



# California Regional Water Quality Control Board Lahontan Region

Alan C. Lloyd, Ph.D.  
Agency Secretary

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<http://www.waterboards.ca.gov/lahontan>

Arnold Schwarzenegger  
Governor

ROBERT MUSIAL  
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SWS  
revised

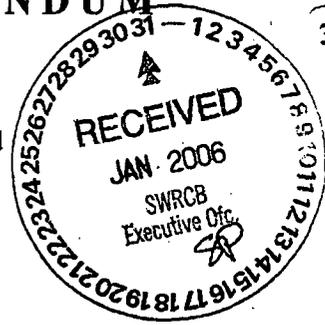
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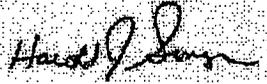
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RAH  
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303 (d) Deadline  
1/31/06

## MEMORANDUM

TO: Craig J. Wilson  
Division of Water Quality  
State Water Resources Control Board



FROM:   
Harold J. Singer  
Executive Officer  
LAHONTAN REGIONAL WATER QUALITY CONTROL BOARD

DATE: January 31, 2006

SUBJECT: COMMENTS ON STATE WATER BOARD STAFF  
RECOMMENDATIONS FOR LAHONTAN REGION WATERS IN THE  
2006 SECTION 303(D) LIST UPDATE

My staff and I have reviewed State Water Board staff's draft recommendations for changes to California's Clean Water Act Section 303(d) list of impaired surface waters as they affect the Lahontan Region. Many of these recommendations were developed in cooperation with my staff, and we thank you for the opportunity for input on preliminary drafts. We support the recommendations to delist a number of Lahontan Region water bodies or water body-pollutant combinations that do not meet current criteria for listing (staff report Volume 1, page 36). However, we disagree with several other recommendations, as discussed in the comments below. Also, we are providing water body fact sheets and supporting information for delisting one water and for listing three waters in the "Water Quality Limited Segments Being Addressed" category of the 303(d) list.

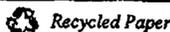
#1  
1a.  
1b.

### Use of OEHHA "Screening Value" Criteria

Several Lahontan Region waters are recommended to be listed (or to remain listed) due to Toxic Substances Monitoring Program (TSMP) fish tissue data that exceed Office of Environmental Health Hazard Assessment (OEHHA) "Screening Value" (SV) criteria. Fact sheets for other regions show that SV criteria are being used to define impairment statewide. These criteria appear to be substitutes for OEHHA's Maximum Tissue Residue Levels (MTRLs). MTRLs and Elevated Data Levels (EDLs) are two types of criteria that have been used to interpret TSMP tissue data in the past. The State Water Board's listing policy (Section 6.1.3.2) states:

"2. Evaluation Guidelines for Protection from the Consumption of Fish and Shellfish:  
RWQCBs may select evaluation guidelines published by USEPA or OEHHA. Maximum

California Environmental Protection Agency



*Tissue Residue Levels (MTRLs) and Elevated Data Levels (EDLs) shall not be used to evaluate fish or shellfish tissue data."*

Section 6.1.3 of the policy also calls for the use of multiple lines of evidence.

SECTION 6.1.3.2

#12

Based on the context and purpose of TSMP sampling, we interpret this section of the policy to mean that TSMP results should not be used as the sole reason for listing. During development of the listing policy, Total Maximum Daily Load (TMDL) Roundtable members, including Lahontan Water Board staff, repeatedly expressed concern that the TSMP was meant to be only a screening tool, and that TSMP sampling was not designed to be statistically representative of a given water body. A further difficulty with interpreting TSMP results in the Lahontan Region is that trout are often hatchery-grown plants, and tissue data from hatchery trout are not necessarily representative of ambient water quality conditions.

#16

#2

The reference cited in the State Water Board staff report for SV criteria is a 1999 OEHA study by Brodberg and Pollock on San Pablo and Black Butte Reservoirs in the Coast Range. This report is available online at: <http://www.oehha.ca.gov/fish/pdf/Cx8258.pdf>. It states (Section 5 on page 4):

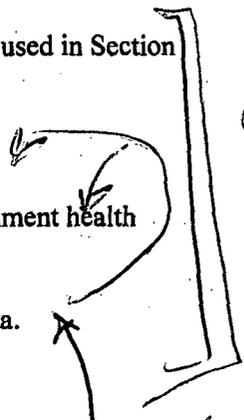
*"The Screening Value (SV) approach is recommended by USEPA (1995) to identify chemical contaminants in fish tissue at concentrations which may be of human health concern for frequent consumers of sport fish. The SVs are not intended as levels at which consumption advisories should be issued but are useful as a guide to identify fish species and chemicals from a limited data set, such as this one, for which more intensive sampling, analysis or health evaluation are to be recommended."*

On pages 5 and 16 of this report, Brodberg and Pollock state that California SVs were calculated specifically for their 1999 study. California SVs were apparently not meant to have wider application. To our knowledge, SVs have not been approved as formal OEHA criteria (in the same sense as Public Health Goals for chemical pollutants). If the State Water Board approves the use of California SV criteria as statewide listing factors, it will set a precedent and effectively mandate the use of these criteria by Regional Water Boards in future list update cycles. This contradicts the optional direction in Section 6.1.3.2 of the listing policy.

USED.

For the reasons outlined above, I believe that TSMP data and SVs should not be used in Section 303(d) listing for any water body unless and until:

- Additional tissue sampling has been done to verify the impairment;
- A fish consumption advisory has been issued by OEHA or local government health authorities; and/or
- Impairment is corroborated by ambient water and/or sediment quality data.



WAS ADDED LATER  
AS #23 UNDER 2012  
REVISION REVIEW RAN  
3/28/06

The Susan R. should not be listed for mercury. The few tissue samples collected

Mr. Wilson

Susan River

The State Water Board staff report (Volume 1, page 25 and Volume III, pages 16 and 17) recommends listing of the Susan River for mercury, based on four fish tissue samples collected in the TSMP. Mercury levels in two of these samples exceeded the OEHHA Screening Value criteria. In 2001, OEHHA staff contacted Lahontan Water Board staff to discuss the 1999 TSMP results for mercury in the Susan River. These results exceeded the MTRB then in effect (0.37 mg/kg, calculated by multiplying the California Toxics Rule standard for mercury by a bioconcentration factor). OEHHA was considering the need for a fish consumption advisory for the Susan River in 2001, but to date no advisory has been issued. We are not aware of any further studies of the river by OEHHA to confirm the need for an advisory. Because of the limitations of TSMP data and SV criteria discussed above, I do not believe that the Susan River should be listed for mercury until further studies have been done to verify impairment.

3

The most significant sources of mercury in the Susan River watershed are probably natural volcanic and geothermal sources. The State Water Board's listing policy is silent on the issue of natural sources. However, the Lahontan Water Board successfully made a case for delisting a number of "naturally impaired" water bodies during the 2002 list update cycle. Our Basin Plan (page 3-2) states:

*"Controllable water quality factors are those actions, conditions, or circumstances resulting from human activities that may influence the quality of the waters of the State, and that may reasonably be controlled. ..."*

*After application of reasonable control measures, ambient water quality shall conform to the narrative and numerical water quality objectives included in this Basin Plan. When other factors result in the degradation of water quality beyond the limits established by these water quality objectives, controllable human activities shall not cause further degradation of water quality in either surface or ground waters."*

There was a short-lived 19<sup>th</sup> century gold rush in the Susan River watershed. We have no information on the extent to which mercury was used or discharged in connection with this mining. However, anthropogenic loads of mercury in the Susan River watershed are likely to be small in proportion to loads from natural sources, and TMDL development to control anthropogenic sources might not result in significant improvements in the levels of mercury in fish tissue.

Natural sources of mercury may cause high fish tissue levels in other parts of the Lahontan Region, and present similar problems for TMDL development and implementation. The State Water Board should take a comprehensive look at natural sources of mercury during its ongoing development of a statewide water quality objective for methylmercury. The implementation policy for the statewide mercury objective should provide direction on the need for Section 303(d) listing and TMDL development in situations where most or all sources of mercury are not controllable.

#3

Mammoth Creek

California Environmental Protection Agency

Mammoth Creek was originally listed for "metals" as a result of TSMP samples showing elevated levels (EDLs) of silver and zinc in fish tissue. Elevated silver and nickel were also found in fish tissue samples from Hot Creek (the lower reach of Mammoth Creek). During the 1998 Section 303(d) list update cycle, State Water Board guidance provided the opportunity to delist waters that were listed only on the basis of EDLs in fish tissue. A number of Lahontan Region waters were delisted at that time. Mammoth Creek was not recommended for delisting in 1998 because of a concern that stormwater, as well as natural sources, might be contributing metals to the creek. Hot Creek was delisted for metals during the 2002 list update cycle.

#4  
~~The State Water Board staff report for the 2006 list update ("Do Not Delist Report", pages 554-555) recommends that Mammoth Creek be listed for mercury, based on the (1992) TSMP fish tissue data and the OEHHA Screening Value (SV) criteria. This is apparently meant as a clarification of the existing "metals" listing. We disagree with the proposed listing of Mammoth Creek for mercury, based on our concerns about the limitations of the TSMP and SV criteria, and on the probability that mercury in fish tissue and ambient water samples comes largely or entirely from natural sources. (Our Surface Water Ambient Monitoring Program database includes several water samples collected by the U.S. Geological Survey [USGS] between 2001 and 2004 with total recoverable mercury concentrations exceeding California toxics rule standards.)~~

Mammoth Creek is located within the volcanic Long Valley Caldera and is continuous with geothermally influenced Hot Creek. There was some 19<sup>th</sup> century gold mining in the Mammoth Creek watershed. The extent of mercury use in connection with this mining is unknown. Lahontan Region staff and USEPA staff recently collected three samples from a tributary of Mammoth Creek near an inactive mine. Results showed low levels of arsenic but no detectable metals in a suite of 17 metals analyzed. ]

4  
 As noted in our comments on the Susan River, above, any human sources of mercury in Mammoth Creek are likely to be small in proportion to natural sources, and TMDL development to control anthropogenic sources might not result in any significant improvements in the levels of mercury in fish tissue. ~~The State Water Board should not list Mammoth Creek for mercury during the 2006 list update cycle, but should address mercury in waters of the Long Valley Caldera and other volcanic/geothermal areas in its forthcoming methylmercury policy.~~ Further fish tissue studies and issuance of fish consumption advisories may be appropriate for Mammoth and Hot Creeks.

