Cell soils. Consequently, there is a high probability that most of the on-site soils will not attain the performance standard. This is a serious problem that must be adequately addressed.

There are four ways to address this issue. The first is to amend the soils with bentonite. This will require adding powdered bentonite to the soil and mixing in a pug mill at the optimum moisture for mixing, prior to placement and compaction. The second is to import clay liner material that will meet the performance standard from an off-site location. The third is to visually separate the on-site soils as proposed; however, QA/QC samples from the separated soils must be collected on a much more frequent basis than that proposed in Table 3-1 of the CQAP. Each stockpiled batch must be proven to meet the hydraulic conductivity performance standard. This will require each batch to be stockpiled separately until the results are obtained for that batch; batches that fail are to be discarded or amended. The fourth alternative is to install a geosynthetic clay liner on top of the compacted liner.

If the choice is to use the separated soils without amendment with bentonite, then the CQAP must be revised to reflect a significant increase in the frequency of QA/QC samples needed to ensure the performance standard is met. QA/QC batch size will be small (hundreds), *not thousand of cubic yards. Each batch must have a hydraulic conductivity test performed on it,* which must meet or exceed the performance standard prior to placement.

The CQAP should be revised to reflect which alternative will be employed at the site. It should also be revised to reflect the necessary changes in QA/QC to ensure the performance standards are met. In addition, it should include a discussion of contingencies to be undertaken in the event that the performance standards are not met.

5. Page 3-10, Section 3.4, Soil Materials: The initial clay liner of the CAMU Phase 1 cell was rejected because ASARCO was not able to meet the compact clay liner specifications requiring no cobbles and rock fragments having a maximum dimension of more than 2-inches. A screening plant was required to sort and screen the native material to achieve this standard. The Phase 2 Design Analysis Report does not discuss a screening plant for construction of the CAMU Phase 2 cell. ASARCO must explain how it intends to meet the Phase 2 specifications for the compact clay liner without screening.

6. Pages 3-10 and 3-12, 3.4 Soil Materials, please expand the document to include the construction specification performance standards for all materials, including local and project site sources for the random fill, engineering fill, and drainage gravel and cover soil.

7. Page 3-12, last paragraph, no soil particles greater than 1 inch will be allowed to be used to construct the liner. Amend the text to reflect this.

8. Page 3-22, 3.5.1.2 Secondary Composite Liner, last paragraph, as stated in our comments above, EPA disagrees that ASARCO's geotechnical work has shown that the compaction of native soils will consistently achieve a compacted clay liner with the desired permeability. Asarco must revise the report's text.

D. Flexible Membranes

1. 3.5 Component Design: Section 5.0 of the CAMU Phase I design report specified a two feet protective layer adjacent to the bottom and sides of the cell. ASARCO must include a two feet protective layer over the primary liner in the CAMU Phase 2 design. The two feet protective layer must include 12 inches of ¼ to ½ inch size material on the bottom. This two feet protective layer may include 12 inches or more of ¼ to ½ inch size gravel layer used for leachate management. If soil is used as part of the protective layer, the soil may not impede the movement of leachate. The two feet protective layer must be free of oversized material and sharp objects.

2. 3.5 Component Design: Frost protection of the liners is very important. Therefore, in the event that ASARCO is not able to load the cell to grade as planned by the end of the 2007

construction season, ASARCO must maintain a 2 feet layer of gravel or other approved material over the bottom and side walls of the cell.

3. 3.5.1.1 Primary Flexible Membrane Liner (FML) and 3.5.1.2 Secondary Composite Liner: To ensure a stable interface with the clay and geonet, ASARCO must use a 60 mil double-sided textured HDPE. In addition, the HDPE must have no factory seams.

4. Page 3-13, second paragraph, the text indicates that waste materials at the East Helena Plant could subject the cell liners to an extreme pH. Per 264.301(c)(2)(iii), the liner must be constructed of materials that are chemically resistant to the waste managed in the landfill and the leachate expected to be generated. Please provide the testing which ASARCO has performed, per SW-846 Method 9090 to demonstrate this chemical resistance for the spectrum of wastes to be placed in the landfill or likely to be generated as leachate.

