California Regional Water Quality Control Board
Lahontan Region

Linda S. Adams
Secretary for
Environmental Protection

2501 Lake Tahoe Boulevard, South Lake Tahoe, California 96150
(530) 542-5400 • Fax (530) 544-2271
www.waterboards.ca.gov/lahontan

Arnold Schwarzenegger
Governor

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Kevin Mayer,
U.S. Environmental Protection Agency
Region IX,
75 Hawthorne Street (mail code SFD-7-2),
San Francisco, California 94105-3901

COMMENTS ON ATLANTIC RICHFIELD COMPANY'S REMEDIAL INVESTIGATION/ FEASIBILITY STUDY PROGRAM WORK PLAN (PWP), LEVIATHAN MINE SITE, ALPINE COUNTY, CALIFORNIA

The Water Board appreciates the opportunity to review and comment on the above document submitted by the Atlantic Richfield Company on July 10, 2009. Attached please find our comments for the PWP.

If you have any questions, please contact me at (530) 542-5461.

for: Chein Ping Kao, P. E.
Senior Water Resource Control Engineer
Leviathan Mine Unit

Enclosure: Comments on PWP

cc: Leviathan mail list

CK/clhT: Comments on PWP.doc
File: Leviathan Mine, EPA

Leviathan Mine

MAILING LIST

Gavin McCabe
Deputy Attorney General
Office of Attorney General
455 Golden Gate Avenue
Suite 11000
San Francisco, CA 94102-7004

Anthony Brown
Environmental Business Manager
Atlantic Richfield Company
6 Centerpointe Drive,
LaPalma, CA. 90623

Lynelle Hartway
Washoe Tribe of California and Nevada
919 Highway 395 South
Gardnerville, NV 89410

Ken Maas
United States Forest Service
Humboldt-Toiyabe National Forest
1200 Franklin Way
Sparks, NV 89431

Ed James
Carson Water Sub-conservancy District
777 E. William St.
Suite 110A
Carson City, NV 89701

Janet Whitlock
US Fish & Wildlife Service
2800 Cottage Way
Suite W-2605
Sacramento, CA 95825

Steve Hampton
Department of Fish and Game
Office of Spill Prevention and
Response
1700 K Street, Suite 250
Sacramento, CA 94244

Gary Riley (SFD-7-2)
US EPA
75 Hawthorne Street
San Francisco, CA 94105

David Coupe
Office of Chief Counsel
State Water Resources Control
Board
P.O. Box 100
Sacramento, CA 95812-0100

Lahontan Regional Water Quality Control Board (Water Board) Comments on Atlantic Richfield Company's (ARCO) Program Work Plan (PWP) for Leviathan Mine Remedial Investigation/Feasibility Study (RI/FS), Alpine County, California

GENERAL COMMENTS:

1. This document seems to be more of an RI/FS concept document. It mostly describes the conceptual approach of an RI/FS process for Leviathan Mine site. There is no specific plan in this document can be used for immediate field implementation.

2. It is important to note that the PWP document presents a biased version of past activities conducted by the Water Board in comparison to those activities that were conducted by ARCO. Water Board staff does not intend to debate the biased view in this document, and Water Board staff's silence to any particular statement should not be construed as Water Board's concurrence.

3. ARCO, under USEPA's Unilateral Administrative Order (UAO) issued on June 23, 2008, is required to conduct an RI/FS for the Leviathan Mine site. The PWP repeatedly implies that certain RI/FS activities are required to be conducted by the Water Board. The Water Board is conducting a portion of a Non-Time Critical Removal Action as part of an Administrative Abatement Action at the site. While some of the data collected by the Water Board may be useful for the RI/FS, the Water Board's data collection efforts are not required as part of the RI/FS.

4. This document states, as in the previously submitted DQO report, that the Sitewide Database managed by ARCO had been "upgraded and supplemented" by the ARCO for RI/FS studies. Yet despite comments from stakeholders, the PWP continues to ignore stakeholders' requests to disclose the changes to the database and justifications for those changes. Altering data without disclosing what changes were made and the rationale behind the changes violates one of the most fundamental principles of any scientific study. Unless these changes and their justifications are made available to the stakeholders, it is impossible for the stakeholders to follow ARCO's recommendations and conclusions for the RI/FS. This can potentially invalidate all future evaluations and decisions made in the RI/FS. The Water Board urges USEPA to require ARCO to provide a detailed list of all changes made to the Sitewide Database and justifications for those changes.

5. It is inappropriate to mix property boundaries with that of the affected site. Property boundaries do not stop the migration of contaminants nor do they follow the boundary of disturbed areas. For the purpose of the Conceptual Site Model, study areas should not stop at the property boundary.

SPECIFIC COMMENTS:

Section 1.0: Introduction

1. Page 2, Section 1, Introduction, the text states: "U.S. EPA issued a new AAA in 2005 directing the LRWQCB to treat acid rock drainage (ARD) captured in the evaporation ponds each year until a final remedy is selected and implemented." This statement is not accurate. The 2005 AAA requires the Water Board (LRWQCB) to treat acid mine drainage (AMD) captured in the existing ponds and "for each year EPA directs continued implementation of Phase 1 of the Non-Time Critical Removal Action (NTCRA)."

2. Page 6, the text states: "During preparation of this PWP, special attention has been given to addressing U.S. EPA and stakeholder comments. In certain sections of the PWP, direct responses to comments are called out and specifically addressed, while in other places additional information or consideration has been incorporated into the particular task. Additional detailed analysis of existing data utilized in scope preparation will be presented in the individual FRI work plans with more specific DQOs, as appropriate." With the exception of Table 44, Water Board staff did not find any direct responses to our comments that are called out and specifically addressed in the text. Even Table 44 only provides references to a generic section of the PWP where specific comments are supposed to be addressed. For example, comment No. 4 asks: "What is the rationale for the minimal effect of faults on groundwater flow?" Table 44 indicates it is addressed in four sections. A total of 28 pages (Hydrogeology (17 pages), ACSA (3 pages), PSA (4 pages), and LCSA (4 pages)) needs to be studied before the apparent "rationale" is located. Page 34 discusses the importance of faults on regional groundwater flow. Page 35 describes secondary permeability as including flow along fault traces. Page 39 cites Herbst and Sciacca (1982) as suggesting that faults may influence groundwater flow across the site. There is no discussion of faulting in the ACSA, PSA or LCSA sections. The PWP makes essentially the same statement originally commented upon in the Draft DQO report. It appears ARCO intends to leave it to the readers to interpret how and if DQO comments are addressed adequately, if at all. Instead of trying to guess how DQO comments were addressed in the PWP, the Water Board does not consider our comments to the DQO reports properly addressed until a point by point response for each of our comments is provided.

3. Page 7, Section 1.4, the text states: "The Work Plan documents the decisions and evaluations made during the planning process and presents the anticipated future tasks. It describes the approach for collecting additional investigations and feasibility studies, identifies critical success factors, assigns responsibilities, and sets the project's schedule." It is

unclear what "assigns responsibilities, and sets the project schedule" means. One must assume the PWP assigns responsibilities to ARCO's own personnel, as ARCO has no jurisdiction to assign responsibilities to any entities other than ARCO. There is no project schedule found in this document.

4. Page 8, Section 1.5, 4th Bullet; the text states: "**Downstream Study Area (DSA).** This area starts at the confluence of Leviathan and Aspen creeks and continues into the upper portion of Bryant Creek to the extent impacts from the site above background have been recorded (Figure 8)." The entire reach of Bryant Creek, in addition to portions of the East Fork of the Carson River, has recorded impacts resulting from Leviathan Mine activities as early as the 1950s. The Downstream Study Area is much too small. The rationale for limiting the Downstream Study Area to the upper portion of Bryant Creek should be provided in more detail.

5. Page 9, Section 1.7.2: "AMD is considered the outflow of acidic waters specifically from mine features (e.g., tunnels, pit). ARD is considered the outflow of acidic waters from other naturally occurring mineralization or features (e.g., landslides, seeps)." It is not clear if mine waste piles and overburden piles are considered as mine features and whether acidic water generated from mine waste piles and overburden piles are considered as AMD or ARD. There is no real geological differentiation made between waste rock geology/composition and naturally occurring geology in this report. The term AMD was never used in the entire PWP document.

6. Page 10, 1.8 Content of Work Plan, Appendix C, bottom of the Page: This section should state that SOPs are also presented in Appendix C.

Section 2.0: Background and Physical Setting

7. Page 11, Section 2.1.1: This section makes no mention of Anaconda's or any other historical ownership of the site. Since this is the background section, all ownership history should be included.

8. Page 11, Figure 9: Water Board staff disagrees with the "Approximate Limits of the Leviathan Creek Basin Landslide" shown in Figure 9. Herbst[1] (1982) shows the landslide scarp extending into patented claims 7, 8, 24, 28 and also extends onto USFS lands west of patented claim 26.

9. Page 11, Section 2.1.1, 3rd paragraph: "Approximately 253 acres of the 656-acre Leviathan Mine have been identified as being disturbed either directly by or as a consequence of mining activity (SAIC, 2000)." Some of

[1] Landslide Investigation, Leviathan Mine, Alpine County, Charlene Herbst, State of California, State Water Resources Control Board, July 6, 1982.

the disturbance is not on the 32 patented claims and patented mill site which comprise the 656-acre Leviathan Mine. The sentence should read: "Approximately 253 acres have been identified as being disturbed directly by or as a consequence of mining activity (SAIC, 2000)."

10. Page 11, Section 2.1.1, 3rd paragraph: "About 21.32 acres of the disturbed surface of Leviathan Mine is on federal lands administered by the US Forest Service (USFS, Figure 9; SAIC, 2000). As identified, the disturbed surface on the USFS property is reported to be the locations of two former mining camps (Isbell Camp and Anaconda Camp) and a small borrow pit for road/dam improvements." As pointed out above, Leviathan Mine was previously described in the PWP as 656 acres. The "21.32 acres" of disturbance on USFS land is not part of the patented 656 acre Leviathan Mine. Therefore, Water Board staff suggests striking "Leviathan Mine" from the first sentence, above. The second sentence omits 9.36 acres of disturbance west of Leviathan Claim 27 and two other smaller areas of disturbance. Using Figure 2 of the SAIC report (2000[2]), Water Board staff prepared the following table to show the USFS-owned disturbed lands.