#### Aspen, Bryant and Leviathan Creeks

5  
 Lahontan Water Board staff has recently provided information and data to State Water Board staff (attached) that ~~recommends moving Aspen, Bryant and Leviathan Creeks to the "Water Quality Limited Segments Being Addressed" category of the 303(d) list.~~ These creeks are affected by acid mine drainage from the Leviathan Mine. ~~In May 2000, the USEPA placed Leviathan Mine on the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) National Priorities List, thus making Leviathan Mine a Superfund site. Since that listing, the USEPA has issued cleanup directives to the Lahontan Water Board, which~~

California Environmental Protection Agency

administers the site for the State Water Board and State of California (the State owns the mine site), and to the Atlantic Richfield Company, which is responsible for the liabilities of Anaconda Mining, the company that developed and operated the mine site. These directives have resulted in response actions reducing acid mine drainage to the creeks. The CERCLA process will ultimately require compliance with all applicable or relevant and appropriate requirements, including compliance with water quality standards. The site is in the Remedial Investigation/Feasibility Study stage of the CERCLA process. A Record of Decision that identifies the complete cleanup solution for the mine site is expected in 2010.

Bear Creek

6

~~The Lahontan Water Board received data and information on the biologic condition of Bear Creek from the Truckee River Watershed Council on January 30, 2006. The Watershed Council recommends maintaining the 303(d)-listing for sediment for this water. Lahontan Water Board staff had earlier submitted data and information to State Water Board staff recommending de-listing Bear Creek. Lahontan Water Board staff have not had the opportunity to assess the Watershed Council's submittal. We request the opportunity to comment on this new information prior to the State Water Board decision on listing or de-listing this water.~~

Bodie Creek

7

NEW DATA - FROM METALS TO MERCURY HOWEVER, DATA HAS NOT BEEN SUBMITTED

~~Bodie Creek is currently Section 303(d)-listed for "metals." Based on the results of an impairment verification survey, I recommend that the listing be refined from the non-specific "metals" category to "mercury." The survey is available online at: [http://www.waterboards.ca.gov/lahontan/TMDL/Bodie\\_Creek/bodie\\_creek\\_project\\_report-12-04.pdf](http://www.waterboards.ca.gov/lahontan/TMDL/Bodie_Creek/bodie_creek_project_report-12-04.pdf)~~

AS AN ATTACHMENT 03/28/06

State Water Board staff's recommendations for Bodie Creek in the 2006 list are included in the "Do Not Delist" report (pages 551 and 552). The fact sheet does not cite the Lahontan Water Board report but concludes that Bodie Creek should "remain" listed for mercury due to fish tissue sample violations of OEHHA Screening Value Criteria. As stated in our comments for the Susan River and Mammoth Creek, we disagree with the use of TSMP data and SV criteria as the sole grounds for Section 303(d) listing. However, since the impairment verification report includes additional data, we believe that listing of Bodie Creek for mercury is appropriate. ~~Our online report notes violations of criteria for several other metals but concludes that listing for these metals is not appropriate because they are from natural sources. For consistency with similar recommended changes in listed pollutants for Crowley Lake, Bodie Creek should be delisted for metals and listed for mercury. The fact sheets for these changes should be included in Volume III of the staff report rather than the "Do Not Delist" report.~~

8 NEW DATA - DE LIST FOR METALS HOWEVER, DATA HAS NOT BEEN SUBMITTED AS AN ATTACHMENT 03/28/06

Clearwater Creek

~~Lahontan Water Board staff has recently provided information and data to State Water Board staff (attached) that recommends delisting Clearwater Creek. Biological assessment of the creek indicates no impairment.~~

Crowley Lake

~~The State Water Board staff report proposes delisting Crowley Lake for nitrogen and phosphorus and listing it for dissolved oxygen and ammonia. Lahontan Water Board staff recommended this change. A University of California study of the lake showed that nutrients come mostly from natural sources, and that regionwide water quality objectives for dissolved oxygen and ammonia are being violated. (Crowley Lake does not have site-specific objectives for any of these constituents.)~~

Elevated ammonia and depressed dissolved oxygen concentrations are associated with eutrophic conditions in Crowley Lake. Eutrophication is in turn the result of impoundment of water with naturally high sources of nutrients. Therefore, ~~we plan to develop site-specific objectives or other Basin Plan amendments that recognize and account for natural nutrient loading and the effects of reservoir management on the development of eutrophic conditions in Crowley Lake. We do not anticipate preparing TMDLs for nutrients or for dissolved oxygen and ammonia in this lake. However, it is appropriate to list Crowley Lake for these constituents until listing issues can be resolved through Basin Plan amendments.~~

Searles Lake

During the 2002 list update cycle, the Lahontan Water Board recommended delisting Searles Lake for "Salinity/TDS/Chlorides" because the salts were from natural sources. We also recommended listing the lake for petroleum hydrocarbons. The State Water Board delisted Searles Lake for salinity and decided not to list it for petroleum hydrocarbons because the Lahontan Water Board had a permit in place to control discharges from brine mining operations. Using the 2004 listing policy criteria, the State Water Board staff report now recommends that Searles Lake be listed for both pollutants, but in the "Water Quality Limited Segments Being Addressed" category.

The recommended listing for Salinity/TDS/Chlorides in the "Water Quality Limited Segments Being Addressed" category is appropriate, as the WILD beneficial use is not fully met at the lake. This is due to birds landing on brine ponds and drowning due to salt encrustation or dieing due to salt ingestion. The Department of Fish and Game has approved Searles Valley Minerals (the operator of brine mining operations at the lake) mitigation plan under Fish and Game Code Section 3005 that allows a certain level of unavoidable and incidental take of waterfowl. It may be appropriate to modify the WILD beneficial use designation of Searles Lake in the Lahontan Basin Plan to recognize this condition. ~~The factsheet for the "Salinity/TDS/Chlorides" listing (Volume III, pages 14 and 15) includes some typographical errors. Information from the fact sheet (pages 12 and 13) for the petroleum hydrocarbons listing was apparently copied and pasted~~

112.

~~to the "Lines of Evidence" section of the salinity fact sheet. This information should be deleted and replaced with language on salinity.~~

116

~~Lahontan Water Board staff disagrees with the recommended listing of Searles Lake for petroleum hydrocarbons. Discharges of petroleum hydrocarbons at Searles Lake are no longer causing violations of water quality objectives or impacting beneficial uses. Information used in State Water Board staff recommendations is dated and does not reflect the current conditions.~~

Schedules for Completion of TMDLs

12

~~The State Water Board staff report (Volume I, page 70) includes recommendations for Lahontan Water Board TMDLs to be completed by 2008. Completion dates were apparently taken from the TMDL Planner Tracker database. The schedules in this database are not current for Lahontan Water Board projects. As explained below, we no longer plan to develop TMDLs for many of the water bodies listed on page 70.~~

The proposed schedule includes our two completely approved TMDLs, for Heavenly Valley Creek and Indian Creek Reservoir. These TMDLs should not be included in the schedule for future work. Their inclusion could be confusing to the public, implying that completion is overdue. When the final Section 303(d) list and schedule are submitted to the U.S. Environmental Protection Agency (USEPA), they should include footnotes identifying all TMDLs that have been fully approved.

The following is a summary of our plans for the waters listed on page 70 that have not yet been addressed through completed TMDLs:

1. **Ward and Blackwood Creeks.** As indicated in the Lahontan Water Board's 2001 staff report for our 2002 list update recommendations, ~~the loading of sediment and nutrients from Section 303(d)-listed tributaries of Lake Tahoe will be addressed through the pending Lake Tahoe TMDL. Separate TMDLs for listed tributary streams may be completed later (after 2008) if refinement of loading estimates is needed.~~ If separate TMDLs are not needed, we will request that these streams be placed on the "Water Quality Segments Being Addressed" list, because they will be addressed through the Lake Tahoe TMDL implementation program.

~~We intend to address violations of water quality objectives for iron in tributaries of Lake Tahoe by revising the objectives. (The current objectives are based on the drinking water Maximum Contaminant Level, rather than on site-specific monitoring data, and are violated even in a reference stream, General Creek.) Update of the objectives will require review of the scientific literature on iron cycling and beneficial use impacts, and consideration of the role of iron as a nutrient in Lake Tahoe. If the new objectives are set at levels monitored in the reference stream, some Tahoe tributary streams with disturbed watersheds may still be in violation. Iron TMDLs for such streams will be completed after 2015, if needed.~~

CJW

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 2. **Bodie Creek.** As noted in the comments above, the Bodie Creek listing should be changed from "metals" to "mercury." Our online impairment verification report recommends additional sampling, as funding and staff resources allow, to determine trends in mercury concentrations and locations of potential sources, and to facilitate assessment of remediation potential. ~~We do not expect to develop a TMDL, or to consider addressing the Bodie Creek listing through other programs, until further sampling is done. If a TMDL is needed, it will be completed after 2008.~~

15 ~~13~~  
 3. **Bridgeport Reservoir.** ~~We currently plan to address the Bridgeport Reservoir listings by developing site-specific objectives and/or amending the Basin Plan to recognize the role of hydromodification and reservoir management in maintaining eutrophic conditions in the reservoir.~~

16 ~~14~~  
 4. **Truckee River.** ~~A review of monitoring data collected since this stream was listed for sediment shows that the Truckee River does not meet current criteria for listing. Recognizing that the Truckee River is threatened by discharges of sediment from stormwater runoff associated primarily with development, the Regional Board plans to designate the Truckee River watershed portions of Placer and Nevada Counties and the Town of Truckee as needing Phase II municipal stormwater permit coverage. We no longer plan to complete sediment TMDLs for this water. When the permit is in place, it will be appropriate to move this listing to the "Water Quality Limited Segments Being Addressed" category of the 303(d) list.~~

CURRENTLY LISTED FOR SEDIMENT - THEY SAY IT SHOULD NOT BE LISTED BASED ON NEW DATA HOWEVER NO NEW DATA HAS BEEN SUBMITTED 03/28/06

AS AN ATTACHMENT

17 ~~15~~  
 5. **Hot Springs Canyon Creek.** ~~Additional impairment verification assessment is needed for this creek. A TetraTech study of five creeks in the Bodie Hills did not assess any new information on this creek. The condition of the creek is unknown. TMDL development, if appropriate, will not occur until 2008, at the earliest.~~

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 6. **Donner Lake.** ~~The impairment verification study for Donner Lake has not yet been completed, and we will not consider a schedule for TMDL development for the lake until study results are available. We expect the study to be completed within the year, and a recommendation for a TMDL development schedule or other appropriate action will be made at that time and can be reflected in the next 303(d) list.~~

19  
 7. **Lake Tahoe.** ~~Our currently projected date for Lahontan Water Board action on Lake Tahoe sediment and nutrient TMDLs is 2008, rather than 2007. The implementation plan for this TMDL will depend on the Tahoe Regional Planning Agency's (TRPA's) pending revisions to its regional land use plan and Section 208 Water Quality Management Plan. TRPA expects to act on its own plans in late 2007. The TRPA action date will affect the schedule for Regional Board action on Basin Plan amendments for the TMDL.~~

20  
 8. **Squaw Creek.** Our current schedule calls for Lahontan Water Board action on the Squaw Creek sediment TMDL in April 2006, rather than 2005.