5. Page 3-21, paragraphs one and two, please provide the testing conducted to ensure compatibility of the liner materials with all known and potential waste constituents.

6. Page 3-17 through 3-22, please amend the text and associated figures to address the above comments and requested to changes to the liner selection and construction.

7. Appendix C, Design Analysis Calculations, amends and resubmit the calculations to reflect the revisions in material type and quantities used for construction.

E. Cushion Layer for Bottom Liner

1. Page 4-1, Section 4.0, Placement of Waste Soils, Sediments, and Demolition Debris in Cell: The CAMU design must include protection of the liner system. The geotextile and geonet may not be sufficient to protect the liners given the nature of the waste to be placed in the cell.

Asarco's design proposes use of 12 inches of crushed concrete or brick as a cushion layer to protect the liner systems against puncture. EPA will require that a minimum of two feet of material be used as a protective layer. This section indicates that concrete and brick will be crushed on-site to 3/8 inch minus. EPA would prefer the crushing of on-site slag or the use of clean gravel, rather than potentially contaminated or hazardous brick and concrete be used for a cushion layer.

Treatment of hazardous waste in this manner triggers the applicability of additional requirements which are not identified in the report. Large quantity generators may treat hazardous waste on site without a permit provided they are in compliance with the applicable provisions in 40 CFR 262.34 and provided that the treatment is not thermal treatment. We assume ASARCO intends to have equipment onsite that can size the concrete and brick. This activity would likely involve a crusher, conveyors, and staging piles of the waste. A crusher and other mixing and handling equipment would not likely be considered a tank or container because they are not designed to contain an accumulation of hazardous waste. EPA guidance states that if a unit would contain any waste, including a free-flowing liquid, it is a tank (Faxback 12899).

Therefore, this operation would not qualify under the exclusion of 40 CFR 264.34 or be "permitted" as a temporary unit pursuant to 40 CFR 264.553.

Since EPA considers the concrete and brick remediation waste, 40 CFR 264.554 staging piles may be applicable. 40 CFR 264.554 states that storage includes mixing, sizing, blending or other similar physical operations to prepare waste for subsequent management or treatment. 67 FR 2997 specifies that more significant treatment operation involving something other than physical treatment—that is, where the chemical character of the waste is changed through chemical or biological treatment do not fall into the staging pile regulations. Based on our assumptions on how the concrete and brick would be sized, the staging pile regulations would likely apply. If the staging pile regulations are not applicable, it is possible that the activity would need to comply with 40 CFR Subpart X Miscellaneous Units.

The concrete and brick (remediation waste) might also be managed under the CAMU regulations; however, the proposed activity would not be the same activity and design previously approved. The currently approved CAMUs are land disposal units not treatment units. Therefore, the unit would be subject to 40 CFR 264.552 and would likely require an opportunity for the public to review and comment on the plan. Managing this issue under 40 CFR 264.552 would require further evaluation to determine if the treated waste would be subject to treatment standards prior to disposal in the grandfathered CAMU.

EPA can administratively manage a staging pile, Subpart X unit, or new CAMU under the existing federal Consent Decree. The current CAMU was managed as an interim measure. Since a staging pile or Subpart X unit was not included in the Phase I CAMU, we would be obligated to seek public comment if they are used. ASARCO will have to submit additional information to ensure compliance with the applicable standards and to allow EPA to set conditions.

ASARCO must include in the CAMU Phase 2 design report additional information on concrete and brick sizing. If ASARCO intends to have equipment on-site that can produce material to this specification, a description of the type of crushing equipment to be used and the location where the equipment will operate must be specified. If ASARCO is going to treat concrete and brick that may be a hazardous waste, ASARCO must provide additional information regarding the process.

If the facility wishes to contend any treated waste is non-hazardous, a sampling plan to characterize the waste must be submitted. In addition, the implication of sizing any ACM containing material must be addressed by ASARCO.

F. Construction Quality Assurance/Quality Control Plan

1. Pages 1-1 and 1-2, "Although QC elements are included in this CQAP, this plan does not fully describe the QC requirements for Phase 2 cell construction. The project specifications describe the majority of QC measures and when taken together with this plan, form a complete set of Construction Quality Control (CQC) requirements. Please amend and resubmit this plan,

including the plans project specifications, which will make this a complete document describing all of the inspection and quality assurance and control requirements.