SE of Aspen Seep	0.70 acres
W of Leviathan Claim 26	9.36 acres
Isabell Camp	8.29 acres
Borrow Pit / Dam	1.94 acres
Anaconda Camp	2.69 acres
N of Pond 2 North	0.34 acres
Total	23.32 acres

While the SAIC report states that there are 21.32 acres of disturbance on USFS-owned land, this seems to be an arithmetic error or the areas presented in SAIC's Figure 2 are incorrect. This information should be clearly described in the PWP.

11. Page 11, Section 2.1.2: The text should include some basic information regarding the wells shown in Figure 10.

12. Page 11, Section 2.1.2, Figure 10: The north-central part of the 4-mile study area shows overlapping hatch marks. It is unclear what these two different patterns represent. This figure has an incomplete portrayal of surface water monitoring locations and should be updated. There should be an "X" at the start of the "Redirected water." Is there a second diversion (X on Figure 10) near the confluence of Bryant Creek and the East Fork Carson River? This is not discussed in the text on pages 12-13.

[2] Final Title Search and Survey for the Leviathan Mine Site, Alpine County, California, Science Applications International Corporation (SAIC), January 31, 2000.

13. Page 15, Section 2.2.1, Figures 12: The Explanation on Figure 12 identifies the landslide scarps as fault scarps. This seems inappropriate and is not consistent with Brown and Caldwell (1983).

14. Page 15, Section 2.2.1: "Physical site features as a result of mining activities include an inactive open pit near the center of the site, regraded overburden/spoil piles adjacent to the open pit to the north, regraded mine waste rock piles to the south and west of the pit, the Delta landslide to the west of the pit, and the large Leviathan Creek basin landslide to the northwest of the pit." The above statement makes it sound like the re-grading of the overburden/spoil piles and mine waste rock piles was completed by the company that completed the mining activities (Anaconda), when most of the re-grading was actually a result of the work completed by the Water Boards for the Pollution Abatement Project. The No.5 Adit should be included as part of the mining related site features. The mine waste that the Leviathan Creek used to run through, which caused the need for re-channelization, also should be included.

15. Page 15 and 16, Figures 14 and 15: It is impossible to read the contour elevations on Figure 14. Neither figure includes the contour interval in the Explanation. Therefore, it is difficult to comment on fill thicknesses, etc.

16. Page 15, Figure 15: Water Board staff disagrees with the interpretation that essentially all of the surface water from the landslide area drains to Aspen Creek. Water Board staff inspected this area on September 15, 2009. From the highpoint located about one mile south of the Aspen Creek and Leviathan Creek confluence, the drainage boundary should head east/northeast and then northwest following the boundary shown on Figure 14. It seems that surface flow on the landslide would follow the path of the landslide to Leviathan Creek.

17. Page 16, Section 2.2.2, bullet points:

- Bullet 1: Water Board staff believes this statement is misleading. The development of the pit was performed by Anaconda. Isbell Construction Company was simply Anaconda's contractor (see page 19, paragraph 3 of the PWP).
- Bullet 2: Dates are wrong. Isbell began their excavation and stripping operations in June 1952. Wells Brothers of Reno began hauling the first 1000 tons of ore from Leviathan to Yerington on July 6, 1953 in conjunction with Isbell's excavation.
- What about the re-grading and diversion of Leviathan Creek done by Anaconda in 1975?
- Bullet 3 should read: "Re-grading of the pit and mine waste piles and construction of the ponds, the Leviathan Creek channel, and other

structures, such as the construction of runoff channels, by the LRWQCB from 1983 through 1985."

- Bullet 4: This statement should be clarified to state that the majority of the landslide activity happened during and adjacent to the open-pit mining by Anaconda (bullet 2). The placement of this bullet in relation to the timeline of activities that altered the topography makes it seem like the landslide occurred after the Water Board's activities.
- Bullet 5 should read: "Slope stabilization and improvements to removal action at the site from 2002 through present."

18. Page 16, Section 2.2.2, 6th paragraph: The last sentence should be modified to read: "This hummocky terrain is the result of landslide activity and slope failures of overburden material placed by Anaconda during mining activities."

19. Page 18, Section 2.2.4, 2nd paragraph: There is still no mention in this section of the possible use of the SNOTEL monitoring station at Monitor Pass (Station ID 19140s, elevation 8310) as a reasonable proxy for precipitation at the Leviathan Mine.

20. Page 18, Table 3: Table 3 should clearly reference the source and time-frame of the data used to make the summary table. The Water Board's weather station does not accurately measure precipitation as snowfall, and, therefore, winter-time precipitation estimates from the Water Board's weather station are of questionable value. This may explain why Table 3 shows more precipitation in the summer than in the winter. The Water Board's weather station should not be used to evaluate precipitation during the winter.

    Assuming the evaporation data in Table 3 are from the Water Board's weather station, Table 3 should identify the parameter as evapotranspiration (ET) not evaporation. The table shows there is more evaporation in November to April than in May to October; this seems incorrect. Furthermore, the ET numbers seem low, although it is unclear what the numbers represent. A quick review of recently collected data from the Water Board's weather station showed approximately 15 inches of ET in July and August 2009.

21. Page 19, 1st paragraph; Please cite the source(s) of the information that indicated Tunnel No. 3 discharged water at a rate of 30 gpm in 1933.

22. Page 19, 3rd paragraph: To the extent that it is known, a description of how overburden material was removed and where was it placed in the surrounding area by Anaconda's contractor in the 1951 through 1953 time period should be included.

23. Page 19, 4th paragraph: Correct date to read between 1953 and 1962. To the extent that it is known, a description of Anaconda's mining methods and a description of how the sulfur ore and waste rock were processed following removal from the open pit in the 1953 to 1962 time-period should be included for the RI/FS process. Also, the waste to ore ratio should be included.

24. Page 19, 5th paragraph. Waste rock was placed in Leviathan Creek. The reference to the Leviathan Creek canyon sounds like it didn't affect the creek.

25. Page 19, 6th paragraph. Mischaracterization that mitigation and remediation activities began in 1956. There was nothing besides the mining operation conducted at that time. Even the holding pit was not mitigation or remediation for the environment but for containment of the acid for their own operations because they did not know where else to put it.

26. Page 22, Section 2.4.2.1: The regional structural geology should include a discussion of folding and faulting in the region. While ARCO has put forth a preliminary hypothesis of cauldron or caldera collapse based on aerial photograph review, it has not presented a summary of peer reviewed regional geology.

27. Page 22, Section 2.4.2.2: The text states: "The geology and large-scale areas of alteration and hot spring activity coincide with the circular structure observed in the aerial photographs and the geologic interpretation that this structure was formed by either plutonism or volcanism." The distribution of mines, areas of alteration, and hot springs shown in Figure 20 does not show a circular pattern around Leviathan mine as suggested in the above-cited text.

28. Page 26, Section 2.4.3.2, General Comment on Subsurface Geology: The stratigraphic interpretation seems inaccurate and unsupported. The purpose of presenting this information is not clear and should be explained to provide a context for a review and comment on this section. There seem to be no conclusions and no recommendations.

29. Page 27, Section 2.4.3.2, Sitewide Stratigraphy: The text states: "Andesite (Ta) was observed at the base of some of the borings. The basalt flow (Trb) or lower sedimentary sequence (Trc) was not observed in any of the borings." The conclusion that the lower sedimentary sequence was not observed is difficult to support. Herbst and Sciacca (SWRCB, 1982) stated: "The lower sedimentary unit has been differentiated from the upper sedimentary unit by its position relative to the basalt and by the greater indurations of the lower unit. The basalt may only divide the

sequence locally – in other areas, the sedimentary sequence probably could be considered as a single unit." Therefore, the absence of the basalt unit does not imply that the boring only penetrated the upper sedimentary sequence.

30. Page 27, Section 2.4.3.2, Sitewide Stratigraphy: The text states: "The thickest section of upper sedimentary sequence (Trs) was observed up to a maximum thickness of 161 ft. in the borehole for piezometer (PZ) PZ-7 (in the LCSA)." The rationale for assuming this borehole penetrates only the upper sedimentary sequence is not explained. The geologic map (Figure 23) shows Trcs, a sandstone member of the lower sedimentary sequence, at ground surface in the vicinity of PZ-7.

31. Page 28, 1st paragraph: The text states: "Because borings have not been advanced in the DSA and BSA, the subsurface geology in these areas has not been evaluated and thus they are not discussed below." It appears that the lack of subsurface geology in the DSA and BSA are data gaps that should be identified as such and addressed in the RI/FS.

32. Page 28, Section 2.4.3.2, Geology in the Pit Study Area (PSA): PZ-33 appears to be well outside the PSA based on Figures 4 and 26. What is the purpose of defining the PSA and then using geology outside the area? It seems that it would be important to describe the lateral and vertical extent of the potential acid-generating rock beneath and in the vicinity of the Pit. Investigations by US Borax in the 1960s provide some insight into this data gap.

33. Page 28, Section 2.4.3.2, Geology at Aspen Creek Study Area (ASCA) and Figure 28: Please provide the rationale supporting the conclusion that the borings penetrate Trs beneath the mine waste. Herbst and Sciacca (1982) describe the lower sedimentary sequence (Trc) as including laminar siltstone interbeds; this seems to be consistent with the boring log for PZ-3A.

34. Page 29, Section 2.4.3.2, Geology at Leviathan Creek Study Area (ASCA), Figure 29: Once again, PZ-7 is shown being almost entirely in the upper sedimentary sequence whereas the surface mapping of Herbst and Sciacca (1982) shows ground surface to be the lower sedimentary sequence.