9. *Susan River.* The final report on the Lahontan Water Board's Susan River Toxicity Testing Project has recently been posted online at [http://www.waterboards.ca.gov/lahontan/TMDL/Susan\\_River/docs/toxicityreport.pdf](http://www.waterboards.ca.gov/lahontan/TMDL/Susan_River/docs/toxicityreport.pdf). This study did not associate observed toxicity with any specific pollutant, though certain pesticides were present where toxicity was identified. The Lahontan Water Board is working with the Department of Pesticide Regulation, pursuant to the Management Agency Agreement between DPR and the State Water Board, to address the detected pesticides. Unless and until a pollutant is implicated, we do not expect to develop a TMDL to address this listing.

In summary, the only TMDLs currently planned for Lahontan Water Board action between 2006 and 2008 are those for Squaw Creek and Lake Tahoe. We expect to address listings of additional waters between 2006 and late 2008 through methods other than TMDLs.

*Discrepancies in Summary Tables*

Table 5 on page 13 of Volume 1 of the staff report summarizes the total numbers of new listings and delistings recommended for each Region. It shows 8 new listings and 24 delistings for the Lahontan Region. However, there are different numbers in the full lists of recommendations. Six new listings are recommended for the Lahontan Region on page 25 of the staff report, and 22 delistings on page 36. The final tables should be made consistent with each other.

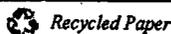
Two of the Lahontan Water Board's "new" listings are actually for completed and fully approved TMDLs. Two other listings (for Searles Lake and Mono Lake) are actually "relistings" of waters delisted due to "programs in place" in 2002. One new listing (of Crowley lake for DO and ammonia) is accompanied by a delisting (for N and P). These situations should be clarified through footnotes to the final draft Section 303(d) list that goes before the State Water Board.

Please contact Judith Unsicker of my staff at (530) 542-5462 or [junsicker@waterboards.ca.gov](mailto:junsicker@waterboards.ca.gov) if you have any questions about the technical or historical information summarized above. You may also contact me at (530) 542-5412 or Chuck Curtis at (530) 542-5460 if you wish to discuss these comments or our projected schedules for completion of TMDLs.

Attachments

JEU/didT:/303d/2006listcomments.doc

**California Environmental Protection Agency**





California Regional Water Quality Control Board  
Lahontan Region



Alan C. Lloyd, Ph.D.  
Agency Secretary

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Arnold Schwarzenegger  
Governor

130

MEMORANDUM

TO: Craig J. Wilson  
Division of Water Quality  
State Water Resources Control Board

648

FROM: Harold J. Singer  
Executive Officer  
LAHONTAN REGIONAL WATER QUALITY CONTROL BOARD

DATE: January 31, 2006

SUBJECT: COMMENTS ON STATE WATER BOARD STAFF  
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There was a short-lived 19<sup>th</sup> century gold rush in the Susan River watershed. We have no information on the extent to which mercury was used or discharged in connection with this mining. However, anthropogenic loads of mercury in the Susan River watershed are likely to be small in proportion to loads from natural sources, and TMDL development to control anthropogenic sources might not result in significant improvements in the levels of mercury in fish tissue.

Natural sources of mercury may cause high fish tissue levels in other parts of the Lahontan Region, and present similar problems for TMDL development and implementation. The State Water Board should take a comprehensive look at natural sources of mercury during its ongoing development of a statewide water quality objective for methylmercury. The implementation policy for the statewide mercury objective should provide direction on the need for Section 303(d) listing and TMDL development in situations where most or all sources of mercury are not controllable.

**Mammoth Creek**

***California Environmental Protection Agency***

Mammoth Creek was originally listed for "metals" as a result of TSMP samples showing elevated levels (EDLs) of silver and zinc in fish tissue. Elevated silver and nickel were also found in fish tissue samples from Hot Creek (the lower reach of Mammoth Creek). During the 1998 Section 303(d) list update cycle, State Water Board guidance provided the opportunity to delist waters that were listed only on the basis of EDLs in fish tissue. A number of Lahontan Region waters were delisted at that time. Mammoth Creek was not recommended for delisting in 1998 because of a concern that stormwater, as well as natural sources, might be contributing metals to the creek. Hot Creek was delisted for metals during the 2002 list update cycle.

The State Water Board staff report for the 2006 list update ("Do Not Delist Report", pages 554-555) recommends that Mammoth Creek be listed for mercury, based on the (1992) TSMP fish tissue data and the OEHHA Screening Value (SV) criteria. This is apparently meant as a clarification of the existing "metals" listing. We disagree with the proposed listing of Mammoth Creek for mercury, based on our concerns about the limitations of the TSMP and SV criteria, and on the probability that mercury in fish tissue and ambient water samples come largely or entirely from natural sources. (Our Surface Water Ambient Monitoring Program database includes several water samples collected by the U.S. Geological Survey [USGS] between 2001 and 2004 with total recoverable mercury concentrations exceeding California Toxics rule standards.)

Mammoth Creek is located within the volcanic Long Valley Caldera and is continuous with geothermally influenced Hot Creek. There was some 19<sup>th</sup> century gold mining in the Mammoth Creek watershed. The extent of mercury use in connection with this mining is unknown. Lahontan Region staff and USEPA staff recently collected three samples from a tributary of Mammoth Creek near an inactive mine. Results showed low levels of arsenic but no detectable metals in a suite of 17 metals analyzed.

As noted in our comments on the Susan River, above, any human sources of mercury in Mammoth Creek are likely to be small in proportion to natural sources, and TMDL development to control anthropogenic sources might not result in any significant improvements in the levels of mercury in fish tissue. The State Water Board should not list Mammoth Creek for mercury during the 2006 list update cycle, but should address mercury in waters of the Long Valley Caldera and other volcanic/geothermal areas in its forthcoming methylmercury policy. Further fish tissue studies and issuance of fish consumption advisories may be appropriate for Mammoth and Hot Creeks.

#### **Aspen, Bryant and Leviathan Creeks**

Lahontan Water Board staff has recently provided information and data to State Water Board staff (attached) that recommends moving Aspen, Bryant and Leviathan Creeks to the "Water Quality Limited Segments Being Addressed" category of the 303(d) list. These creeks are affected by acid mine drainage from the Leviathan Mine. In May 2000, the USEPA placed Leviathan Mine on the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) National Priorities List, thus making Leviathan Mine a Superfund site. Since that listing, the USEPA has issued cleanup directives to the Lahontan Water Board, which

administers the site for the State Water Board and State of California (the State owns the mine site), and to the Atlantic Richfield Company, which is responsible for the liabilities of Anaconda Mining, the company that developed and operated the mine site. These directives have resulted in response actions reducing acid mine drainage to the creeks. The CERCLA process will ultimately require compliance with all applicable or relevant and appropriate requirements, including compliance with water quality standards. The site is in the Remedial Investigation/Feasibility Study stage of the CERCLA process. A Record of Decision that identifies the complete cleanup solution for the mine site is expected in 2010.

### **Bear Creek**

The Lahontan Water Board received data and information on the biologic condition of Bear Creek from the Truckee River Watershed Council on January 30, 2006. The Watershed Council recommends maintaining the 303(d)-listing for sediment for this water. Lahontan Water Board staff had earlier submitted data and information to State Water Board staff recommending de-listing Bear Creek. Lahontan Water Board staff have not had the opportunity to assess the Watershed Council's submittal. We request the opportunity to comment on this new information prior to the State Water Board decision on listing or de-listing this water.

### **Bodie Creek**

Bodie Creek is currently Section 303(d)-listed for "metals." Based on the results of an impairment verification survey, I recommend that the listing be refined from the non-specific "metals" category to "mercury." The survey is available online at: [http://www.waterboards.ca.gov/lahontan/TMDL/Bodie\\_Creek/bodie\\_creek\\_project\\_report\\_12\\_04.pdf](http://www.waterboards.ca.gov/lahontan/TMDL/Bodie_Creek/bodie_creek_project_report_12_04.pdf).

State Water Board staff's recommendations for Bodie Creek in the 2006 list are included in the "Do Not Delist" report (pages 551 and 552). The fact sheet does not cite the Lahontan Water Board report but concludes that Bodie Creek should "remain" listed for mercury due to fish tissue sample violations of OEHHA Screening Value Criteria. As stated in our comments for the Susan River and Mammoth Creek, we disagree with the use of TSMP data and SV criteria as the sole grounds for Section 303(d) listing. However, since the impairment verification report includes additional data, we believe that listing of Bodie Creek for mercury is appropriate. Our online report notes violations of criteria for several other metals but concludes that listing for these metals is not appropriate because they are from natural sources. For consistency with similar recommended changes in listed pollutants for Crowley Lake, Bodie Creek should be delisted for metals and listed for mercury. The fact sheets for these changes should be included in Volume III of the staff report rather than the "Do Not Delist" report.

**Clearwater Creek**

Lahontan Water Board staff has recently provided information and data to State Water Board staff (attached) that recommends delisting Clearwater Creek. Biological assessment of the creek indicates no impairment.

**Crowley Lake**

The State Water Board staff report proposes delisting Crowley Lake for nitrogen and phosphorus and listing it for dissolved oxygen and ammonia. Lahontan Water Board staff recommended this change. A University of California study of the lake showed that nutrients come mostly from natural sources, and that regionwide water quality objectives for dissolved oxygen and ammonia are being violated. (Crowley Lake does not have site-specific objectives for any of these constituents.)

Elevated ammonia and depressed dissolved oxygen concentrations are associated with eutrophic conditions in Crowley Lake. Eutrophication is in turn the result of impoundment of water with naturally high sources of nutrients. Therefore, we plan to develop site-specific objectives or other Basin Plan amendments that recognize and account for natural nutrient loading and the effects of reservoir management on the development of eutrophic conditions in Crowley Lake. We do not anticipate preparing TMDLs for nutrients or for dissolved oxygen and ammonia in this lake. However, it is appropriate to list Crowley Lake for these constituents until listing issues can be resolved through Basin Plan amendments.

**Searles Lake**

During the 2002 list update cycle, the Lahontan Water Board recommended delisting Searles Lake for "Salinity/TDS/Chlorides" because the salts were from natural sources. We also recommended listing the lake for petroleum hydrocarbons. The State Water Board delisted Searles Lake for salinity and decided not to list it for petroleum hydrocarbons because the Lahontan Water Board had a permit in place to control discharges from brine mining operations. Using the 2004 listing policy criteria, the State Water Board staff report now recommends that Searles Lake be listed for both pollutants, but in the "Water Quality Limited Segments Being Addressed" category.