2. Table 2-1, Quality Assurance Roles by Functional Position, the table indicates that EPA will conduct the progress meetings; however, in Section 2.4.3, the text indicates that the Owner and regulatory agency "may also choose to attend." Please rectify this discrepancy. To clarify our position, EPA would like to be notified of progress meetings, provided an agenda and handouts, participate via phone or in person.

3. Table 4-1, please see Comment 1, for soil content, liquid and plastic limits, and grain size distribution, please provide the specification or specified limit. For soil content and scarification depth, please provide the specification which serves as the rejection criteria. For number of passes, equipment type and weight, please specify the number of passes, the equipment type and weight.

4. To address EPA's concerns regarding the inability of the soils to consistently meet the hydraulic conductivity performance standard, if ASARCO chooses to separate the soils without amendment with bentonite, then the CQAP must be revised to reflect a significant increase in the frequency of QA/QC samples needed to ensure the performance standard is met. QA/QC batch size will be small (hundreds), not thousand of cubic yards. Each batch must have a hydraulic conductivity test performed on it, which must meet or exceed the performance standard prior to placement. The CQAP should be revised to reflect which alternative will be employed at the site. It should also be revised to reflect the necessary changes in QA/QC to ensure the performance standards are met. In addition, it should include a discussion of contingencies to be undertaken in the event that the performance standards are not met.

5. If ASARCO decides to install a geosynthetic clay liner on top of the compacted liner, QA/QC criteria for the GCL and reject criteria must be submitted. We refer you to pages 184 through 189 of Quality Assurance and Quality Control for Waste Containment Facilities, EPA/600/R-93/182, September 1993, for establishment of acceptance and conformance testing, placement, joining, repairs, backfilling and covering.

6. As stated in the cover letter, a condition of approval is that all QA/QC must be overseen by an independent third party geotechnical engineering firm, including construction of the final cap. ASARCO must submit a statement of training and qualifications of individuals designated by the selected firm to provide such oversight of installation of liners, geonet, geotextiles, construction of the leachate collection and leak detection systems and permanent cap, for EPA review and approval. The field QA/QC oversight personnel shall have the authority to require field testing at locations of their choice. They shall also have the authority to require re-work or removal and replacement for areas that do not meet the QA/QC specifications. If 10% or more of the field QA/QC test fail, EPA shall be notified immediately. The CQAP shall be revised to reflect this requirement.

7. Where native soils are used, all material greater than 1 inch must be removed prior to placement. This will require a vibrating screen on-site. The CQAP should be revised to reflect his requirement.

8. No lifts shall be greater than six inches. Lifts smaller than six inches may be necessary to achieve the performance standards for density. The CQAP should be revised to reflect this requirement.

9. The CQAP does not contain any post-construction samples of the liner for conformational hydraulic testing. The CQAP must include post-construction conformational testing for final hydraulic conductivity performance. The CQAP should be revised to include this requirement.

10. The CQAP must be expanded to discuss repair of holes from sampling and testing. A number of tests will require that a penetration be made into a lift of compacted soil. All penetrations must be repaired. Backfill may consist of the soil liner material itself, granular or palletized bentonite, or a mixture of bentonite and soil liner material. Please specify the material and procedure to be used to fill test holes. Hole repair is critical. Approximately 20% of all the repairs should be inspected by a different person than the one who did the repair and written records of the backfill procedures be documented.

11. The submitted CQAP must be amended to identify the field seaming to be used, including the material, methods, preheat, seaming rate, use of tents or enclosures and other details of the procedure. The type, nature, number, condition, and details of trial seams, as well as the results of such tests, should be detailed. The type, nature, number and details of destructive samples and disposition of sections of the sample should be described. Any unusual condition with respect to personnel, equipment, sampling and/or testing should be described, documented, reported to EPA verbally within twenty-four hours, and followed within three-days by a written notification to EPA.