35. Page 32, Section 2.4.7: This entire section is written without providing the benefit of references.

36. Pg. 32, Section 2.4.7, Leviathan Creek Basin Landslide: The text states: "It is our understanding that there is not a current program to monitor the movements in the landslide, but it is assumed to be active." Understanding

the landslide is an important part of this site, and a plan to investigate the slide should be included as part of the ACSA.

37. Page 32, Delta Slope, 4th sentence: The text states: "The waste rock at the Delta slope was regraded after the 2004 slope failure." The event in 2004 was a debris flow, not a "slope failure." The Regional Board conducted a multi-year geotechnical investigation and civil engineering evaluation, and in the summer of 2005, the Regional Board regraded the waste rock at the Delta Slope.

38. Page 32, Section 2.4.7, Delta Slope; Water Board staff disagrees with the statement: "Drainage trenches and surface water diversion features were installed **in an attempt to** reduce the infiltration of surface water into the slide mass and control potential erosion." [emphasis added] The drainage trenches, or finger drains, are subsurface features installed to lower the water table and are an integral part of the Delta Slope Stabilize Project (DSSP). This project was not just "an attempt." As stated in our comment No. 138 to the DQO report, the interception of the seepage is sufficiently complete to accomplish the project goal of slope stabilization. While controlling potential erosion was a component of the project, it was not a primary focus of the work.

39. Page 32, Section 2.4.7, Delta Slope: Water Board staff disagrees with the speculative statement: "There is a large catchment area above the slope that likely still allows surface water to flow toward the toe of the slope and DS." As part of the DSSP, a series of surface water ditches were installed to convey surface water that originates both above and on the Delta Slope to a point below the toe of the slope. Therefore, at the completion of the DSSP, it was unlikely that surface water would flow toward the toe of the slope and the Delta Seep. However, significant grading activities by ARCO since the completion of the DSSP have reduced the effectiveness of some of the surface water conveyances on the Delta Slope and have changed overall drainage patterns in portions of the Delta Slope. Re-grading of the ARCO work area adjacent to Pond 4, implemented by ARCO following the 2005 LRWQCB Delta Slope stabilization project, has significantly altered the drainage patterns above, adjacent to, and on the Delta Slope. This area appears to be a data gap and should be identified as such and investigated appropriately during the RI/FS process.

40. Page 33, Section 2.5.1, Data Search; the text states: "During the LRWQCB telephone interview, Carey and Gavigan indicated that they could not recall of any significant aquifers within the Bryant Creek watershed and that the region primarily consisted of rock with poor permeability." Water Board staff Gavigan and Carey did not state "...that the region primarily consisted of rock with poor permeability." The brief conversation with AMEC-Geomatrix staff focused on Water Board staff's

knowledge of wells in the area surrounding the mine. Water Board staff did not discuss hydrogeologic properties of the area.

41. Page 35, Section 2.5.2.1, Potential Hydrostratigraphic Units: It is not clear why the hydrostratigraphic units described in this section do not correlate to the simplified lithostratigraphic units identified on page 27. This section seems to discount the basalt and the andesites as "potential hydrostratigraphic units" yet adds Mesozoic aged units, which have never been identified at the site. Herbst and Sciacca (1982) identified the andesite units (Ta and Tra) as potentially having fracture permeability. They also describe the basalt to have "...blocky fracture and pervasive jointing; salt stains on joints indicate water flow through fractures."

42. Page 36, Section 2.5.2.1, Evaluation of Hydrostratigraphic Units: There seems to be an incorrect assumption that everywhere on the site, the Upper Sedimentary Sequence underlies the Quaternary units, if there is no Quaternary unit at the surface, the Upper Sedimentary Sequence is exposed at the surface. For example, at PZ-7, the geologic map shows the surface geology to be lower sedimentary sequence rocks. Yet, the report indicates that the well is screened in Upper Sedimentary Sequence. This seems impossible. Similarly, wells MW10S/10D, MW-11, and MW-12 seem to be located in lower sedimentary sequence rocks based on the geologic map presented in Brown and Caldwell (1983).

43. Page 36, Section 2.5.2.1, Evaluation of Hydrostratigraphic Units, 4th paragraph: the text states: "Groundwater level elevations collected in November 1982 and April 1983 (the most recent data) were between 3.56 and 4.25 ft. higher in the Quaternary-age units than in the Tertiary-age units (Table 7). This data suggests that the two geologic units in the PSA act as separate hydrostratigraphic units." These data indicate there are downward vertical hydraulic gradients. Other types of analysis would be required to evaluate if these units are or are not hydraulically connected. Please define what is meant by "act as separate hydrostratigraphic units."

44. Page 36, Section 2.5.2.1, Evaluation of Hydrostratigraphic Units, 5th paragraph: See above comment.

45. Page 37, 2nd paragraph: It is unclear what is meant by "at least two hydrostratigraphic units exist at the site." On page 35, the PWP describes four hydrostratigraphic units based on geology (this list seems to leave out several potential units as commented). The presence of vertical downward gradients where mine waste overlies tertiary rock is not surprising as hydraulic conductivity likely decreases across this contact. In Water Board staff's opinion, "a separate hydrostratigraphic unit" as used on Page 36 of the PWP for both the PSA and the ACSA suggests there is an aquitard between the mine waste and the Tertiary units so that water from the

Quaternary units does not flow into the Tertiary units. This situation seems unlikely.

46. Page 37, Section 2.5.2.2 Hydraulic Conductivity: As mentioned previously, not all of the wells are screened in either Quaternary-Age units or Upper Sedimentary Sequence; some wells appear to be screened in Lower Sedimentary Sequence rocks.

47. Page 38, Section 2.5.2.3 Groundwater Flow Patterns and Hydraulic Gradients, 2nd paragraph: Figures 32 and 34 show exactly the same water levels; Figure 34 apparently uses data from 8/8/06 instead of 8/14/08. Table 8 has multiple entries for 7/7/06 and 8/16/06.

48. Page 38, Section 2.5.2.3 Groundwater Flow Patterns and Hydraulic Gradients, 3rd paragraph: There are no data in the Aspen Creek drainage shown on Figures 32, 33, or 34. It is unclear how the conclusion that "groundwater flow is to the north toward Aspen Creek" is made. Figure 30, which uses data from the early 1980s, suggests that groundwater flow is to the northwest toward the confluence of Aspen and Leviathan creeks. A discussion of vertical hydraulic gradients observed at well pairs MW-10S/D, MW-2S/D should be provided.

49. Page 38, Section 2.5.2.3 Groundwater Flow Patterns and Hydraulic Gradients, 4th paragraph: This paragraph should clarify that the first sentence discusses groundwater flow in the Aspen Creek drainage. Groundwater does not appear to "flow toward the center of the pit" in Figures 32, 33, or 34.

50. Page 40, Section 2.5.2.4 Groundwater/Surface Water Interaction, 2nd paragraph: The text states: "Groundwater discharges to the surface have been measured from the AS, DS, adit, PUD, and CUD. These waters are contained and treated on site before being discharged to the surface waters (Section 3.2)." This paragraph suggests that CUD and DS flows are captured and treated year-round prior to discharge; this is not true. The timing of capture/storage/evaporation/treatment of Adit and PUD flows relative to discharge subsequent to treatment may be important in the water balance.

51. Page 40, Section 2.5.2.4, Groundwater/Surface Water Interaction, 3rd paragraph and the bullets that followed: There are not sufficient data presented to describe the shape of the potentiometric surface around Aspen Creek. The prominent upstream V along the channelized portion of Leviathan Creek may indicate that groundwater is flowing toward the creek, but it seems highly unlikely that groundwater discharges to Leviathan Creek. The Creek is in either a concrete channel or concrete pipelines in this portion of the site. The shape of the potentiometric

surface shown along the channelized Leviathan Creek may be a function of the Channel Underdrain (CUD) draining groundwater from the area beneath Leviathan Creek. Water Board staff disagree with the statement: "Coupled with the presence of seeps in the northern part of the site (DS, AS), this information suggests that shallow groundwater may be discharging into the creeks." The Aspen Seep is not particularly close to Aspen Creek. The DS may be an artifact of the original stream channel and may serve as a preferential pathway for subsurface flow. Water Board staff noticed in July 2009 that Leviathan Creek went subsurface at the toe of the Leviathan Creek landslide suggesting a losing reach between the DS and Station 15. The statement: "No investigation has been performed to evaluate the extent of leakage through the pond liners or through the conveyance piping" is incorrect. Liner investigations have been performed and repairs to the inlet and outlet boots have been made. Additionally, the Water Board has completed a video investigation or the twin 72-inch pipelines, and the pipes have been cored to confirm integrity.

52. Page 41, Section 2.5.3 Water Balance, Figure 35: It would be helpful if arrows were used between all boxes to show direction of flow. For example, the figure suggests that "Discharge from Groundwater to Stream Flow" is connected to "Runoff from Waste Rock", but the intent is that groundwater discharges to streams on site and adds to stream flow. It is unclear how the Adit, PUD, CUD, DS, and OS are categorized as "Groundwater Flows Off Site"; it seems they should be categorized as "Groundwater Flow from On Site" since they are discharged to either Leviathan or Aspen Creeks above Station 17.

53. Page 43, 1st sentence, Figure 35: The section labeled "Surface water flow derived off site" should have "overland flow onto the site" included under both the Leviathan Creek and the Aspen Creek portions of the flow chart.

54. Pg. 45, Section 2.5.3.3, Streamflow, 1st paragraph: A key component of the water balance is also surface water flow leaving the site to be subtracted from the surface water entering the site. No part of this section discusses the monitoring stations that could be used to evaluate the surface water leaving the site. Stations 25, 16, and 24 may be useful stations for evaluating flow leaving the site.