The recommended listing for Salinity/TDS/Chlorides in the "Water Quality Limited Segments Being Addressed" category is appropriate, as the WILD beneficial use is not fully met at the lake. This is due to birds landing on brine ponds and drowning due to salt encrustation or dieing due to salt ingestion. The Department of Fish and Game has approved Searles Valley Minerals (the operator of brine mining operations at the lake) mitigation plan under Fish and Game Code Section 3005 that allows a certain level of unavoidable and incidental take of waterfowl. It may be appropriate to modify the WILD beneficial use designation of Searles Lake in the Lahontan Basin Plan to recognize this condition. The fact sheet for the "Salinity/TDS/Chlorides" listing (Volume III, pages 14 and 15) includes some typographical errors. Information from the fact sheet (pages 12 and 13) for the petroleum hydrocarbons listing was apparently copied and pasted

to the "Lines of Evidence" section of the salinity fact sheet. This information should be deleted and replaced with language on salinity.

Lahontan Water Board staff disagrees with the recommended listing of Searles Lake for petroleum hydrocarbons. Discharges of petroleum hydrocarbons at Searles Lake are no longer causing violations of water quality objectives or impacting beneficial uses. Information used in State Water Board staff recommendations is dated and does not reflect the current conditions.

### **Schedules for Completion of TMDLs**

The State Water Board staff report (Volume I, page 70) includes recommendations for Lahontan Water Board TMDLs to be completed by 2008. Completion dates were apparently taken from the TMDL Planner-Tracker database. The schedules in this database are not current for Lahontan Water Board projects. As explained below, we no longer plan to develop TMDLs for many of the water bodies listed on page 70.

The proposed schedule includes our two completely approved TMDLs, for Heavenly Valley Creek and Indian Creek Reservoir. These TMDLs should not be included in the schedule for future work. Their inclusion could be confusing to the public, implying that completion is overdue. When the final Section 303(d) list and schedule are submitted to the U.S. Environmental Protection Agency (USEPA), they should include footnotes identifying all TMDLs that have been fully approved.

The following is a summary of our plans for the waters listed on page 70 that have not yet been addressed through completed TMDLs:

1. ***Ward and Blackwood Creeks.*** As indicated in the Lahontan Water Board's 2001 staff report for our 2002 list update recommendations, the loading of sediment and nutrients from Section 303(d)- listed tributaries of Lake Tahoe will be addressed through the pending Lake Tahoe TMDL. Separate TMDLs for listed tributary streams may be completed later (after 2008) if refinement of loading estimates is needed. If separate TMDLs are not needed, we will request that these streams be placed on the "Water Quality Segments Being Addressed" list, because they will be addressed through the Lake Tahoe TMDL implementation program.

We intend to address violations of water quality objectives for iron in tributaries of Lake Tahoe by revising the objectives. (The current objectives are based on the drinking water Maximum Contaminant Level, rather than on site-specific monitoring data, and are violated even in a reference stream, General Creek.) Update of the objectives will require review of the scientific literature on iron cycling and beneficial use impacts, and consideration of the role of iron as a nutrient in Lake Tahoe. If the new objectives are set at levels monitored in the reference stream, some Tahoe tributary streams with disturbed watersheds may still be in violation. Iron TMDLs for such streams will be completed after 2015, if needed.

2. **Bodie Creek.** As noted in the comments above, the Bodie Creek listing should be changed from "metals" to "mercury." Our online impairment verification report recommends additional sampling, as funding and staff resources allow, to determine trends in mercury concentrations and locations of potential sources, and to facilitate assessment of remediation potential. We do not expect to develop a TMDL, or to consider addressing the Bodie Creek listing through other programs, until further sampling is done. If a TMDL is needed, it will be completed after 2008.
3. **Bridgeport Reservoir.** We currently plan to address the Bridgeport Reservoir listings by developing site-specific objectives and/or amending the Basin Plan to recognize the role of hydromodification and reservoir management in maintaining eutrophic conditions in the reservoir.
4. **Truckee River.** A review of monitoring data collected since this stream was listed for sediment shows that the Truckee River does not meet current criteria for listing. Recognizing that the Truckee River is threatened by discharges of sediment from stormwater runoff associated primarily with development, the Regional Board plans to designate the Truckee River watershed portions of Placer and Nevada Counties and the Town of Truckee as needing Phase II municipal stormwater permit coverage. We no longer plan to complete sediment TMDLs for this water. When the permit is in place, it will be appropriate to move this listing to the "Water Quality Limited Segments Being Addressed category of the 303(d) list.
5. **Hot Springs Canyon Creek.** Additional impairment verification assessment is needed for this creek. A TetraTech study of five creeks in the Bodie Hills did not assess any new information on this creek. The condition of the creek is unknown. TMDL development, if appropriate, will not occur until 2008, at the earliest.
6. **Donner Lake.** The impairment verification study for Donner Lake has not yet been completed, and we will not consider a schedule for TMDL development for the lake until study results are available. We expect the study to be completed within the year, and a recommendation for a TMDL development schedule or other appropriate action will be made at that time and can be reflected in the next 303(d) list.
7. **Lake Tahoe.** Our currently projected date for Lahontan Water Board action on Lake Tahoe sediment and nutrient TMDLs is 2008, rather than 2007. The implementation plan for this TMDL will depend on the Tahoe Regional Planning Agency's (TRPA's) pending revisions to its regional land use plan and Section 208 Water Quality Management Plan. TRPA expects to act on its own plans in late 2007. The TRPA action date will affect the schedule for Regional Board action on Basin Plan amendments for the TMDL.
8. **Squaw Creek.** Our current schedule calls for Lahontan Water Board action on the Squaw Creek sediment TMDL in April 2006, rather than 2005.

9. **Susan River.** The final report on the Lahontan Water Board's Susan River Toxicity Testing Project has recently been posted online at [http://www.waterboards.ca.gov/lahontan/TMDL/Susan\\_River/docs/toxicityreport.pdf](http://www.waterboards.ca.gov/lahontan/TMDL/Susan_River/docs/toxicityreport.pdf). This study did not associate observed toxicity with any specific pollutant, though certain pesticides were present where toxicity was identified. The Lahontan Water Board is working with the Department of Pesticide Regulation, pursuant to the Management Agency Agreement between DPR and the State Water Board, to address the detected pesticides. Unless and until a pollutant is implicated, we do not expect to develop a TMDL to address this listing.

In summary, the only TMDLs currently planned for Lahontan Water Board action between 2006 and 2008 are those for Squaw Creek and Lake Tahoe. We expect to address listings of additional waters between 2006 and late 2008 through methods other than TMDLs.

#### **Discrepancies in Summary Tables**

Table 5 on page 13 of Volume 1 of the staff report summarizes the total numbers of new listings and delistings recommended for each Region. It shows 8 new listings and 24 delistings for the Lahontan Region. However, there are different numbers in the full lists of recommendations. Six new listings are recommended for the Lahontan Region on page 25 of the staff report, and 22 delistings on page 36. The final tables should be made consistent with each other.

Two of the Lahontan Water Board's "new" listings are actually for completed and fully approved TMDLs. Two other listings (for Searles Lake and Mono Lake) are actually "relistings" of waters delisted due to "programs in place" in 2002. One new listing (of Crowley lake for DO and ammonia) is accompanied by a delisting (for N and P). These situations should be clarified through footnotes to the final draft Section 303(d) list that goes before the State Water Board.

Please contact Judith Unsicker of my staff at (530) 542-5462 or [junsicker@waterboards.ca.gov](mailto:junsicker@waterboards.ca.gov) if you have any questions about the technical or historical information summarized above. You may also contact me at (530) 542-5412 or Chuck Curtis at (530) 542-5460 if you wish to discuss these comments or our projected schedules for completion of TMDLs.

Attachments

JEU/didT:/303d/2006listcomments.doc



**California Regional Water Quality Control Board**  
**Lahontan Region**



Alan C. Lloyd, Ph.D.  
 Agency Secretary

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

Arnold Schwarzenegger  
 Governor

**MEMORANDUM**

**TO:** Craig J. Wilson  
 Division of Water Quality  
 State Water Resources Control Board

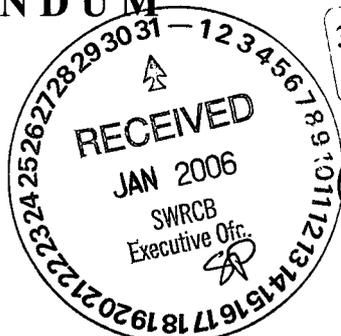
**FROM:** Harold J. Singer  
 Executive Officer

*Harold J. Singer*

**LAHONTAN REGIONAL WATER QUALITY CONTROL BOARD**

**DATE:** January 31, 2006

**SUBJECT: COMMENTS ON STATE WATER BOARD STAFF  
 RECOMMENDATIONS FOR LAHONTAN REGION WATERS IN THE  
 2006 SECTION 303(D) LIST UPDATE**



303 (d) Deadline:  
 1/31/06

130

My staff and I have reviewed State Water Board staff's draft recommendations for changes to California's Clean Water Act Section 303(d) list of impaired surface waters as they affect the Lahontan Region. Many of these recommendations were developed in cooperation with my staff, and we thank you for the opportunity for input on preliminary drafts. We support the recommendations to delist a number of Lahontan Region water bodies or water body-pollutant combinations that do not meet current criteria for listing (staff report Volume 1, page 36). However, we disagree with several other recommendations, as discussed in the comments below. Also, we are providing water body fact sheets and supporting information for delisting one water and for listing three waters in the "Water Quality Limited Segments Being Addressed" category of the 303(d) list.

**Use of OEHHA "Screening Value" Criteria**

Several Lahontan Region waters are recommended to be listed (or to remain listed) due to Toxic Substances Monitoring Program (TSMP) fish tissue data that exceed Office of Environmental Health Hazard Assessment (OEHHA) "Screening Value" (SV) criteria. Fact sheets for other regions show that SV criteria are being used to define impairment statewide. These criteria appear to be substitutes for OEHHA's Maximum Tissue Residue Levels (MTRLs). MTRLs and Elevated Data Levels (EDLs) are two types of criteria that have been used to interpret TSMP tissue data in the past. The State Water Board's listing policy (Section 6.1.3.2) states:

*"2: Evaluation Guidelines for Protection from the Consumption of Fish and Shellfish: RWQCBs may select evaluation guidelines published by USEPA or OEHHA. Maximum*

**Susan River**

The State Water Board staff report (Volume 1, page 25 and Volume III, pages 16 and 17) recommends listing of the Susan River for mercury, based on four fish tissue samples collected in the TSMP. Mercury levels in two of these samples exceeded the OEHHA Screening Value criteria. In 2001, OEHHA staff contacted Lahontan Water Board staff to discuss the 1999 TSMP results for mercury in the Susan River. These results exceeded the MTRL then in effect (0.37 mg/kg, calculated by multiplying the California Toxics Rule standard for mercury by a bioconcentration factor). OEHHA was considering the need for a fish consumption advisory for the Susan River in 2001, but to date no advisory has been issued. We are not aware of any further studies of the river by OEHHA to confirm the need for an advisory. Because of the limitations of TSMP data and SV criteria discussed above, I do not believe that the Susan River should be listed for mercury until further studies have been done to verify impairment.