12. Page 5-1, first paragraph, please discuss what measures will be taken should the Contractor and Engineering Inspector discover, ridges, ruts, and other non-uniformities in the surface, beyond spray painting and rejecting the area.

13. The recommended maximum percentage of failing compaction tests for the following parameters is:

Parameter	Maximum Allowable Percentage of Outliers
Water Content	3% and Outliers Not Concentrated in One Lift or One Area, And No Water Content Less than 2% or More than 3% of the Allowable Value
Dry Density	3% and Outliers Not Concentrated in One Lift or One Area, and No Dry Density Less than 0.8 kN/cubic meters below the Required Value
Number of Passes	5% and Outliers Not Concentrated in One Lift or One Area

Please amend the text to reflect these requirements

14. Table 4-1, Testing of Clay Liner after compaction, please amend the table to indicate that the test rejection criteria for the in-situ water content, in-situ density, and water content will have no more than 3% outliers and the outliers may not be concentrated in one area or lift. For the in-situ water content, use the ASTM 3017 method and allow no water content less than 2% below the line of optimums. For the in-situ density, use ASTM 2922 and allow no dry densities less than 5 pounds per cubic foot below required value. Please amend the table to reflect that the in-situ density will be checked using ASTM D 1556, on a 1 per every 10 tests basis. Please amend the table to indicate that the water content will be checked using ASTM D 2216 on a frequency of 1 per every 10 in-situ water content tests; with no more than 3% outliers and no water content less than 2% or more than 3% of the allowable value.

15. Table 4-1, Testing of Soil Prior to Compaction, please add the Moisture Content Parameter, using Test Method ASTM D3017, on a one per 1000 cubic yard basis.

16. Table 4-1, Testing of Soil Prior to Compaction, for scarification, please amend the table to indicate that the effectiveness will be tested with a tape measure on a frequency of 10/acre, with a rejection criteria of a scarification depth less than specification limits at 2 or more tests per acre. Please discuss how the scarification will be done. To enhance the bonding of lifts, to maximize the hydraulic tortuosity along lift interfaces, and to minimize the overall hydraulic conductivity, please make sure the surface of a previously compacted lift is rough before placing the new lift of soil (the previously compacted lift is often scarified with a disc prior to placement of a new lift), which promotes bonding and increased hydraulic tortuosity along the lift interface and use a fully-penetrating footed roller (the feet pack the base of the new lift into the surface of the previously compacted lift) where the roller foot length is approximately equal to the lift thickness.

17. Table 4-1, Testing of Soil Prior to Compaction, Construction Stakes. Per EPA/600/R-93/182, "The recommended survey procedure for control of lift thickness involves laser sources and receivers. A laser beam source is set at a known elevation, and reception devices held by hand on rods or mounted to grading equipment are used to monitor lift thickness....For those areas where lasers cannot be used, it is recommended that either flexible plastic grade stakes or metallic grade stakes (numbered and inventoried as part of QA/QC process) be used. It is preferable if the stakes are mounded on a base so that the stakes do not have to be driven into the underlying lift. Repair of grade stake holes should be required; the repairs should be periodically inspected and the repairs documented." Asarco must specify an acceptable method to be used.

18. Sampling Patterns, please amend the CQAP to discuss how the sample locations will be selected for the compacted liner. A common method is to establish a grid pattern.

19. In the amended CQAP, please include copies of all blank field forms to be used for quality assurance test for Items listed in Tables 3-1 through 6-1. If such forms do not exist, please develop them for the amended plan. EPA requests that these daily forms be faxed to us three times per week during construction of the CAMU cell: for work conducted Friday through Sunday, fax the forms on Monday; for work conducted Monday and Tuesday, fax to us on Wednesday; for work conducted on Wednesday and Thursday, fax the daily QA/QC sheets to us

on Friday. When an item meets the test rejection criteria, notify EPA within 24 hours verbally, followed by a written notification within 3 days. Amend the CQAP to include these provisions.

20. The Construction Quality Assurance Plan must be expanded to include construction criteria and QA/QC requirements for the leak detection and leachate collection system, inclusive of pumps, piping, drainage layers.

21. The Construction Quality Assurance Plan does not address the final cap. Please expand the plan to include the construction of both the temporary and permanent cap for all proposed cap components.