55. Page 45, Section 2.5.3, Streamflow, 1st Paragraph and Figures 2 and 37: The stream flow gauging stations are operated and maintained by the USGS for the Water Board. The USGS did not establish gauging stations independent of the Water Board. Figure 2 shows some monitoring locations but does not distinguish which stations are stage gauging stations. It is not clear what is shown on Figure 37. For example, Pit Clarifier A, B, and C are sludge sampling locations, not flow monitoring stations. The note at the top of Figure 37 references the location of

Station 26 to that of Station 25, yet Station 25 is not on the map. A figure that clearly shows the surface water locations gauged by the USGS is lacking. In spite of the figure's title, Figure 37 does not show all Monthly or Semi-annual surface water sampling locations, but does include stations that have not been sampled for decades.

56. Page 47, Section 2.5.3, Groundwater System Flow and Physical Characteristics: Water Board staff disagrees that the "hydraulic conductivity of the Tertiary-age lower sedimentary sequence ... has not been measured." Please see our comments for page 36.

57. Page 48-49, Section 2.5.3, Infiltration and Runoff: These calculations and results in the "total available water balance" should be more clearly explained. For example: (1) What are the size of the drainage areas above Stations 1 and 15? (2) What are the average annual base flows at Stations 1 and 15? (3) What are the average annual spring runoff flows at Stations 1 and 15? It seems more logical to use Station 23 to encompass both the Aspen and Leviathan Creeks into a single estimate of Infiltration and Runoff. It's unclear how there can be 12.5 inches of excess water available for runoff and infiltration, when the estimated combined value for infiltration and runoff is about 2 inches (runoff = 1.3 inches; infiltration = 0.5 inches). Please explain the discrepancy. In conclusion to this section, the text states: "During the RI/FS, alternative approaches may be reviewed for applicability to the site, and an appropriate method to estimate infiltration and runoff will be developed." Water Board staff expected this PWP to identify the specific data gaps and explain what data would be collected to develop these estimates. We concur that appropriate methods need to be developed to improve the water balance.

58. Page 49, Section 2.5.3.4, Preliminary Water Balance: Water Board staff believes it would be useful to use real data for individual years to develop several water balances. This may help form ranges of runoff and infiltration. It may also be helpful to perform surface water balances for Leviathan Creek and Aspen Creek drainages separately. This seems to follow the conceptual study areas. The fact that some surface water runoff from the Pit is captured and conveyed to Leviathan Creek is yet another factor that undermines the utility ofsegregating the Pit Study Areafrom other contiguous sections of the site. The sub-watersheds used to develop Table 16 should be shown in a figure with acreages for each sub-watershed. In Table 16, flows into the ponds are cancelled by evaporation. If this were the case, then no water would need to be treated. The analysis does not take into account precipitation falling directly on the ponds. In Table 16, the inflow, "Groundwater Discharges to Streams Onsite," and the outflow, "Evaporation and Evapotranspiration," should be replaced by the measured flow of treated groundwater discharged to Leviathan Creek from the State's Pond 1 lime treatment

system. This would be a relatively accurate measured volume to be used in the surface water balance.

59. Page 50, Section 2.5.4, Overview of the Hydrogeologic Conceptual Site Model:

- 1st bullet: It needs to clarify, by use of a figure and supporting data, what is meant by "near the disturbed portion of the site" and "whereas there is flow further downstream".

- 3rd bullet: It needs to clarify, through data analysis, why faulting does not appear to influence groundwater flow. It seems faulting, which predated and controlled the extent of mineralization, could have a similar effect on groundwater flow.

- 4th bullet: please see comments for pages 35 and 36.

60. Page 50, Section 2.5.4, Overview of the Hydrogeologic Conceptual Site Model, Figure 40: Water Board staff has concerns regarding the continuity of the Upper Sedimentary Sequence and the Basalt unit. The Lower Sedimentary Sequence outcrops near the landslide. The Basalt unit outcrops well above the elevation suggested in Figure 40. It is unclear how the downward vertical gradients are represented in the conceptual model. The PUD, Adit, CUD, DS, and AS should be part of the conceptual model.

Section 3.0: Initial Evaluation

Comment Nos. 59 to 77 apply to Page 51, Section 3.1, bullets (Tables 18-39 and Figure 37): The text states: "In addition, more current, select data from the database has been tabulated, including the following:

- surface water data from samples collected and analyzed from 2005 through 2008 at each of the U.S. EPA surface water station locations (Tables 18 through 35; Figure 37);
- stream sediment data from samples collected from 6 U.S. EPA station locations (Table 36; Figure 37);
- soil sample pH data from samples collected and analyzed from 200 surface locations (Table 37; Figure 41);
- recent groundwater data from samples collected from 15 locations that were analyzed by a laboratory (Table 38; Figure 26); and
- recent groundwater field parameter data measured from 64 locations (Table 39; Figure 26)."

61. Data sources not quoted correctly. Tables 18-20, 23, 24, and 25, present data from multiple sources; however; only one source is quoted. Source data information should be corrected to include all sources.

62. Table 21: Source is incorrect; this data was not collected and submitted by the LRWQCB. This data is not found in the June 2009 version of the Sitewide Database.

63. Tables 30, 31, 32 Source data: LRWQCB did not collect nor provide to the database any of the data listed in these tables; reference to LRWQCB as a source should be removed and the correct source(s) added.

64. Most tables use data from 2005-2007; however, Table 27, Station 4L, presents data from 2003-2007 (semi-annual station so it is reasonable to include a larger time frame). Why not also look at 2003-2007 for Station 26 in Table 26 as well?

65. Table 30: The abbreviation "ABS EFF" is not listed as a station in the Sitewide Database; there is a listing for "Bioreactor Effluent" in the database. Station names should be used consistently for the project and either follow the conventions in the Sitewide Database or amend naming references in the database

66. There are inconsistencies between the conductivity data presented in Tables 18-20, 22-29, and 33-35 and the conductivity data in the Sitewide Database. Much of the conductivity data presented in these tables is wrong. The Water Board staff reviewed conductivity data in the 2007, 2008, and 2009 updates to the Sitewide Database as well as its own submittals to the database. The Water Board collects and submits both electrical conductivity (EC) and specific conductivity (SpC) data. The 2007 database version presents conductivity results with the labels "Field Conductivity," "Field Specific Conductivity," and "Field Electrical Conductivity." Field Conductivity and Field Electrical Conductivity were both used to label EC. In the 2008 database version, all conductivity measurements were incorrectly labeled as the parameter "Scandium." The Water Board does not collect data on Scandium. The Water Board recently downloaded a more recent, 2009 version of the database from Amec Geomatrix's FTP site. The 2009 database version took all the "Scandium" results and labeled them as "Specific Conductivity." The important distinction between EC and SpC was lost, and the EC data is now wrongly labeled. The database now contains 2 data points, both labeled as Specific Conductivity, for each monthly sample collected at the Water Board's 11 surface water monitoring stations. For the PWP document data tables, it appears that these two conductivity numbers were then averaged and the average was presented in the data table. This is a misrepresentation and manipulation of the true data. The database should be corrected to show proper labeling of EC and SpC values; then the correct values can be used in future calculations and summary tables. The erroneous changes made to the database regarding conductivity data

make one wonder what other erroneous changes have been made, which seriously undermines the credibility of the database. Each and every changeto data in the database should be documented in the database and documentation of a quality control program for the database. Without more transparency it is difficult to have confidence in the accuracy of the database.

[See the Water Board's specific comment No. 8 on the DQO report regarding upgrades and changes to the database, and comments for Page 70 below.]

67. Tables 31, 32, 33, 34, and 35: Conductivity data is presented in both "us/cm" and "ms/cm" in the table, not only "us/cm" as indicated in the table headers. The measurements should be converted into the same units for presentation and then labeled correctly.

68. Tables 30-32 do not present data from USEPA surface water locations as indicated by the bullet, but rather ARCO's early response action treatment data. There is no presentation of Water Board's treatment data and no other CUD/DS treatment data. These tables seem out of context.

69. Table 32: Section 3.1 states that the data presented in the tables was selected from the database; however, Water Board staff cannot find data on this station in the 2009 Sitewide database.

70. Table 33: Only some of the data presented in the table can be found in the Sitewide Database. These data should be uploaded to the database.

71. Table 33: Abbreviation "AS" is used for this station; however, that abbreviation is not used in the Sitewide Database. The database uses "OS." Acceptable station names should be determined and used consistently for the project.

72. Table 34: Section 3.1 states that the data presented in the tables was selected from the database; however, only some of the data presented can be found in the Sitewide Database. These data should be uploaded to the database.

73. Table 35: The "Dissolved" data of the table has many columns mislabeled and the table also has errors with regards to sample date. For example, the Dissolved Acidity column actually shows data for Dissolved Aluminum, Dissolved Arsenic is actually Dissolved Cobalt. Dissolved Mn is actually Sulfate results. Data in the 10/25/05 row is actually 11/30/05 data. The entire "Dissolved" portion of the table needs to be reviewed and corrected.

74. Table 36: The source information is not correct; this data was not collected by the Water Board. The data presented in the table was not in the 2009 Sitewide Database and should be uploaded to the database. The Water Board collected stream sediment data on 6/26/2002 and 6/16/2003, and these data are available in the 2009 Sitewide Database

75. Tables 37-39: The source information needs correction; the reference to the LRWQCB should be removed. As indicated by the source code "SRK-003," the 1998-1999 Data Summary Report was produced by SRK, under contract to ARCO.

76. Table 38: There are additional and more recent groundwater chemistry data in the 2009 Sitewide Database that was not included in this table. MW-3 has groundwater chemistry data for 6/26/02, 9/25/02, and 11/7/03 that should be considered when evaluating groundwater chemistry.

77. Table 39: Source information is incorrect; the table presents data from multiple sources.

78. Table 39: It is unclear why the table is labeled as "Recent Groundwater Quality Field Parameters" when data presented is over 25 years old and was collected prior to construction of the State of California's Pollution Abatement Project. For the past several years, the USEPA has been collecting current field data for many groundwater wells at the mine. It seems that the more recent USEPA data is more relevant in this table. USEPA's summer field data seems to be missing from the Sitewide database.