The most significant sources of mercury in the Susan River watershed are probably natural volcanic and geothermal sources. The State Water Board's listing policy is silent on the issue of natural sources. However, the Lahontan Water Board successfully made a case for delisting a number of "naturally impaired" water bodies during the 2002 list update cycle. Our Basin Plan (page 3-2) states:

*"Controllable water quality factors are those actions, conditions, or circumstances resulting from human activities that may influence the quality of the waters of the State, and that may reasonably be controlled. ..."*

*After application of reasonable control measures, ambient water quality shall conform to the narrative and numerical water quality objectives included in this Basin Plan. When other factors result in the degradation of water quality beyond the limits established by these water quality objectives, controllable human activities shall not cause further degradation of water quality in either surface or ground waters."*

There was a short-lived 19<sup>th</sup> century gold rush in the Susan River watershed. We have no information on the extent to which mercury was used or discharged in connection with this mining. However, anthropogenic loads of mercury in the Susan River watershed are likely to be small in proportion to loads from natural sources, and TMDL development to control anthropogenic sources might not result in significant improvements in the levels of mercury in fish tissue.

Natural sources of mercury may cause high fish tissue levels in other parts of the Lahontan Region, and present similar problems for TMDL development and implementation. The State Water Board should take a comprehensive look at natural sources of mercury during its ongoing development of a statewide water quality objective for methylmercury. The implementation policy for the statewide mercury objective should provide direction on the need for Section 303(d) listing and TMDL development in situations where most or all sources of mercury are not controllable.

**Mammoth Creek**

***California Environmental Protection Agency***

Mammoth Creek was originally listed for "metals" as a result of TSMP samples showing elevated levels (EDLs) of silver and zinc in fish tissue. Elevated silver and nickel were also found in fish tissue samples from Hot Creek (the lower reach of Mammoth Creek). During the 1998 Section 303(d) list update cycle, State Water Board guidance provided the opportunity to delist waters that were listed only on the basis of EDLs in fish tissue. A number of Lahontan Region waters were delisted at that time. Mammoth Creek was not recommended for delisting in 1998 because of a concern that stormwater, as well as natural sources, might be contributing metals to the creek. Hot Creek was delisted for metals during the 2002 list update cycle.

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As noted in our comments on the Susan River, above, any human sources of mercury in Mammoth Creek are likely to be small in proportion to natural sources, and TMDL development to control anthropogenic sources might not result in any significant improvements in the levels of mercury in fish tissue. The State Water Board should not list Mammoth Creek for mercury during the 2006 list update cycle, but should address mercury in waters of the Long Valley Caldera and other volcanic/geothermal areas in its forthcoming methylmercury policy. Further fish tissue studies and issuance of fish consumption advisories may be appropriate for Mammoth and Hot Creeks.

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### **Bear Creek**

The Lahontan Water Board received data and information on the biologic condition of Bear Creek from the Truckee River Watershed Council on January 30, 2006. The Watershed Council recommends maintaining the 303(d)-listing for sediment for this water. Lahontan Water Board staff had earlier submitted data and information to State Water Board staff recommending de-listing Bear Creek. Lahontan Water Board staff have not had the opportunity to assess the Watershed Council's submittal. We request the opportunity to comment on this new information prior to the State Water Board decision on listing or de-listing this water.

### **Bodie Creek**

Bodie Creek is currently Section 303(d)-listed for "metals." Based on the results of an impairment verification survey, I recommend that the listing be refined from the non-specific "metals" category to "mercury." The survey is available online at: [http://www.waterboards.ca.gov/lahontan/TMDL/Bodie\\_Creek/bodie\\_creek\\_project\\_report\\_12\\_04.pdf](http://www.waterboards.ca.gov/lahontan/TMDL/Bodie_Creek/bodie_creek_project_report_12_04.pdf).

State Water Board staff's recommendations for Bodie Creek in the 2006 list are included in the "Do Not Delist" report (pages 551 and 552). The fact sheet does not cite the Lahontan Water Board report but concludes that Bodie Creek should "remain" listed for mercury due to fish tissue sample violations of OEHHA Screening Value Criteria. As stated in our comments for the Susan River and Mammoth Creek, we disagree with the use of TSMP data and SV criteria as the sole grounds for Section 303(d) listing. However, since the impairment verification report includes additional data, we believe that listing of Bodie Creek for mercury is appropriate. Our online report notes violations of criteria for several other metals but concludes that listing for these metals is not appropriate because they are from natural sources. For consistency with similar recommended changes in listed pollutants for Crowley Lake, Bodie Creek should be delisted for metals and listed for mercury. The fact sheets for these changes should be included in Volume III of the staff report rather than the "Do Not Delist" report.

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Elevated ammonia and depressed dissolved oxygen concentrations are associated with eutrophic conditions in Crowley Lake. Eutrophication is in turn the result of impoundment of water with naturally high sources of nutrients. Therefore, we plan to develop site-specific objectives or other Basin Plan amendments that recognize and account for natural nutrient loading and the effects of reservoir management on the development of eutrophic conditions in Crowley Lake. We do not anticipate preparing TMDLs for nutrients or for dissolved oxygen and ammonia in this lake. However, it is appropriate to list Crowley Lake for these constituents until listing issues can be resolved through Basin Plan amendments.

### Searles Lake

During the 2002 list update cycle, the Lahontan Water Board recommended delisting Searles Lake for "Salinity/TDS/Chlorides" because the salts were from natural sources. We also recommended listing the lake for petroleum hydrocarbons. The State Water Board delisted Searles Lake for salinity and decided not to list it for petroleum hydrocarbons because the Lahontan Water Board had a permit in place to control discharges from brine mining operations. Using the 2004 listing policy criteria, the State Water Board staff report now recommends that Searles Lake be listed for both pollutants, but in the "Water Quality Limited Segments Being Addressed" category.

The recommended listing for Salinity/TDS/Chlorides in the "Water Quality Limited Segments Being Addressed" category is appropriate, as the WILD beneficial use is not fully met at the lake. This is due to birds landing on brine ponds and drowning due to salt encrustation or dieing due to salt ingestion. The Department of Fish and Game has approved Searles Valley Minerals (the operator of brine mining operations at the lake) mitigation plan under Fish and Game Code Section 3005 that allows a certain level of unavoidable and incidental take of waterfowl. It may be appropriate to modify the WILD beneficial use designation of Searles Lake in the Lahontan Basin Plan to recognize this condition. The fact sheet for the "Salinity/TDS/Chlorides" listing (Volume III, pages 14 and 15) includes some typographical errors. Information from the fact sheet (pages 12 and 13) for the petroleum hydrocarbons listing was apparently copied and pasted

to the "Lines of Evidence" section of the salinity fact sheet. This information should be deleted and replaced with language on salinity.

Lahontan Water Board staff disagrees with the recommended listing of Searles Lake for petroleum hydrocarbons. Discharges of petroleum hydrocarbons at Searles Lake are no longer causing violations of water quality objectives or impacting beneficial uses. Information used in State Water Board staff recommendations is dated and does not reflect the current conditions.

### *Schedules for Completion of TMDLs*

The State Water Board staff report (Volume I, page 70) includes recommendations for Lahontan Water Board TMDLs to be completed by 2008. Completion dates were apparently taken from the TMDL Planner-Tracker database. The schedules in this database are not current for Lahontan Water Board projects. As explained below, we no longer plan to develop TMDLs for many of the water bodies listed on page 70.

The proposed schedule includes our two completely approved TMDLs, for Heavenly Valley Creek and Indian Creek Reservoir. These TMDLs should not be included in the schedule for future work. Their inclusion could be confusing to the public, implying that completion is overdue. When the final Section 303(d) list and schedule are submitted to the U.S. Environmental Protection Agency (USEPA), they should include footnotes identifying all TMDLs that have been fully approved.

The following is a summary of our plans for the waters listed on page 70 that have not yet been addressed through completed TMDLs:

1. ***Ward and Blackwood Creeks.*** As indicated in the Lahontan Water Board's 2001 staff report for our 2002 list update recommendations, the loading of sediment and nutrients from Section 303(d)- listed tributaries of Lake Tahoe will be addressed through the pending Lake Tahoe TMDL. Separate TMDLs for listed tributary streams may be completed later (after 2008) if refinement of loading estimates is needed. If separate TMDLs are not needed, we will request that these streams be placed on the "Water Quality Segments Being Addressed" list, because they will be addressed through the Lake Tahoe TMDL implementation program.

We intend to address violations of water quality objectives for iron in tributaries of Lake Tahoe by revising the objectives. (The current objectives are based on the drinking water Maximum Contaminant Level, rather than on site-specific monitoring data, and are violated even in a reference stream, General Creek.) Update of the objectives will require review of the scientific literature on iron cycling and beneficial use impacts, and consideration of the role of iron as a nutrient in Lake Tahoe. If the new objectives are set at levels monitored in the reference stream, some Tahoe tributary streams with disturbed watersheds may still be in violation. Iron TMDLs for such streams will be completed after 2015, if needed.

2. **Bodie Creek.** As noted in the comments above, the Bodie Creek listing should be changed from "metals" to "mercury." Our online impairment verification report recommends additional sampling, as funding and staff resources allow, to determine trends in mercury concentrations and locations of potential sources, and to facilitate assessment of remediation potential. We do not expect to develop a TMDL, or to consider addressing the Bodie Creek listing through other programs, until further sampling is done. If a TMDL is needed, it will be completed after 2008.
3. **Bridgeport Reservoir.** We currently plan to address the Bridgeport Reservoir listings by developing site-specific objectives and/or amending the Basin Plan to recognize the role of hydromodification and reservoir management in maintaining eutrophic conditions in the reservoir.
4. **Truckee River.** A review of monitoring data collected since this stream was listed for sediment shows that the Truckee River does not meet current criteria for listing. Recognizing that the Truckee River is threatened by discharges of sediment from stormwater runoff associated primarily with development, the Regional Board plans to designate the Truckee River watershed portions of Placer and Nevada Counties and the Town of Truckee as needing Phase II municipal stormwater permit coverage. We no longer plan to complete sediment TMDLs for this water. When the permit is in place, it will be appropriate to move this listing to the "Water Quality Limited Segments Being Addressed category of the 303(d) list.
5. **Hot Springs Canyon Creek.** Additional impairment verification assessment is needed for this creek. A TetraTech study of five creeks in the Bodie Hills did not assess any new information on this creek. The condition of the creek is unknown. TMDL development, if appropriate, will not occur until 2008, at the earliest.
6. **Donner Lake.** The impairment verification study for Donner Lake has not yet been completed, and we will not consider a schedule for TMDL development for the lake until study results are available. We expect the study to be completed within the year, and a recommendation for a TMDL development schedule or other appropriate action will be made at that time and can be reflected in the next 303(d) list.
7. **Lake Tahoe.** Our currently projected date for Lahontan Water Board action on Lake Tahoe sediment and nutrient TMDLs is 2008, rather than 2007. The implementation plan for this TMDL will depend on the Tahoe Regional Planning Agency's (TRPA's) pending revisions to its regional land use plan and Section 208 Water Quality Management Plan. TRPA expects to act on its own plans in late 2007. The TRPA action date will affect the schedule for Regional Board action on Basin Plan amendments for the TMDL.
8. **Squaw Creek.** Our current schedule calls for Lahontan Water Board action on the Squaw Creek sediment TMDL in April 2006, rather than 2005.