22. Appendix G, Construction Quality Assurance Plan: All geomembranes including the primary and secondary liners must be tested to ensure conformity of the material used with the design (40 CFR 264.19(c)(iii)). Tables 5-1 and 6-1 list the parameters, test methods, test frequency and rejection criteria. The tables should include the parameter values and units that the conformance tests are evaluating. If a test result is in nonconformance, all material from the lot represented by the failing test should be considered out of specification and rejected.

II. Waste Materials

1. Page 1-1, 1.0 Introduction: The report states that the CAMU Phase 2 Cell will contain plant site soil and demolition debris generated through the implementation of the Montana Consent Decree and the RCRA Consent Decree. EPA understands that the Montana Consent Decree CDV-2004-212 has expired and was not extended. Table 3-3 lists demolition debris waste materials. Please revise the text to indicate that the Montana Consent Decree has expired. ASARCO should explain under what enforcement mechanism or work plan the waste for disposal in the CAMU is being generated for each line item in this table.

2. Page 3-13, Waste Material: It is our understanding that ASARCO will be disposing of asbestos in the CAMU Phase 2 Cell. Asbestos regulations require specific management practices. ASARCO must clarify whether asbestos containing material will be disposed in a separate cell within the CAMU Phase 2 Cell. ASARCO must comply with the MDEQ's Montana Asbestos Work Practices and Procedures Manual. ASARCO must include in the work plan a description of how asbestos will be managed; simply citing the applicable regulations is inadequate.

3. Pages 3-14 and 3-15, Table 3-3, please provide a copy of the source document from which the major demolition debris waste material categories and quantities were extracted as an Appendix to the revised Design Analysis Report and include it as a listed reference in Section 8.0.

4. Pages 3-14 and 3-15, Table3-3, the demolition debris waste must fall into one of the pre-approved categories, as defined in the July 2006 progress report, or ASARCO must describe and request approval for additional categories of wastes to be placed in the CAMU. The table includes 2000 cubic yards from "Excavation for Plant Cap." The meaning of this category is

unclear, since a final site remedy has not been approved by EPA. The approval of the CAMU Phase 2 Cell Plan does not constitute approval of a plant cap.

The table includes a category "Remediation of Property for Chemet". ASARCO must explain this category that is slated to generate 5000 cubic yards of waste. The table also includes a category "Sanitary Treatment", which must be explained.

5. Page 3-23, first full paragraph, the text indicates that the HDS water treatment system may be removed. It is EPA's understanding that ASARCO will continue to need to treat purge water and storm water, as part of its site management and long-term monitoring. Projection of removal of this system seems premature since the corrective measures study has not yet been completed and onsite water treatment may be a necessary component of the remedial measures selected.

6. EPA request the evaluation performed by ASARCO to determine the acceptability of the waste for placement in the CAMU. ASARCO must submit an estimation of the weight of each general waste category and all analytical data for each waste stream.

7. In addition to wood debris, please list other organic or potential gas generating materials. Please discuss the potential organic constituents that may be released from these materials, mobilized into the leachate, and should be added to the groundwater constituent monitoring list.

8. 3.5 Waste Material: ASARCO should identify the waste material intended for disposal in the CAMU that ASARCO suspects may be of extreme pH that will require neutralization. The current report indicates that neutralization or blending of waste materials with an extreme pH is being planned. The specifics as to quantities anticipated needing blending and/or neutralization, the type of neutralization, the location of this process including units in which it will be conducted, etc., must be provided for approval

9. The current design report indicates that ASARCO evaluated and investigated the chemical compatibility and gas generating potential of the demolition debris. We request submission of this evaluation, as well as the results of any chemical or physical characterization performed on the CAMU-eligible waste categories.

III. Landfill Operations

1. 4.0, Placement of Waste Soils, Sediments and Demolition Debris in Cell. The design report must specify the size of the waste lifts and the placement of the waste.

2. Page 4-1, Section 4.0, Placement of Waste Soils, Sediments and Demolition Debris in Cell: The text indicates a dust control program will be required. The dust control plan must be submitted prior to commencing construction of the CAMU.