79. Figure 37: Stations 23, 24, and 25 are not described nor located on the map. They should be added to the map.

80. Page 52, Section 3.1.1, Previous Investigations: This section provides a list of past documents but fails to mention that copies of these documents and a brief summary for each of the correspondences and investigation reports are also provided in Appendix B. The Water Board declines to review and comment on the completeness and accuracy of ARCO's interpretations and summaries of these past documents. The absence of Water Board's comment should not be construed as Water Board's concurrence of the summaries in Appendix B. There is data available in the reports included as part of Appendix B that should be re-evaluated and added to the database where appropriate, and the criteria used to determine what data should be included in the database and what should be excluded should be re-evaluated and discussed in Appendix B.

81. Page 54, Section 3.1.2: The opening paragraph states that the list of bulleted items has data that "has been included in the document review and uploaded to the project database," and the first bullet states that

USEPA collects biotic data each year. Biotic data collected by USEPA cannot be found in the 2009 version of the database. USEPA's biotic, sediment, and field data should be uploaded to the database.

82. Page 54, Section 3.1.2, 3rd bullet: This statement is not correct. The Water Board did not collect surface water samples to evaluate water quality from the Pond 4 Lime Treatment System (LTS). A station "P4LTS Effluent" is listed as a surface water station in the 2009 database; however, it does not have a station description, nor does it have any associated data. It is unclear how this data was uploaded to the project database as indicated in the introductory paragraph.

83. Page 55, Section 3.1.2: Ongoing surface water flow data collected by the Water Board, via contract with the USGS, should be listed in the section on "ongoing surface water investigations."

84. Page 55, Section 3.1.2, the text states: "The LRWQCB collected sediment samples to evaluate the efficiency of the Pond 4 LTS. Ongoing sediment data is currently being collected in the Pond 4 LTS." This statement is incorrect. Water Board did not collect sediment data related to the Pond 4 LTS. Water Board did collect sediment samples in June 2002 and June 2003 related to macroinvertebrate sampling. The Pond 4 LTS is a treatment system which may produce sludge to sample; however, it does not have sediment to sample.

85. Page 55, Section 3.1.2: The text states: "ongoing groundwater quality data is being collected from MW-3 by the LRWQCB. This data is periodically uploaded to the project database." This statement is incorrect. The Water Board collected three groundwater samples from MW-3 in 2002 and 2003 but does not have an ongoing sampling program for any groundwater locations. The database does not have any data more current than 2003 for MW-3.

86. Page 59, Section 3.2.1.4, 3rd set of bullets at the bottom of Page 59: The first bullet should read, "**Some** seeps and springs, particularly DS and AS, were not diverted into the evaporation ponds and continue to produce ARD that flows into Leviathan and Aspen creeks."

87. Page 59, Section 3.2.1.4, 3rd set of bullets at the bottom of Page 59: The second bullet states: "ARD continued flowing at a rate of 15 to 45 gallons per minute (gpm) in the underdrain below the Leviathan Creek concrete channel (CUD), which was routed directly into Leviathan Creek." What data were used to determine the rate of 15-45 gpm? A plot of the CUD flow averaged by month shows a considerable decrease in the overall flow of the CUD since the inception of the PAP. The source of the data used to calculate the 11.54 acres of constructed pond area should be identified.

88. Page 59, Section 3.2.1.4, 3rd set of bullets at the bottom of Page 59: The third bullet states: "The evaporation ponds were under-sized; as a result, ARD overflowed from the Ponds into Leviathan Creek during periods of high flow each spring." This statement is misleading, as the ponds were never planned to contain all of the AMD all of the time. Because space at the site was limited, the ponds were expected to overflow during peak spring flow so that the high flows would dilute the AMD collected in the ponds. The Leviathan Mine Pollution Abatement Project (PAP) Design Report and Draft Environmental Impact Report states on page 1-5 that "The evaporation pond area would not be sufficient to dispose of all the subsurface drainage, therefore discharge of contaminated water would occur in the early- to mid-spring period of average water years." It should be noted here that the PAP design did not include any treatment of pond water.

89. Page 60, Section 3.2.1.4, last paragraph: The text states, "The AAA requires that the LRWQCB continue to treat flows from the adit and PUD each year as well as the other measures listed above." This statement is not entirely correct; the AAA does not require all the work listed in the bulleted items.

90. Page 65; Section 3.2.2.2: The text states, "The Delta slope stabilization activities included installation of a drain intended to capture surface water runoff from the slope. This drain is called the Delta Slope Underdrain, and it is a discharge point for ARD adjacent to the DS." The Delta Slope Underdrain was not intended to capture surface water runoff from the slope as stated in the text. The Delta Slope Underdrain is a series of subsurface drains installed to improve stability of the Delta Slope.

91. Page 65 and 66, Section 3.2.2.2, Pond 4 Lime Treatment Systems, CUD, and DS, 2005 and 2006: Neither section discusses the reason why the DS was not collected or treated in 2006. The 2006 discussion should explain why nothing from the DS was collected or treated in the 2006 treatment season, resulting in ARCO being fined by USEPA for discharging untreated DS into Leviathan Creek.

92. Page 67, Section 3.2.2.3, HDS Treatment from the Pond 4 Lime Treatment System, 2nd Paragraph: The meaning of "semi-permanent" requires definition. As used in the sentence, the term implies that the HDS treatment system would likely be used longer that the 5-year design plant life as stated in the *Process Design Criteria and Technical Decision Memorandum High Density Sludge Treatment Plant*, prepared in June 2007 by Geomatrix and AMEC for Atlantic Richfield Company. The term "semi-permanent" was not mentioned in the above referenced document. Additionally, Geomatrix prepared the 2007-08 *Treatability Studies and*

Interim Work Plan for Atlantic Richfield in June 2007, which states in Section 3.2.5, "The HDS treatment system will be designed for a service life of up to 3 years and is expected to operate for up to 7 months per year, weather permitting". Again, no reference to a "semi-permanent" HDS treatment system was made.

93. Page 70; Section 3.3.1: Section 3.3.1.1 states, "As part of the scoping evaluation, the site electronic database was reviewed for completeness and then was supplemented and upgraded for future use in the RI/FS process. An inventory of data from various environmental media was prepared and a general assessment of the data quality was conducted. This database update was last provided to the U.S. EPA and the stakeholders in June of 2008." There are lots of data summarized in Section 3.1 that is not in the project database. It is apparent that changes have been made to the database, as is demonstrated by the changes to conductivity data highlighted in a comment above. It is difficult to review a data summary when the data is not available in the database as the text claims. The text states the database was "supplemented and upgraded." Changes made by ARCO in conductivity data submitted by the Water Board are not in a manner that maintains the integrity and usability of the data. None of the "changes and upgrades" to the database were submitted for review by the stakeholders. [Also see Water Board's DQO comment No 8.]

94. Page 70, Section 3.3.1.2, Evaluation of Hydrogeology, 2nd and 3rd Bullet: The term "major" requires definition as used in the statements. The statements are unsupported and contradict statements made previously in the PWP on page 39, Section 2.5.2.3. This appears to be a data gap.

95. Page 71, Section 3.3.1.2, Evaluation of Hydrogeology, Last sentence: The text states: "Based on the hydrogeological model and the data evaluation, investigation data gaps were developed for the RI/FS." These investigation data gaps developed for the RI/FS should be listed and reported in the PWP.

96. Page 71, Section 3.3.1.3, Evaluation of Geochemistry, 1st, 2nd, and 4th Bullets: This section presents examples that are typical throughout the document that the PWP is not consistent in following its own definition in terms of ARD vs. AMD. On Page 9, Section 1.7.2 the text states: *"AMD is considered the outflow of acidic waters specifically from mine features (e.g., tunnels, pit). ARD is considered the outflow of acidic waters from other naturally occurring mineralization or features (e.g., landslides, seeps)."* Here the PWP repeatedly uses ARD to describe discharges from pit and Adit.

97. Page 71 and 72, Section 3.3.1.3, Evaluation of Geochemistry, 4th, 5th, 6th, 7th, 8th, and 9th Bullets: The statements all appear to be data gaps that need to be identified as such in the PWP.

98. Page 72, Section 3.3.1.3, Evaluation of Geochemistry, 9th Bullet: The text states: "An increase in pH along the groundwater flow path in the eastern portion of the site suggests the possible neutralization of groundwater in contact with calcite-bearing rocks." The source data used to support the statement should be identified.

99. Page 72, Section 3.3.1.3, Evaluation of Geochemistry, 10th Bullet: The word "minimized" should be replaced with "controlled."

100. Page 73; Section 3.3.2.1: The DQO Report specifies five study areas but the list provided in Section 3.3.2.1 only specifies four study areas. The Background Study Area is no longer presented as a study area. Why is there no longer a BSA, as has been discussed in prior documents?

101. Page 73: "**3.3.2.2 Continued Use of Interim Response Actions (IRMs)** As noted above, the current SMS includes the use of IRMs to capture and treat discharges from several areas." By extending IRMs into Site Management Strategy for a final remedy, ARCO, in essence, excluded all other remedial alternatives from been considered for final remedy selection in the FS. This is not acceptable under NCP or CERCLA.

102. Page 73, Section 3.3.2.3: The text states, "Based on the CSM's, the greatest current and future risk remaining to human health and the environment is from on-property source and discharge areas: Aspen, pit, CUD, DS, and ponds." It is unclear what is meant by "Aspen," Is this the Aspen Seep or Aspen Creek or something else? It is also unclear what is meant by "pit," Is this the Pit Underdrain, or in fact the open pit area in general? The Water Board objects to the listing of ponds as a "source and discharge area." Ponds capture the Adit and PUD (sources defined by EPA) and are actually part of an interim removal action.