9. **Susan River.** The final report on the Lahontan Water Board's Susan River Toxicity Testing Project has recently been posted online at [http://www.waterboards.ca.gov/lahontan/TMDL/Susan\\_River/docs/toxicityreport.pdf](http://www.waterboards.ca.gov/lahontan/TMDL/Susan_River/docs/toxicityreport.pdf). This study did not associate observed toxicity with any specific pollutant, though certain pesticides were present where toxicity was identified. The Lahontan Water Board is working with the Department of Pesticide Regulation, pursuant to the Management Agency Agreement between DPR and the State Water Board, to address the detected pesticides. Unless and until a pollutant is implicated, we do not expect to develop a TMDL to address this listing.

In summary, the only TMDLs currently planned for Lahontan Water Board action between 2006 and 2008 are those for Squaw Creek and Lake Tahoe. We expect to address listings of additional waters between 2006 and late 2008 through methods other than TMDLs.

### Discrepancies in Summary Tables

Table 5 on page 13 of Volume 1 of the staff report summarizes the total numbers of new listings and delistings recommended for each Region. It shows 8 new listings and 24 delistings for the Lahontan Region. However, there are different numbers in the full lists of recommendations. Six new listings are recommended for the Lahontan Region on page 25 of the staff report, and 22 delistings on page 36. The final tables should be made consistent with each other.

Two of the Lahontan Water Board's "new" listings are actually for completed and fully approved TMDLs. Two other listings (for Searles Lake and Mono Lake) are actually "relistings" of waters delisted due to "programs in place" in 2002. One new listing (of Crowley lake for DO and ammonia) is accompanied by a delisting (for N and P). These situations should be clarified through footnotes to the final draft Section 303(d) list that goes before the State Water Board.

Please contact Judith Unsicker of my staff at (530) 542-5462 or [junsicker@waterboards.ca.gov](mailto:junsicker@waterboards.ca.gov) if you have any questions about the technical or historical information summarized above. You may also contact me at (530) 542-5412 or Chuck Curtis at (530) 542-5460 if you wish to discuss these comments or our projected schedules for completion of TMDLs.

Attachments

JEU/didT:/303d/2006listcomments.doc

TAKEN FROM SV/RCB  
**STAFF REPORT** OF FEB 06,  
 FROM WEB PAGE. **DRAFT** COMPARE TO LETTER  
 ID (130)

Regional Board	TMDL Project Name	Water Body	Pollutant	TMDL Completion Date
6	• Blackwood Creek <sub>1</sub>	Blackwood Creek	Iron <sup>2</sup>	2007
			Nitrogen	2007
			Phosphorus	2007
			Sedimentation/Siltation	2007
	• Bodie Creek	Bodie Creek	Metals	2006
	• Bridgeport Reservoir	Bridgeport Reservoir	Nitrogen	2006
			Phosphorus	2006
			Sedimentation/Siltation	2006
	Bronco Creek	Bronco Creek	Sedimentation/Siltation	2006
	Clearwater Creek	Clearwater Creek	Sedimentation/Siltation	2006
	• Donner Lake PCBs	Donner Lake	Priority Organics	<del>2007</del>
	Gray Creek	Gray Creek (Nevada County)	Sedimentation/Siltation	2006
	Heavenly Valley Creek (source to USFS boundary) Sediment	Heavenly Valley Creek (source to USFS boundary)	Sedimentation/Siltation	2001
	• Hot Springs Canyon Creek Sediment	Hot Springs Canyon Creek	Sedimentation/Siltation	<del>2006</del> 2008
	Indian Creek Reservoir Phosphorus	Indian Creek Reservoir	Phosphorus	2002
	• Lake Tahoe Nutrients/Sediment	Tahoe, Lake	Nitrogen Phosphorus Sedimentation/Siltation	2007 / 2008 2007 2007 ↓
	• Squaw Creek Sediment	Squaw Creek	Sedimentation/Siltation	<del>2005</del> 2006
	• Susan River Toxicity	Susan River	Unknown Toxicity	<del>2007</del> 2019
• Truckee River Sediment	Truckee River	Sedimentation/Siltation	2006	
• Ward Creek Sediment <sub>1</sub>	Ward Creek	Iron <sup>2</sup> Nitrogen Phosphorus Sedimentation/Siltation	2007 2007 2007 2007	
7	Alamo River Sedimentation/Siltation	Alamo River	Silt	2001
	Coachella Valley Storm Channel Pathogen TMDL	Coachella Valley Storm Channel	Pathogens	2006
	Imperial Valley Drains (Niland 2, P, Pumice, and their tributary)	Imperial Valley Drains	Sedimentation/Siltation	2004

1- ADDRESSED THROUGH PENDING LAKE TAHOE TMDL  
 2- W/PO OBJECTIVES TO BE REVISED AFTER REVIEW OF SCIENTIFIC LITERATURE.

### **Additions, Deletions, and Changes**

The basis for the 2006 section 303(d) list is the 2002 list (Appendix 1). All listings in 2002 section 303(d) list will remain unless a change is recommended in this staff report. A summary of the number recommendations to add or delete waters and pollutants on the section 303(d) list is presented in Table 5. It is recommended that SWRCB add 464 water quality limited segments (water body-pollutant combinations) to the section 303(d) list. It is further recommended that 177 water body-pollutant combinations be removed from the section 303(d) list. The additions and deletions are presented in Tables 6 and 7, respectively. Several changes to the affected area for a variety of listings are also recommended (Table 8). Each of these proposed changes are documented in fact sheets contained in Volumes II and III of this staff report.

TABLE 5: SUMMARY OF RECOMMENDATIONS FOR LISTING AND DELISTING.

Region	Numbers of Recommendations to	
	List	Delist
North Coast (1)	11	6
San Francisco Bay (2)	40	22
Central Coast (3)	71	20
Los Angeles (4)	92	95
Central Valley (5)	46	4
Lahontan (6)	8	24
Colorado River Basin (7)	29	0
Santa Ana (8)	45	1
San Diego (9)	122	5
Statewide	464	177

The 2002 section 303(d) list has 1,883 water body-pollutant combinations. With the recommendations presented in Table 5, the section 303(d) would increase by 287 water quality limited segments.

### **Schedules**

In developing the 2006 section 303(d) submittal, the staff reassessed the priorities established in the 2002 section 303(d) list. Based on budgeted resources currently available and the factors presented in section 5 of the Listing Policy, SWRCB staff recommends the schedules for completion of TMDLs in Table 9. All other waters, not presented in Table 9, are recommended for completion by 2019.

## **Administrative Record**

The administrative record contains all data and information used in the development of the 2006 section 303(d) list. Copies of the staff documents supporting the 2006 list submittal are posted on the SWRCB website at:

[http://www.waterboards.ca.gov/tmdl/303d\\_update.html](http://www.waterboards.ca.gov/tmdl/303d_update.html)

The administrative record supporting the proposed 2006 section 303(d) list is housed in the Division of Water Quality, State Water Resources Control Board, 1001 I Street, 15<sup>th</sup> Floor, Sacramento, California. To make an appointment to review the record, please call Mr. Randal Yates at (916) 341-5533.

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**California Regional Water Quality Control Board**  
**Lahontan Region**



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Arnold Schwarzenegger  
 Governor

**MEMORANDUM**

130

**TO:** Craig J. Wilson  
 Division of Water Quality  
 State Water Resources Control Board

*Harold J. Singer*

**FROM:** Harold J. Singer  
 Executive Officer

**LAHONTAN REGIONAL WATER QUALITY CONTROL BOARD**

**DATE:** JAN 31 2006

**SUBJECT: COMMENTS ON STATE WATER BOARD STAFF  
 RECOMMENDATIONS FOR LAHONTAN REGION WATERS IN THE  
 2006 SECTION 303(D) LIST UPDATE**

My staff and I have reviewed State Water Board staff's draft recommendations for changes to California's Clean Water Act Section 303(d) list of impaired surface waters as they affect the Lahontan Region. Many of these recommendations were developed in cooperation with my staff, and we thank you for the opportunity for input on preliminary drafts. We support the recommendations to delist a number of Lahontan Region water bodies or water body-pollutant combinations that do not meet current criteria for listing (staff report Volume 1, page 36). However, we disagree with several other recommendations, as discussed in the comments below. Also, we are providing water body fact sheets and supporting information for delisting one water and for listing three waters in the "Water Quality Limited Segments Being Addressed" category of the 303(d) list.

**Use of OEHHA "Screening Value" Criteria**

Several Lahontan Region waters are recommended to be listed (or to remain listed) due to Toxic Substances Monitoring Program (TSMP) fish tissue data that exceed Office of Environmental Health Hazard Assessment (OEHHA) "Screening Value" (SV) criteria. Fact sheets for other regions show that SV criteria are being used to define impairment statewide. These criteria appear to be substitutes for OEHHA's Maximum Tissue Residue Levels (MTRLs). MTRLs and Elevated Data Levels (EDLs) are two types of criteria that have been used to interpret TSMP tissue data in the past. The State Water Board's listing policy (Section 6.1.3.2) states:

*"2. Evaluation Guidelines for Protection from the Consumption of Fish and Shellfish: RWQCBs may select evaluation guidelines published by USEPA or OEHHA. Maximum*

*Tissue Residue Levels (MTRLs) and Elevated Data Levels (EDLs) shall not be used to evaluate fish or shellfish tissue data."*

Section 6.1.3 of the policy also calls for the use of multiple lines of evidence.

Based on the context and purpose of TSMP sampling, we interpret this section of the policy to mean that TSMP results should not be used as the sole reason for listing. During development of the listing policy, Total Maximum Daily Load (TMDL) Roundtable members, including Lahontan Water Board staff, repeatedly expressed concern that the TSMP was meant to be only a screening tool, and that TSMP sampling was not designed to be statistically representative of a given water body. A further difficulty with interpreting TSMP results in the Lahontan Region is that trout are often hatchery-grown plants, and tissue data from hatchery trout are not necessarily representative of ambient water quality conditions.