3. ASARCO must develop and submit for Agency review and approval a work plan for the operating life of the cell, which includes establishment of an operating record. This must include the mechanics of waste transport, including the following: conditions to halt waste placement

and transport such as wind velocity and direction and precipitation events; communications; sorting, sizing, and sampling; spill response; weight; identification of wastes requiring special management (asbestos, super sacs of flue dust, acidic wastes, wood, etc.); pretreatment; oversize material; security; dust control; odor control; decontamination of equipment used to transport, place, compact, size and sort waste materials.

4. Material transfer and waste placement. Specifics regarding waste staging, segregation, and pre-placement sizing need to be provided in the revised plan.

5. Please expand the text to describe the decontamination procedures to be used during cell construction and waste placement, especially to prevent spread of contamination beyond the cell boundaries. Include methods to be used, location of decontamination structures, management of wastes produced.

IV. Sampling Plan: Monitoring, Verification, Criteria, Statistics

1. ASARCO must include in the post-closure plan (such as Appendix D or E), a leak detection monitoring equivalent to 40 CFR 264.303(c).

2. Page 2-4, Section 2.8, Monitoring, Inspection and Construction Quality Control, Please amend the text to include 264 Subpart F requirements for establishment of a groundwater monitoring program for releases.

3. 3.5.5, Groundwater Monitoring System—Appendix D Sampling and Monitoring Plan

   a. 5.0 Sample Handling and Analysis: The parameter list proposed in Table 5-2 is inadequate. The parameter list must include all constituents that may be a source from the waste. The list must be expanded to include: arsenic, aluminum, antimony, barium, beryllium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, selenium, silver, thallium, tin, vanadium, and zinc. The detection limits must be low enough to allow comparison to DEQ-7 standards.

   b. 6.2, Data Reporting: ASARCO must include with each semiannual data submittal, a table of the unique sample numbers and the corresponding sample location.

   c. 6.2, Data Reporting: ASARCO must include with each annual groundwater monitoring report a potentiometric contour map.

   d. 6.2, Data Reporting: ASARCO must include a concentration contour map of any detected analytes with each semiannual report.

   e. 6.3, Monitoring Program Review: The Plan does not adequately address steps for compliance monitoring or corrective action if a statistically significant increase in groundwater is noted. In addition, the Plan does not include procedures for prompt notification of EPA. ASARCO must revise the Plan to address these deficiencies. We

suggest ASARCO refer to 40 CFR 264 Subpart F including 40 CFR 264.98 through 264.100.

4. Page 3-9, Section 3.3.2, Groundwater, Future evaluations of groundwater flow direction (potentiometric maps) would benefit from an additional well or piezometer installed in the area to the southwest of what is referred to as "the subsequent cell" located southwest of the current Phase I Cell and northwest of the proposed Phase II Cell. Since there is currently no well or piezometer located in that area, installing one would aid in defining groundwater flow direction in the CAMU area for both the Phase I and Phase II Cells. This is a requirement for the groundwater monitoring system for design for the Phase II Cell.

5. Page 3-27, 3.5.5, Groundwater Monitoring System, please expand the text to indicate that a detection monitoring program will be established in compliance with 264 Subpart F requirements. The SMP for the long-term monitoring of releases from the CAMU must be amended to include the following:

--establishment of trigger levels for each selected contaminant of concern;
--verification sampling protocol;
--notification requirements;
--resampling frequency;
--corrective measure responses and actions for a verified release from the CAMU cell.

Please refer to the materials previously provided as guidance.

6. Appendix A, Figure 1, please ensure the accuracy of these cross-sections and well-transects. Please indicate on this figure the location of the additional CAMU well requested by EPA.

7. As reflected in our February 21, 2007, comment letter on the Technical Inspection Report, CAMU Phase I Cell, Revised January 2007, we have concluded that ASARCO accurately conducted the Mann-Kendall non-parametric trend testing on the data with the few caveats noted in our comment letter. EPA has reviewed ASARCO's responses to our comments which dealt with the use of the one-way or two-way test and the identification of how non-detects (censored data) were addressed and found them to be acceptable. The approach described in your responses should be included in the development of the long-term verification monitoring program and statistical evaluation of the monitoring data.