103. Page74: The text states: "The universe of ARARs and TBCs that may apply to the remedial alternatives under consideration at the site were listed to identify how the ARARs influence the feasibility of those alternatives at this point in the RI/FS scoping process." The text only states the ARARs were listed but didn't disclose where they were listed. The ARARs discussion is inadequate. Specific steps should be identified as part of work plan to identify ARARs.

104. Pages 76, Section 3.4: "For the purpose of the CSM, the Leviathan Mine Site is divided into two general areas: the disturbed area of the property where active mining occurred, referred to as "on-property," and the "off-property" areas, defined as all other areas of the site." It is inappropriate

to mix property boundaries with that of the site. Property boundaries do not stop the migration of contaminants nor does they follow the boundary of disturbed areas. For the purpose of the Conceptual Site Model, study areas should not stop at the property boundary. If the distinction between "on-property" and "off-property" is made for developing the CSMs, it should relate the terms to the defined study areas for clarity. For example does the "on-property" area include all of the PSA, LCSA, and ACSA?

105. Page 78, Section 3.4.2, The text states, "This listing will serve as the basis for additional site characterization during the RI/FS." Please clarify if "this list" refers to the entire list in the SOW, or the shortened list for risk assessment?

106. Page 78; Section 3.4.3.1: The term "upper portions of Leviathan Mine Road" is vague. The Water board staff believes that portions of the road both south and north of the mine site should be assessed for placement of mine materials and fugitive dust generation.

107. Page 80, Section 3.4.4.1: "The identification of potential human receptors is based on the characteristics of the site, the surrounding land uses, and the probable future land uses.... Future land use is not anticipated to change in the area surrounding the mine property." It is inappropriate to speculate, at the work plan stage, the future land use decisions which presuppose the potential receptors and exposure routes. Unless all stakeholders enter into a Land Use Covenant (LUC) with specific institutional controls in place, remedial investigation and accompanying risk assessment should, at minimum, include an unrestricted land use scenario.

108. Page 80, Section 3.4.4.1: The receptor "Future On-Site Washoe" was described in the DQO Report but is no longer presented as a receptor in the PWP. Why was this receptor removed from the list? How is this receptor captured by the proposed receptors?

109. Page 80-82, Section 3.4.4.1: Exposure durations are proposed for only two of the seven receptors. Exposure durations should be provided for all receptors.

110. Page 82 and Figures 43 and 44, Section 3.4.4.2: The figures show a green arrow depicting ground water migrating to surface water, but not the reverse. Surface water migrating to ground water is a possibility that should be evaluated.

111. Pages 83-84, Section 3.4.4.3: Changes were made with respect to exposure media for the current "On-Property Trespasser" and future "On-Property Recreational Visitor" between the HH CSM presented in Figure

43 and the CSM presented in the DQO report. The DQO report showed potentially complete exposure pathways for these two receptors for exposure to surface water via direct contact/ingestion and ingestion via aquatic organisms and wildlife. However all three surface water exposure pathways (direct, aquatic organism, and wildlife) were changed to incomplete in the PWP. This is a significant change that is not detailed in the text. The rationale behind the change should be documented in the text. Direct exposure to surface water and ingestion of wildlife should be potentially complete pathways (as was presented in the DQO report).

112. Pages 85-87 and Figure 44, Section 3.4.5: Why does the HH CSM consider the pathway of "Diversion to River Ranch" but the Ecological CSM does not?

113. Page 86 and Figure 44, Section 3.4.5.2: Exposure of Herbivorous Mammals via ingestion and contact with sediment should be considered as a potentially complete pathway as herbivorous mammals may enter and forage in the riparian zone.

Section 4.0: RI/FS Rationale

114. Page 88, Section 4.1, DQOs: The text states: "The data needs presented in the DQO Report are summarized in Table 43 and will form an important part of RI/FS Rationale." Does this table purportedly constitute a complete list of all Data Collection Needs identified by ARCO in the 10/22/08 DQO Report? This does not appear to be a complete or exhaustive list of all data collection needed to complete the RI/FS.

115. Page 89, Section 4.3, Revisions to the CSMs, Item 4, top of Page 89: The text states: "Total sulfate, ferric sulfate, ferrous sulfate, and sulfuric acid were added as COPCs based on their listing in the SOW. However, the CSM clarifies that these inorganic constituents may be used for acid-base accounting, but will not be considered in the human health or ecological risk assessments." The Water Board's Basin Plan contains water quality objectives for sulfate, and the Basin Plan is an important State ARAR. While it may not need to be included in the risk assessment, final remediation goal will have to meet water quality objectives in the Basin Plan, unless those requirements are appropriately waived pursuant to CERCLA and the NCP.

116. Page 89, Section 4.3, Revisions to the CSMs, Item 12, middle of Page 89: The text states: "The duration that each receptor may be exposed at the site was added to the description of each receptor." This is only true for two out of the seven receptors identified.

117. Page 89, Section 4.3, Revisions to the CSMs, Item 13, middle of Page 89: The text states: "Exposure pathways for the recreational users (current and future) were expanded to include consumption of wildlife and fishing." According to Figure 43, this statement is not true. To the contrary, potentially complete exposure pathways via surface water for consumption of wildlife and fishing by future recreational visitors were removed between the DQO and this PWP.

118. Page 90, Section 4.4: This section should also contain Geotechnical Evaluation, Receptor Identification, and Risk Assessment.

119. Page 90, Section 4.4.1, 1st paragraph: "As part of a sitewide study in the RI and in support of the water balance, limited investigation of deeper groundwater may be needed to rule out transport in the next deeper groundwater unit." Water Board staff believes an investigation of the interactions between shallow and deeper groundwater units is a very important task in RI and such investigation should be completed.

120. Page 91, Section 4.4.2, Source Characterization, 2nd Paragraph, the text states: "The overburden or waste pile material should only need to be characterized if it is determined that this material is a source of contamination to Aspen or Leviathan Creek or to address other on-property exposure scenarios." It should be noted that not all overburden or waste pile material have uniform and consistent characteristics. The purpose of characterizing the overburden or waste pile material is to determine if they are sources of contamination. Furthermore, the criteria for characterization should not be limited to risks from on-property exposure scenarios only, but should also include off-property exposure scenarios. Once again, the property lines are not appropriate dividing lines for this RI/FS study.

121. Page 91, Section 4.4.2, Source Characterization, 2nd Paragraph, the text states: "It is only necessary to evaluate waste for chemical composition, chemical characteristics, or migration and dispersal if there is an exposure or release pathway that is relevant to remedial decision making." Statements made earlier in the RI/FS work plan leave the reader to understand that the overburden/waste rock deposited throughout the site (originating in the pit) did, in fact, contain mineralized sulfur ore. Page 29, Section 2.4.4, "Alteration and Mineralization at the Site" states: "Marcasite, pyrite, arsenopyrite, and chalcopyrite occur within the strata above and below the ore body strata (Evans 1977). These sulfide minerals are found throughout the silicified/altered overburden strata in the vicinity of the open pit." All of the aforementioned minerals are acid producing when exposed to water and oxygen through mining practices

Section 5.0: RI Approach

122. Page 94, Section 5.0, RI Approach, 2nd Paragraph: The report should clearly identify which of the SOW's "specific requirements ... are not applicable to the site or are unnecessary to satisfy the data gaps presented in the DQOs."

123. Page 94, Section 5.1: A sitewide geochemical evaluation should be added to this section to determine the solute fate and transport through the mine wastes on site.

124. Page 94, Scope of PWP: The text states: "...this PWP is intended to meet the requirements of the UAO and data gap activities identified in the DQO Report and present a prioritization and general scope and schedule for upcoming RI/FS investigation activities." There is no schedule presented in the PMP.

125. Page 95: "As indicated above, these generalized data needs are considered preliminary and will be refined with more specific DQOs during the development of FRI work plans and other project planning documents. Many of the data needs will also be addressed through the study area investigations described in Section 5.2." It is unclear what the other project planning documents are.

126. Page 98, Section 5.1.2, Sitewide Bioassessment Investigations, Task BIO-3: Herbivorous fish in the vicinity of the site are not shown as a potentially complete pathway as part of the Ecologicial Risk CSM. If they occur in the vicinity of the site, then it seems that the pathway is potentially complete.

127. Page 99, Section 5.1.3, Sitewide Hydrogeologic Investigations, Task HY-3: The sentence discussing "resulting well pairs" is the first mention of installing shallow and deep wells. This should have been explained in Task HY-2. It is unclear if the well pairs would be nested.

128. Page 101, Section 5.1.4, Sitewide Geotechnical Investigations, 2nd bullet: There was not a slope failure in 2004 but a debris flow due to heavy precipitation. The Delta Slope stabilization project was designed and constructed as a long-term slope stability project. It seems there are more important geotechnical investigations to be performed at the site, such as overburden and waste rock piles and pit high walls.

129. Page 102, Task GT-2—Investigation for Storage Pond Expansion: This task appears to be premature. If storage ponds are chosen as a selected final remedy, this task should be part of Remedial Design after the ROD is finalized. The extent of this task should be the same as stated in Page 101, "As with other RI tasks, the geotechnical investigations will be

conducted only to the extent necessary to support remedial decisions for the site."

130. Page 102, Section 5.1.5, Sitewide Storm Water and Snowmelt Runoff Investigations: The text states: "Surface water runoff may also occur as a result of rapid snowmelt, although this is a less likely transport mechanism." "Rain on snow" precipitation events are likely to produce the largest runoff events at the site and have the capacity to move large amounts of sediment. The period of December 31, 2005 to January 1, 2006 is an example of a rain on snow event. It produced the highest flow ever recorded at Station 15.

131. Page 103, Section 5.1.6, Surface water and Sediment Geochemical Investigations: The sediment data cited as collected by the USGS between 1998 and 2005 were actually collected by several entities including ARCO's consultant ENSR, the USGS, and the Water Board.