The reference cited in the State Water Board staff report for SV criteria is a 1999 OEHHA study by Brodberg and Pollock on San Pablo and Black Butte Reservoirs, in the Coast Range. This report is available online at: <http://www.oehha.ca.gov/fish/pdf/Cx8258.pdf>. It states (Section 5 on page 4):

*"The Screening Value (SV) approach is recommended by USEPA (1995) to identify chemical contaminants in fish tissue at concentrations which may be of human health concern for frequent consumers of sport fish. The SVs are not intended as levels at which consumption advisories should be issued but are useful as a guide to identify fish species and chemicals from a limited data set, such as this one, for which more intensive sampling, analysis or health evaluation are to be recommended."*

On pages 5 and 16 of this report, Brodberg and Pollock state that California SVs were calculated specifically for their 1999 study. California SVs were apparently not meant to have wider application. To our knowledge, SVs have not been approved as formal OEHHA criteria (in the same sense as Public Health Goals for chemical pollutants). If the State Water Board approves the use of California SV criteria as statewide listing factors, it will set a precedent and effectively mandate the use of these criteria by Regional Water Boards in future list update cycles. This contradicts the optional direction in Section 6.1.3.2 of the listing policy.

For the reasons outlined above, I believe that TSMP data and SVs should not be used in Section 303(d) listing for any water body unless and until:

- Additional tissue sampling has been done to verify the impairment;
- A fish consumption advisory has been issued by OEHHA or local government health authorities; and/or
- Impairment is corroborated by ambient water and/or sediment quality data.

**Susan River**

The State Water Board staff report (Volume 1, page 25 and Volume III, pages 16 and 17) recommends listing of the Susan River for mercury, based on four fish tissue samples collected in the TSMP. Mercury levels in two of these samples exceeded the OEHHA Screening Value criteria. In 2001, OEHHA staff contacted Lahontan Water Board staff to discuss the 1999 TSMP results for mercury in the Susan River. These results exceeded the MTRL then in effect (0.37 mg/kg, calculated by multiplying the California Toxics Rule standard for mercury by a bioconcentration factor). OEHHA was considering the need for a fish consumption advisory for the Susan River in 2001, but to date no advisory has been issued. We are not aware of any further studies of the river by OEHHA to confirm the need for an advisory. Because of the limitations of TSMP data and SV criteria discussed above, I do not believe that the Susan River should be listed for mercury until further studies have been done to verify impairment.

The most significant sources of mercury in the Susan River watershed are probably natural volcanic and geothermal sources. The State Water Board's listing policy is silent on the issue of natural sources. However, the Lahontan Water Board successfully made a case for delisting a number of "naturally impaired" water bodies during the 2002 list update cycle. Our Basin Plan (page 3-2) states:

*"Controllable water quality factors are those actions, conditions, or circumstances resulting from human activities that may influence the quality of the waters of the State, and that may reasonably be controlled. ...*

*After application of reasonable control measures, ambient water quality shall conform to the narrative and numerical water quality objectives included in this Basin Plan. When other factors result in the degradation of water quality beyond the limits established by these water quality objectives, controllable human activities shall not cause further degradation of water quality in either surface or ground waters."*

There was a short-lived 19<sup>th</sup> century gold rush in the Susan River watershed. We have no information on the extent to which mercury was used or discharged in connection with this mining. However, anthropogenic loads of mercury in the Susan River watershed are likely to be small in proportion to loads from natural sources, and TMDL development to control anthropogenic sources might not result in significant improvements in the levels of mercury in fish tissue.

Natural sources of mercury may cause high fish tissue levels in other parts of the Lahontan Region, and present similar problems for TMDL development and implementation. The State Water Board should take a comprehensive look at natural sources of mercury during its ongoing development of a statewide water quality objective for methylmercury. The implementation policy for the statewide mercury objective should provide direction on the need for Section 303(d) listing and TMDL development in situations where most or all sources of mercury are not controllable.

**Mammoth Creek**

Mammoth Creek was originally listed for “metals” as a result of TSMP samples showing elevated levels (EDLs) of silver and zinc in fish tissue. Elevated silver and nickel were also found in fish tissue samples from Hot Creek (the lower reach of Mammoth Creek). During the 1998 Section 303(d) list update cycle, State Water Board guidance provided the opportunity to delist waters that were listed only on the basis of EDLs in fish tissue. A number of Lahontan Region waters were delisted at that time. Mammoth Creek was not recommended for delisting in 1998 because of a concern that stormwater, as well as natural sources, might be contributing metals to the creek. Hot Creek was delisted for metals during the 2002 list update cycle.

The State Water Board staff report for the 2006 list update (“Do Not Delist Report”, pages 554-555) recommends that Mammoth Creek be listed for mercury, based on the (1992) TSMP fish tissue data and the OEHHA Screening Value (SV) criteria. This is apparently meant as a clarification of the existing “metals” listing. We disagree with the proposed listing of Mammoth Creek for mercury, based on our concerns about the limitations of the TSMP and SV criteria, and on the probability that mercury in fish tissue and ambient water samples come largely or entirely from natural sources. (Our Surface Water Ambient Monitoring Program database includes several water samples collected by the U.S. Geological Survey [USGS] between 2001 and 2004 with total recoverable mercury concentrations exceeding California Toxics rule standards.)

Mammoth Creek is located within the volcanic Long Valley Caldera and is continuous with geothermally influenced Hot Creek. There was some 19<sup>th</sup> century gold mining in the Mammoth Creek watershed. The extent of mercury use in connection with this mining is unknown. Lahontan Region staff and USEPA staff recently collected three samples from a tributary of Mammoth Creek near an inactive mine. Results showed low levels of arsenic but no detectable metals in a suite of 17 metals analyzed.

As noted in our comments on the Susan River, above, any human sources of mercury in Mammoth Creek are likely to be small in proportion to natural sources, and TMDL development to control anthropogenic sources might not result in any significant improvements in the levels of mercury in fish tissue. The State Water Board should not list Mammoth Creek for mercury during the 2006 list update cycle, but should address mercury in waters of the Long Valley Caldera and other volcanic/geothermal areas in its forthcoming methylmercury policy. Further fish tissue studies and issuance of fish consumption advisories may be appropriate for Mammoth and Hot Creeks.

**Aspen, Bryant and Leviathan Creeks**

Lahontan Water Board staff has recently provided information and data to State Water Board staff (attached) that recommends moving Aspen, Bryant and Leviathan Creeks to the “Water Quality Limited Segments Being Addressed” category of the 303(d) list. These creeks are affected by acid mine drainage from the Leviathan Mine. In May 2000, the USEPA placed Leviathan Mine on the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) National Priorities List, thus making Leviathan Mine a Superfund site. Since

that listing, the USEPA has issued cleanup directives to the Lahontan Water Board, which administers the site for the State Water Board and State of California (the State owns the mine site), and to the Atlantic Richfield Company, which is responsible for the liabilities of Anaconda Mining, the company that developed and operated the mine site. These directives have resulted in response actions reducing acid mine drainage to the creeks. The CERCLA process will ultimately require compliance with all applicable or relevant and appropriate requirements, including compliance with water quality standards. The site is in the Remedial Investigation/Feasibility Study stage of the CERCLA process. A Record of Decision that identifies the complete cleanup solution for the mine site is expected in 2010.

### **Bear Creek**

The Lahontan Water Board received data and information on the biologic condition of Bear Creek from the Truckee River Watershed Council on January 30, 2006. The Watershed Council recommends maintaining the 303(d)-listing for sediment for this water. Lahontan Water Board staff had earlier submitted data and information to State Water Board staff recommending de-listing Bear Creek. Lahontan Water Board staff have not had the opportunity to assess the Watershed Council's submittal. We request the opportunity to comment on this new information prior to the State Water Board decision on listing or de-listing this water.

### **Bodie Creek**

Bodie Creek is currently Section 303(d)-listed for "metals." Based on the results of an impairment verification survey, I recommend that the listing be refined from the non-specific "metals" category to "mercury." The survey is available online at: [http://www.waterboards.ca.gov/lahontan/TMDL/Bodie\\_Creek/bodie\\_creek\\_project\\_report\\_12\\_04.pdf](http://www.waterboards.ca.gov/lahontan/TMDL/Bodie_Creek/bodie_creek_project_report_12_04.pdf).

State Water Board staff's recommendations for Bodie Creek in the 2006 list are included in the "Do Not Delist" report (pages 551 and 552). The fact sheet does not cite the Lahontan Water Board report but concludes that Bodie Creek should "remain" listed for mercury due to fish tissue sample violations of OEHHA Screening Value Criteria. As stated in our comments for the Susan River and Mammoth Creek, we disagree with the use of TSMP data and SV criteria as the sole grounds for Section 303(d) listing. However, since the impairment verification report includes additional data, we believe that listing of Bodie Creek for mercury is appropriate. Our online report notes violations of criteria for several other metals but concludes that listing for these metals is not appropriate because they are from natural sources. For consistency with similar recommended changes in listed pollutants for Crowley Lake, Bodie Creek should be delisted for metals and listed for mercury. The fact sheets for these changes should be included in Volume III of the staff report rather than the "Do Not Delist" report.

**Clearwater Creek**

Lahontan Water Board staff has recently provided information and data to State Water Board staff (attached) that recommends delisting Clearwater Creek. Biological assessment of the creek indicates no impairment.

**Crowley Lake**

The State Water Board staff report proposes delisting Crowley Lake for nitrogen and phosphorus and listing it for dissolved oxygen and ammonia. Lahontan Water Board staff recommended this change. A University of California study of the lake showed that nutrients come mostly from natural sources, and that regionwide water quality objectives for dissolved oxygen and ammonia are being violated. (Crowley Lake does not have site-specific objectives for any of these constituents.)

Elevated ammonia and depressed dissolved oxygen concentrations are associated with eutrophic conditions in Crowley Lake. Eutrophication is in turn the result of impoundment of water with naturally high sources of nutrients. Therefore, we plan to develop site-specific objectives or other Basin Plan amendments that recognize and account for natural nutrient loading and the effects of reservoir management on the development of eutrophic conditions in Crowley Lake. We do not anticipate preparing TMDLs for nutrients or for dissolved oxygen and ammonia in this lake. However, it is appropriate to list Crowley Lake for these constituents until listing issues can be resolved through Basin Plan amendments.

**Searles Lake**

During the 2002 list update cycle, the Lahontan Water Board recommended delisting Searles Lake for "Salinity/TDS/Chlorides" because the salts were from natural sources. We also recommended listing the lake for petroleum hydrocarbons. The State Water Board delisted Searles Lake for salinity and decided not to list it for petroleum hydrocarbons because the Lahontan Water Board had a permit in place to control discharges from brine mining operations. Using the 2004 listing policy criteria, the State Water Board staff report now recommends that Searles Lake be listed for both pollutants, but in the "Water Quality Limited Segments Being Addressed" category.