8. Appendix D, Sampling and Monitoring Plan (SMP), February 2007, we offer the following comments related to the statistical evaluation procedures proposed in the SMP:

a) The SMP identifies a number of different analytical methods for dissolved trace metals in Table 5-2. One of the problems noted in our earlier review was the lack of information regarding non-detection levels (measured and as reported). If analytical methods were changed in the course of the reported data time frames, the methods used and detection limits should also be reported. It is quite possible that analytical method sensitivities can affect the statistical evaluations. It would be better to have a

consistent set of data with constant detection limits and based on the same analytical technique. From Table 5-2, it appears the ICP-MS is being used for metals, potentially a much more sensitive technique.

b) The data reported in our earlier review contained some curious reporting significance levels. Specifically for arsenic, data were reported to one, then two, and occasionally three significant decimal places. With such small changes in level involved, statistical testing outcomes could be affected. ASARCO needs to adhere to a consistent approach in the future for the number of reported significant decimal places and should propose a procedure to address this for existing data.

b) The results using Mann-Kendall trend testing suggested a least one significant increase in sulfate in Well MW-6, and possible arsenic increases in wells MW-2, 3 and 4. The question for now is what happens next. Will the Mann-Kendall test be applied at each new data event acquisition and repeated? This may be satisfactory if there is no evidence of a trend, but what is the approach for wells and analytes with increases? Obviously, one can continue to evaluate whether the increases continue or cycle back to somewhat lower levels. At some point, it seems necessary to start the data evaluation over from scratch; otherwise complex historical patterns could negatively affect future testing. ASARCO should respond to this point.

c) The SMP has suggested switching to control charts However, the same problem with historical data having a definite trend would cause similar problems with control charts. There is a way to remove the trend from the data and work with residuals; however, all future data must be treated the same way (since a continuing trend is presumed). At some point, if the trend differs (e.g., a decrease), then the control chart might show a negative trend (significant but not important). Please discuss how these issues would be addressed if control charts are used.

d) ASARCO is simultaneously collecting sulfate and other major ions. We suggest evaluation of the cation/anion and TDS balances on the data for well MW-6 to see if a more geochemical explanation might be found for the sulfate increase. Generally, more than one ion will be involved with such a change and may turn out to be natural water quality variation.

V. Maintenance

1. Reutilization of the temporary cap. It appears, from the text, that reutilization of the RPE temporary cap is anticipated. Please explain how and where it will be stored, how it will physically be removed and replaced, what measures are to be taken to preserve its integrity and prevent contamination. Please discuss the pros and cons of leaving it in place rather than remove it each season.

2. Please describe additional security measures that may be required while the cell is open, being filled, and the temporary cap is in place. What measures are being taken to ensure the

temporary cap will withstand high wind events, precipitation, control fugitive emissions, and prevent animal excursions and physical contact with the waste.

3. Page 5-1, 5.0 Temporary Closure and Monitoring, please amend the text to include the following items for the temporary cap: type of cushion layer, installation method, prevention of precipitation, site security, freezing effects, wind, and animal intrusion.

VI. Final Cap

1. 3.5 Component Design: The design report must be updated to include additional information on the proposed cap including the GCL. The geosynthetic clay liner should be needle punch reinforced GCL comprised of a uniform layer of granular sodium bentonite encapsulated between a scrim reinforced non-woven and a virgin staple fiber non-woven geotextile. The needle punched fibers should be thermally fused to the scrim reinforced non-woven geotextile to enhance the reinforcing bond. All seams must be overlapped a minimum of 12 inches and sealed with powdered bentonite sealing compound. Seams must be oriented parallel to the line of maximum slope. No horizontal seams should be allowed on the slopes.

Appendix G should be modified to include the specification requirements for the GCL and conformance testing. If a test result is in non-conformance, all material from the lot represented by the failing test should be considered out of specification and rejected.