132. Page 104, Section 5.1.6, Surface Water and Sediment Geochemical Investigations, Task SW-3: It is unclear how an evaluation of chemical mass loading can be accomplished without a sampling and analysis program to evaluate the effects of stormwater runoff. Task SS-2 does not include a comprehensive plan for stormwater runoff sampling. The scope of this task is incomplete. Task SW-3 should add a discussion on what will be done with the surface water samples once collected.

133. Page 105, Section 5.1.7: The background sites being considered in this section should be listed.

134. Page 105, Section 5.1.7, Background Studies; the text states: "Background Groundwater – Groundwater monitoring wells used for background data collection should be installed in areas that have similar geologic alteration patterns but have not been disturbed by mining." Effort should be made to put these borehole locations on a site map. How close is too close to the pit to be considered undisturbed? If the groundwater level is below the mineralization, would the well be discounted as an appropriate background well? How will this study account for changes to hydrology induced by mining, which can alter groundwater chemistry in apparently undisturbed rock?

135. Page 107, Section 5.2.1: An investigation of the Aspen Seep bioreactor area/pond should be included in this section. The ASB discharges treated effluent to an unlined pond which may, in turn, contribute water to the adjacent slide mass, and potentially lubricate the large landslide in the area.

136. Page 108, Section 5.2.1, ACSA, Task ACSA-2 – Investigation of Mine Features: What will occur if the geophysical techniques are not effective?

137. Page 109, Section 5.2.1, ACSA, Task ACSA-4 – Shallow Groundwater Investigation: Will the shallow wells be monitored on a semi-annual basis with the deep monitoring wells?

138. Page 111, Section 5.2.2, PSA, Task PSA-1 – Soil Mapping, Sampling, and Chemical Analysis: The text states: "The results of previous surface soil sampling in the PSA show the highest concentrations of metals and other COPCs at the site. Similarly, data collected from the USGS piezometers and the SRK monitoring wells show the highest concentrations of metals and lowest pH in groundwater wells installed in the PSA." Please see comment No. 6 in our December 5, 2008 letter commenting on the Draft DQO report. It remains unfortunate that a formal data evaluation report was not prepared, and it is unfortunate that statements like those cited above are not supported with appropriate figures and tables.

139. Page 111-112, Section 5.2.2, PSA, Task PSA-2 – Investigation of Mine Features Soil Mapping, Sampling, and Chemical Analysis: The text states: "The open-pit mining operation reportedly destroyed all the remnants of the underground operation (e.g. stopes, adits, raise, and shafts) with the exception of Adit No. 5, although it appears possible that there could be remnants of other underground workings in the pit walls." Please see the PWP Figure 18; it shows remaining unexcavated portions of tunnels 1, 3, and 5. This statement should be revised to reflect what is shown in the figure.

140. Page 114, Section 5.2.3: There should be separate task in this section designed to examine the evaporation ponds and associated piping systems for the possibility of leaks/contribution of contaminants to Leviathan Creek.

141. Page 115, Section 5.2.3, Task LCSA-3: Sentence should read: "Water sources may include precipitation, pond and channel leakage or water discharging through the pit."

142. Page 116, Section 5.2.3, Task LCSA-5: Shallow/deep well pairs should be installed in order to examine the possibility of the transfer of COPCs from shallow to deep flow systems in the DS area.

Section 6.0: Risk Assessment Approach

143. Page 120: Given that so many methods and assumptions will not be presented until the Draft HHRA Work Plan and the Draft ERA Work Plan,

it is imperative that stakeholders are allowed ample time to review and comment on the HHRA and ERA work plans.

144. Page 120; USEPA's Risk Assessment Guidance for Superfund (RAGS) defines baseline risks as "risks that might exist if no remediation or institutional controls were applied at the site." However the text states, "The objective of the HHRA will be to determine whether site COPCs pose a current or potential risk to human health and the environment in the absence of any future remedial action." Despite the fact that the PWP states it will comply with the RAGS guidance, the risk assessment approach seems to differ fundamentally. Does the risk assessment assume that the current level of capture and treatment of AMD will continue into the future? The proposed risk assessment does not seem to be planned to look at impacts from the site under the USEPA definition of "baseline."

145. Page 122: The statement in the text, "...however, the remainder of the mine property is not surrounded by fencing" is not correct. There is a four-strand barbed wire fence that surrounds the disturbed portion of the mine site. The fence has been posted with "No Trespassing" signs.

146. Page 124, Figure 46: The ERA study area is too rigidly defined for this stage in the process. The text should explain that there is the potential for impacts to be found that go beyond the proposed boundaries, and that those impacts will be fully evaluated.

147. Page 127, Section 6.2.3.1: The text lists the habitat classification "open mine" as the last bullet in a list, but this classification is not used on either Figure 45 or 46, nor in Table 46. Will this classification be used?

148. Page 127; Section 6.2.3.1: A definition should be provided for the term "barren." This will aid in field verification of "barren" areas. Many acres of the Pit Study Area, which is depicted as "barren" on Figure 45, have been subject to revegetation and support a variety of native and adapted plants.

149. Section 6.2.3.1, Figures 45 and 46: In addition to the habitat classifications listed in the text, Figures 45 and 46 also show an "impact area" category. This category should be defined and discussed in the text. It is unclear why both the creeks and the roads on the maps indicate "impact area".

150. Page 129, Section 6.2.3.2: The first sentence of this page states, "The representative species selected for each group of target receptors are listed in Table 48." However, the title of Table 48 is Animal Species Potentially Present and Their Preferred Habitat, and the table lists many species for each receptor group. It is unclear if the "potentially present

species" in Table 48 are also the "representative species." Was this statement actually referring to Table 49?

151. Page 129; Section 6.2.3.4: Table 49 presents exposure parameters for vertebrate species selected for assessment. Why were exposure parameters not provided for invertebrate and plant species?

152. Page 129; Section 6.2.4: Details of sampling for plants, soils, sediment, and surface water should be provided in the ERA Work Plan.

Section 7.0: Feasibility Study Approach

No comments

Section 8.0: Data Management Plan (DMP)

153. Page 146, Section 8.2.2, Electronic File Deliverables (EDDs), bottom of the page: Where does the Database Manager mentioned in this section fall in the overall project management hierarchy presented on pages 152-154 in Section 9? Which manager in the hierarchy has ultimate responsibility to assure proper data entry and data management of the database? Who will assure that all changes, revisions or other edits to the original EDD are correct and accurate? Water Board staff believes the original EDDs should also be maintained with redundant backups for cross-reference by the Database Manager (or QA Manager?) when errors are identified in the database. Water Board staff is aware of, and concerned by, existing errors in the database regarding data we have submitted to ARCO.

Section 9.0: Project Management Plan

154. Page 151, Section 9.1, Project Organization: The text states: "To the extent required under the UAO and consistent with work plans submitted to and approved by the U.S. EPA, Atlantic Richfield will be responsible for the following activities:" It is the Water Board's position that, under the UAO, ARCO is to conduct all activities required for the RI/FS.

155. Page 151: "Certain RI/FS tasks may be performed by other entities, including the LRWQCB. Those tasks and entities are not included in the following discussion." The Water Board provides certain information pursuant to the AAA; however, ARCO is required by USEPA, under the UAO, to conduct all tasks for RI/FS.

156. Page 151: "Perform RI and FS investigations (some activities will be shared with the USGS and LRWQCB)." The Water Board provides certain

information pursuant to the AAA; however, ARCO is required by USEPA, under the UAO, to conduct all tasks for RI/FS.

157. Page 151: "Distribute database/GIS updates (with information from LRWQCB, USGS, and others, as appropriate)." The Water Board provides certain information pursuant to the AAA; however, the Water board is under no obligation or any USEPA order to provide information for RI/FS tasks.

Section 10.0: RI/FS Prioritization and Schedule

158. Page 160: "This prioritization will be used in Section 10 to plan and implement the RI work." This statement implies that the same prioritization does not apply to the FS.

159. Page 161: "Strictly following the guidance, on-property work would take precedent over off-property work because these areas represent the greatest current or future potential exposure to human health and the environment and are most relevant to the selection of the final remedy." As commented previously, property lines should not serve as the boundary for RI/FS work. The property line does not stop contamination from migrating across the line nor does it stop current or future potential exposure to human health and the environment.

160. Page 161 to 164: It is not clear how the tasks listed and priority levels assigned on Page 161-163 correlate to the schedule narrative (Section 10.2) on Page 163-164. It is also unclear how these tasks will be accomplished in terms of scheduling and preparation of the various FRI work plans and carrying out their implementation. How many FRIs will be submitted to completely cover the entire scope of work? When will they be submitted? It appears highly speculative, without a detailed schedule, that all 51 tasks outlined can be completed in 3 to 4 years (top of p. 164) and reported on by the end of the fourth year.

161. Page 163: The text states: "The schedule also will depend on the extent to which RI/FS activities are assigned to and performed by other entities, including the LRWQCB." The Water Board (LRWQCB) is not responsible for performing any RI/FS tasks and does not plan to perform any of those tasks. ARCO is required by USEPA, under UAO, to conduct all tasks for the RI/FS.

APPENDIX A: Administrative Order for Remedial Investigation and Feasibility Study, Leviathan Mine, Alpine County, California

No Comments

APPENDIX B: Previous Investigations

The Water Board declines to review and comment on the completeness and accuracy of ARCO's interpretations and summaries of these past documents. The absence of Water Board's comment should not be construed as Water Board's concurrence of the summaries in Appendix B.

APPENDIX C: Sampling and Analysis Plan

162. Page 3; Section 1.2: The second paragraph of this section states, "However, much of the previous data has not been collected under sampling plans or QA/QC procedures that formally meet the requirements of the CERCLA Guidance." This statement is vague and should be refined to clarify as to what relevant data this statement applies. Most of the data collected at the site and submitted to the database has been collected pursuant to USEPA-approved sampling and analysis plans.