2. 3.5.1.3 Cap Composite Liner: To improve stability, ASARCO must use a 40 mil double-sided textured HDPE for the cap liner. A geocomposite should be used between the liner and the 12 inch drainage layer, *especially on the cap slopes, to prevent sloughing.*

3. Page 3-13, 3.5 Waste Material, last paragraph, the text indicates that a gas extraction system is included in the design; however, on page 3-17, Section 3.5 Component Design [please renumber in your revision], there is no gas collection and removal system included or described. ASARCO must include additional information including design specifications, drawings, and QA/QC requirements. A 6 inch gas migration layer is proposed on Figure 3-5. We recommend that the top of the waste be covered with at least 12 inches of material to ensure protection of the cap. The waste layer should be smoothed prior to the gas migration layer being applied to ensure that all protuberances are adequately covered.

4. Page 3-22, 3.5.1.3, Cap Composite Liner, the text states that the GCL cap slopes will be reinforced. The GCL specifications, which are requested to be included in the resubmission of the design plan, should address the transition from the gentle top slopes to the side slopes. Sharp changes in slope, or uneven or variable-radius curved transitions, may lead to unacceptable wrinkles or poor contact with the subgrade at these locations. Please ensure the specifications provide instructions for constructing the subgrade slope transitions that are uniformly curved and smooth.

5. For the GCL liner, please provide the design analyses, including the results of the interface friction testing according to ASTM Method D5321 with both dry and hydrated GCL of

the specific type proposed for use in the CAMU, to support the conclusion that the slopes will be stable. Provide relevant literature or case study citations, if available.

6. Page 3-27, Cover System, the cover system proposed for this cell consists of 6-inches of seeded topsoil overlying 24-inches of subsoil. The cover for CAMU Cell 1 consisted of 8-inches of seeded topsoil overlying 16-inches of subsoil. Please explain why the design has been altered. Please also expand the text to discuss the vegetation mix selected to reseed the cap.

VII. Post-Closure Care

1. The O & M Plan must be amended to establish specific criteria and response time lines for repair for each inspection element. It must also include notification provisions of required repairs to the regulatory agencies.

1. Page 2-4, Section 2.9, Please amend the text to include compliance with 264 Subpart H requirements for post-closure care.

2. Page 2-4, Section 2.9, please amend the text to include compliance with 264 Subpart G, closure and post-closure requirements which include the survey plat, notice to the deed, and post-closure notices.

3. O&M Plan, Appendix E, revise in response to comments.

4. Operation and Maintenance Plan, ASARCO must establish permanently surveyed benchmarks for both CAMU cells.

5. 5.0 Temporary Closure and Monitoring—Appendix E Operation and Maintenance Plan: This appendix includes an operation and maintenance plan for the temporary cap and post-closure care monitoring of the CAMU. Section 3.3 Site Inspection states that a technical inspection will be performed no less than very five years. The section discusses informal inspections to be conducted no less than once per month. Formal inspections once every five years are insufficient. Asarco must inspect the landfill twice a year. The inspections should evaluate settling and subsidence, erosion, membrane liner damage, and the cap's vegetation. ASARCO must document the inspections and any corrective action taken. The reports should be submitted to EPA in an annual report. Significant issues should be reported verbally to EPA within 7-calendar days and in writing within 14 calendar days. The plan should be updated to include these additional inspection and reporting requirements.

6. ASARCO must evaluate and establish a rapid and large leakage rate (RLL) and an action leakage rate (ALR) for the existing CAMU cell and the CAMU Phase II cell and include these in a Response Action Plan developed for each cell. These requirements are further outlined 40 CFR 264.302.

VIII. General Provisions for Design Revision

1. ASARCO should provide a more detailed construction schedule similar to Figure 4-1 Construction Schedule in the Phase I Design.

2. 3.5, Component Design: This section states that the landfill has been designed and constructed pursuant to EPA and Department guidance. However, 8.0 References does not reference any Department guidance. Please specify the Department guidance that ASARCO is using. Please revise 8.0 References, to reflect all materials and guidance relied upon during development of this design plan.

3. Page 7-1, 7.-0 Standard Plans and Specifications, please amend this section to reflect the revisions required elsewhere throughout the document and responsive to state and EPA comments.

4. A Final Construction Report for the CAMU Phase 2 cell must be developed and submitted within sixty (60) days of the completion of cell construction.