163. Page 5, Section 2.2.1: It would be helpful to provide, or reference, a figure showing the Leviathan Creek landslide and the Delta Slope landslide. The text should be corrected to note that the Leviathan Creek landslide is actually located in the Aspen Creek Study Area (ACSA), not in the Leviathan Creek Study Area (LCSA). It would be relevant to note that a slope stabilization project was completed on the Delta Slope, and that it has not shown signs of movement since completion of that project.

164. Table 5: For metals analyses, why is Method 200.8 not included on the list but Method 200.7 is listed?

165. Table 5: Footnote 2 states that Target Limits were evaluated based on the lowest screening level for the regional CTR, MCL, and Basin Plan limits for applicable parameters; however, several parameters have lower screening levels than those presented. The Basin Plan contains lower target limits for Copper. CTR contains lower target limits for Cadmium, Copper, Lead, Nickel, Selenium, and Zinc.

166. Table 5: The Basin Plan contains objectives for Total Dissolved Solids, Acidity, Alkalinity, Sulfate, and Chloride; however, these were not presented as target limits in the table.

167. Table 6: The proposed Expected Detection Limits for Arsenic and Lead are greater than the Target Limits for Soil. This could lead to analytical

results that cannot be compared to the Target Limits. The expected detection limits should be lowered so that data can be compared to all criteria, or an explanation provided as to why this is not achievable or necessary.

168. Table 6: The proposed Expected Detection Limits for Cadmium and Selenium are greater than the Target Limits for Tissue. This could lead to analytical results that cannot be compared to the Target Limits. The expected detection limits should be lowered so that data can be compared to all criteria, or an explanation provided as to why this is not achievable or necessary.

169. Table 7: Table 7 does not list Method 200.7 for metals water samples. Method 200.7 is listed on Table 5. The lists should be the same for both tables.

Appendix A: RI/FS Field Sampling Plan

170. FSP, Section A5.0, page 5: What is meant by a "waste sample"? Is this only referring to investigative-derived waste, or is referring to locations on-site such as "waste piles"?

171. FSP, Section A5.0, page 5: To be consistent with other parts of the PWP, the study area designation for the Leviathan Creek Study Area should be corrected to show an "L" not an "A."

Appendix B: RI/FS Quality Assurance Project Plan

172. Section B2.7.2, page 11: The acronym ENFOS should be defined.

173. Section B3.7.2.2, page 28: The text states: "... laboratory reports will meet the defined BP Level I data deliverables described in the LaMP technical requirements for all samples reported. In addition, BP Level III data deliverables will be required for a minimum of 20 percent of the overall samples collected for the purpose of completing data validation." Given that the LaMP is not part of the SAP, it is not clear what items or documents are included in the BP Level I and BP Level III data packages. The deliverables required for each level should be more thoroughly detailed.

Appendix C: SOPs

174. Page 1, Introduction: Twice on Page 1, the text mentions 28 SOPs, but only 27 are listed on pages 1 and 2, and only 27 SOPs are presented in this section of the document.

175. Page 1-2, Section C1.1.2 Site Notification: "Scheduling should begin a minimum of two weeks prior to initiation of each new field investigation by notifying USEPA Remedial Project Manager, the AMEC Geomatrix RI/FS Manager, the AMEC Site Coordinator, and where applicable, the LRWQCB Coordinator." The Water Board staff requests to be informed prior to initiation of each new field investigation in accordance with the Access Agreement.

176. Page 1-5, Section C1.2.2, Worker, Visitor, and Truck Driver Access, 1st Bullet: "The current gate code for the site is [XXXX]." Water Board staff objects to inclusion of the current site gate code being publicized in this document. We request that ARCO put its own locks on the gates and link them to the Water Board's locks in series so that we can change our gate code and keep it private from this point forward. We further request ARCO give out their gate code on a need-only basis.

177. Page 5-1, Section C5.0, Surface Geophysical Surveys, end of 1st Paragraph: "Depending on the conditions, they may be used to identify buried hazards ...and distinguish between ... contaminated and uncontaminated soil." Water Board staff is not aware of any surface geophysical surveys that can distinguish between contaminated and uncontaminated soils.

178. Page 11-4, Section C11.2, General Logging Procedures, 6th Bullet: "Record the depth of casing for each sample attempt, if applicable." What casing is being referred to here?

179. Page 11-7, Table C-11-1, Terms Used to Describe the Geotechnical Physical Properties of Soil, USCS Soil Classification System for Coarse-Grained Soils (<50% passes #200 sieve): "GM - Silty gravels, poorly-graded gravel-sand-silt mixtures." Based on the categories given in Table C-11, these soils probably should not be defined as poorly graded, but could be either well-graded or poorly graded depending on the grain size distribution of the soils.

180. Page 11-7, Table C-11-1, Terms Used to Describe the Geotechnical Physical Properties of Soil, USCS Soil Classification System for Coarse-Grained Soils (<50% passes #200 sieve): "GC Clayey gravels, poorly-graded gravel-sand-silt mixtures" should read "...gravel-sand-clay mixtures." Additionally, as with the previous comment, based on the categories given in Table C-11, these soils probably should not be defined as poorly graded, but could be either well-graded or poorly graded.

181. Page 11-7, Table C-11-1, Terms Used to Describe the Geotechnical Physical Properties of Soil, USCS Soil Classification System for Fine-Grained Soils (>50% passes #200 sieve): "OL Organic silts & clays of

medium to high plasticity" should read "Organic silts and clays of low to medium plasticity.

182. Page 11-8, Section C11.4, Sampling and Description of Rock, 1st paragraph, top of page: "The classification terms for rock descriptions are presented in Tables C11-1 and C11-2." The rock descriptions are presented in Tables C11-2 and C11-3.

183. Page 11-13, Section C11.5, Rock Core Collection: "Rock cores may be photographed in the core boxes." Water Board staff requests all cores be digitally photographed and the original, unaltered digital files be made accessible to all stakeholders.

184. Page12-5, Section C12.3.1, Field Test Pit Log, 9th Bullet: "elevation and location datum." Water Board staff suggests that GPS coordinates also be included for test pits, as well as boring and well locations.

185. Page 12-6, Section C12.3.2, Field Test Pit Sample Log, last paragraph, bottom of page: "The field test pit sample log will include the sample time, sample depth, sample type (grab or composite), the moisture level (dry, moist, or saturated) ..." According to Table C11-1, Terms Used to Describe the Geotechnical Physical Properties of Soil, the moisture descriptions to be used at the site are dry, moist, and wet. Table C11-1 describes "wet" as "*visible free water, usually soil is below water table.*" This definition would appear to preclude the term "saturated". If saturated is to be used as a descriptor, it should also be included and defined in Table C11-1.

186. Page 13-7, Section C13.4, Borehole Abandonment, 1st Paragraph, Last Sentence: "For boreholes that do not penetrate the water table, the grout materials may be poured from the surface." Deep borings, even when dry, cannot be abandoned by pouring grout materials from the surface. According to State regulations, borings over 30 ft deep must have grout materials placed by tremie or other appropriate method. In some counties, more stringent regulations may apply.

187. Page 14-3, C14.2.1, Penetration Test and Split Barrel Sampling, 4th Paragraph, 1st Sentence: "Penetration test and split-barrel sampling are methods used to collect representative disturbed soil samples." Typically, these methods are used to collect relatively undisturbed soil samples.

188. Page15-2, Section C15.0, Borehole Geophysical Surveys, 1st Paragraph: The text states: "This Standard Operating Procedure (SOP) describes setup procedures that will be performed by the field geologist or engineer that will observe the surface geophysical survey. This SOP does not include procedures for conducting a surface geophysical survey. It is

expected that the surface geophysical survey will be subcontracted to a third party that is appropriately qualified and specializes in such investigations. In addition to the setup procedures, this SOP includes a discussion of various surface geophysical technologies that may be used during the course of the RI to provide background information for the observing field personnel." This paragraph is very confusing. If the author intends to discuss surface geophysical survey, this paragraph should be moved to a separate section entitled "Surface Geophysical Surveys" and not be included in this Section which is for "Borehole Geophysical Surveys."

189. Page 16-1, Section C16.0 – Installation and Construction of Groundwater Monitoring Wells and Piezometers: This section should state that well locations and top of well casing elevations will be surveyed by a California-licensed Land Surveyor to the nearest 0.01 foot (ft) in the vertical and 0.1 ft in the horizontal. Water Board staff also recommends that they be surveyed by GPS.

190. Page 17-5, Section C17.3, Piezometer Sampling: "Piezometers are a permanent or temporary well that may be designed and constructed without the surface sealing or sand filter pack requirements of a monitoring well." A piezometer designed without appropriate annular materials could allow cross-contamination at the site. Any piezometers constructed on site must be designed with adequate surface seals to prevent cross contamination. All subsurface structures designed for the purposes of monitoring and/or sampling groundwater must be constructed in accordance with all applicable Federal, State and local laws and regulations.

191. Page 18-6, Section C18.3, Hydropunch In-Situ Groundwater Sampling, Last Paragraph, Bullet 2: This bullet appears to be referencing hydropunch groundwater samples, not grab groundwater samples as stated.

192. Page 20-6, Section C20.3, Seepage Meter Installation, Figure 20.3: The surface water level indicates surface flow from left to right, yet the figure description below it states the flow is right to left. The schematic presented in Figure 20.3 does not match the installation description on p. 20-5.

193. Page 21-4, Section C21.3, Operation: The 8th bullet refers to repeating "steps 3 thru 9," yet there are no numbered steps in this or any other section in SOP C21. Even assigning the bullets numbers does not correlate to the step numbers given.

APPENDIX D: Task Specific Health and Safety Plan

194. Comment on June 2009 AMEC Geomatrix Task Specific Health and Safety Plan RI/FS Activities, Page 8, Table 2, Emergency Response Telephone Numbers: Change Chein Kao's phone number from (530) 543-6754 to (530) 542-5461. Remove Douglas Carey as Site Manager and add Chuck Curtis as Division Manager, phone number (530) 542-5460.