The recommended listing for Salinity/TDS/Chlorides in the "Water Quality Limited Segments Being Addressed" category is appropriate, as the WILD beneficial use is not fully met at the lake. This is due to birds landing on brine ponds and drowning due to salt encrustation or dieing due to salt ingestion. The Department of Fish and Game has approved Searles Valley Minerals (the operator of brine mining operations at the lake) mitigation plan under Fish and Game Code Section 3005 that allows a certain level of unavoidable and incidental take of waterfowl. It may be appropriate to modify the WILD beneficial use designation of Searles Lake in the Lahontan Basin Plan to recognize this condition. The fact sheet for the "Salinity/TDS/Chlorides" listing (Volume III, pages 14 and 15) includes some typographical errors. Information from the fact sheet (pages 12 and 13) for the petroleum hydrocarbons listing was apparently copied and pasted

to the "Lines of Evidence" section of the salinity fact sheet. This information should be deleted and replaced with language on salinity.

Lahontan Water Board staff disagrees with the recommended listing of Searles Lake for petroleum hydrocarbons. Discharges of petroleum hydrocarbons at Searles Lake are no longer causing violations of water quality objectives or impacting beneficial uses. Information used in State Water Board staff recommendations is dated and does not reflect the current conditions.

### **Schedules for Completion of TMDLs**

The State Water Board staff report (Volume I, page 70) includes recommendations for Lahontan Water Board TMDLs to be completed by 2008. Completion dates were apparently taken from the TMDL Planner-Tracker database. The schedules in this database are not current for Lahontan Water Board projects. As explained below, we no longer plan to develop TMDLs for many of the water bodies listed on page 70.

The proposed schedule includes our two completely approved TMDLs, for Heavenly Valley Creek and Indian Creek Reservoir. These TMDLs should not be included in the schedule for future work. Their inclusion could be confusing to the public, implying that completion is overdue. When the final Section 303(d) list and schedule are submitted to the U.S. Environmental Protection Agency (USEPA), they should include footnotes identifying all TMDLs that have been fully approved.

The following is a summary of our plans for the waters listed on page 70 that have not yet been addressed through completed TMDLs:

1. ***Ward and Blackwood Creeks.*** As indicated in the Lahontan Water Board's 2001 staff report for our 2002 list update recommendations, the loading of sediment and nutrients from Section 303(d)- listed tributaries of Lake Tahoe will be addressed through the pending Lake Tahoe TMDL. Separate TMDLs for listed tributary streams may be completed later (after 2008) if refinement of loading estimates is needed. If separate TMDLs are not needed, we will request that these streams be placed on the "Water Quality Segments Being Addressed" list, because they will be addressed through the Lake Tahoe TMDL implementation program.

We intend to address violations of water quality objectives for iron in tributaries of Lake Tahoe by revising the objectives. (The current objectives are based on the drinking water Maximum Contaminant Level, rather than on site-specific monitoring data, and are violated even in a reference stream, General Creek.) Update of the objectives will require review of the scientific literature on iron cycling and beneficial use impacts, and consideration of the role of iron as a nutrient in Lake Tahoe. If the new objectives are set at levels monitored in the reference stream, some Tahoe tributary streams with disturbed watersheds may still be in violation. Iron TMDLs for such streams will be completed after 2015, if needed.

2. **Bodie Creek.** As noted in the comments above, the Bodie Creek listing should be changed from “metals” to “mercury.” Our online impairment verification report recommends additional sampling, as funding and staff resources allow, to determine trends in mercury concentrations and locations of potential sources, and to facilitate assessment of remediation potential. We do not expect to develop a TMDL, or to consider addressing the Bodie Creek listing through other programs, until further sampling is done. If a TMDL is needed, it will be completed after 2008.
3. **Bridgeport Reservoir.** We currently plan to address the Bridgeport Reservoir listings by developing site-specific objectives and/or amending the Basin Plan to recognize the role of hydromodification and reservoir management in maintaining eutrophic conditions in the reservoir.
4. **Truckee River.** A review of monitoring data collected since this stream was listed for sediment shows that the Truckee River does not meet current criteria for listing. Recognizing that the Truckee River is threatened by discharges of sediment from stormwater runoff associated primarily with development, the Regional Board plans to designate the Truckee River watershed portions of Placer and Nevada Counties and the Town of Truckee as needing Phase II municipal stormwater permit coverage. We no longer plan to complete sediment TMDLs for this water. When the permit is in place, it will be appropriate to move this listing to the “Water Quality Limited Segments Being Addressed category of the 303(d) list.
5. **Hot Springs Canyon Creek.** Additional impairment verification assessment is needed for this creek. A TetraTech study of five creeks in the Bodie Hills did not assess any new information on this creek. The condition of the creek is unknown. TMDL development, if appropriate, will not occur until 2008, at the earliest.
6. **Donner Lake.** The impairment verification study for Donner Lake has not yet been completed, and we will not consider a schedule for TMDL development for the lake until study results are available. We expect the study to be completed within the year, and a recommendation for a TMDL development schedule or other appropriate action will be made at that time and can be reflected in the next 303(d) list.
7. **Lake Tahoe.** Our currently projected date for Lahontan Water Board action on Lake Tahoe sediment and nutrient TMDLs is 2008, rather than 2007. The implementation plan for this TMDL will depend on the Tahoe Regional Planning Agency’s (TRPA’s) pending revisions to its regional land use plan and Section 208 Water Quality Management Plan. TRPA expects to act on its own plans in late 2007. The TRPA action date will affect the schedule for Regional Board action on Basin Plan amendments for the TMDL.
8. **Squaw Creek.** Our current schedule calls for Lahontan Water Board action on the Squaw Creek sediment TMDL in April 2006, rather than 2005.

9. ***Susan River.*** The final report on the Lahontan Water Board's Susan River Toxicity Testing Project has recently been posted online at [http://www.waterboards.ca.gov/lahontan/TMDL/Susan\\_River/docs/toxicityreport.pdf](http://www.waterboards.ca.gov/lahontan/TMDL/Susan_River/docs/toxicityreport.pdf). This study did not associate observed toxicity with any specific pollutant, though certain pesticides were present where toxicity was identified. The Lahontan Water Board is working with the Department of Pesticide Regulation, pursuant to the Management Agency Agreement between DPR and the State Water Board, to address the detected pesticides. Unless and until a pollutant is implicated, we do not expect to develop a TMDL to address this listing.

In summary, the only TMDLs currently planned for Lahontan Water Board action between 2006 and 2008 are those for Squaw Creek and Lake Tahoe. We expect to address listings of additional waters between 2006 and late 2008 through methods other than TMDLs.

### **Discrepancies in Summary Tables**

Table 5 on page 13 of Volume 1 of the staff report summarizes the total numbers of new listings and delistings recommended for each Region. It shows 8 new listings and 24 delistings for the Lahontan Region. However, there are different numbers in the full lists of recommendations. Six new listings are recommended for the Lahontan Region on page 25 of the staff report, and 22 delistings on page 36. The final tables should be made consistent with each other.

Two of the Lahontan Water Board's "new" listings are actually for completed and fully approved TMDLs. Two other listings (for Searles Lake and Mono Lake) are actually "relistings" of waters delisted due to "programs in place" in 2002. One new listing (of Crowley lake for DO and ammonia) is accompanied by a delisting (for N and P). These situations should be clarified through footnotes to the final draft Section 303(d) list that goes before the State Water Board.

Please contact Judith Unsicker of my staff at (530) 542-5462 or [junsicker@waterboards.ca.gov](mailto:junsicker@waterboards.ca.gov) if you have any questions about the technical or historical information summarized above. You may also contact me at (530) 542-5412 or Chuck Curtis at (530) 542-5460 if you wish to discuss these comments or our projected schedules for completion of TMDLs.

Attachments

JEU/didT/303d/2006listcomments.doc

(130)

ATTACH #7  
ASPEN, BRYANT  
LEVIATHAN CREEKS

ATTACHMENT 2

Aspen, Bryant, and Leviathan Creeks

ATTACHMENT  
To # (130)

LAHONTANI  
SINGER  
31 JAN 06.

**FACT SHEET**  
**Aspen, Bryant, and Leviathan Creeks**  
**Region 6**

**Water Segments:** Aspen Creek, Bryant Creek, Leviathan Creek

**Pollutant:** Metals associated with Acid Mine Drainage from Leviathan Mine

**Decision:** List

**Weight of Evidence:**

This pollutant is being considered for listing under section 2.2 of the Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List (Policy). Section 2.2 of the Policy is titled "Water Quality Limited Segments Being Addressed." Water segments can be placed in this category if either of the following conditions is met:

1. A TMDL has been developed and approved by USEPA and the approved implementation plan is expected to result in full attainment of the standard within a specified time frame; or
2. The RWQCB has determined in fact sheets that an existing regulatory program is reasonably expected to result in the attainment of the water quality standard within a reasonable, specified time frame.

The water segments covered by this Fact Sheet fall into category 2. A remedial program other than a TMDL has been developed, approved, and is being implemented. This program is expected to eventually result in attainment of the respective standards. Based on the readily available data and information, the weight of evidence indicates that there is sufficient justification in favor of placing this water segment-pollutant combination in the Water Quality Limited Segments Being Addressed portion of the section 303(d) list.

**LRWQCB Staff Recommendation:**

After review of the available data and information for this recommendation, LRWQCB staff concludes that the water body should be placed in the Water Quality Limited Segments Being Addressed category of the section 303(d) list because a program is in place to address this water quality problem.

**Lines of Evidence:**

*Line of Evidence:* Remedial Program in Place

*Beneficial Uses:*

Leviathan Creek, Bryant Creek: MUN, AGR, GWR, REC-1, REC-2, COLD, WILD  
Aspen Creek: MUN, AGR, GWR, REC-1, REC-2, COLD, WILD, COMM

*Information Used to Assess Water Quality:*

An alternative enforceable program is in place that will address metals and other acid mine drainage associated water quality standards exceedances for these water segments. In May 2000, the USEPA placed Leviathan Mine on the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) National Priorities List (NPL), thus making Leviathan Mine a federal Superfund site. The USEPA identified the State of California and ARCO Environmental Remediation L.L.C. as potentially responsible parties. The cleanup process at Leviathan Mine is required to meet all environmental requirements, or ARARs (applicable or relevant and appropriate requirements) during its operation.

On July 19, 2000, pursuant to its authority under CERCLA, USEPA issued an Administrative Abatement Action (AAA,) to the RWQCB and, thereby, directed the RWQCB to implement certain pollution

SUGGESTED  
FACT SHEET  
ASPEN, BRYANT  
LEVIATHAN

abatement and site characterization activities at Leviathan Mine. With only slight modification, USEPA reissued the AAA in 2001, 2002, 2003, 2004, and again in 2005. The 2005 AAA issued to the LRWQCB is presented in Attachment 1.

In November 2000, the USEPA issued an Administrative Order requiring Atlantic Richfield to submit work plans for a phased Remedial Investigation/Feasibility Study. Under this order, ARCO Environmental Remediation L.L.C. has also implemented early response actions (ERAs). The November 2000 Administrative Order issued to Atlantic Richfield is presented in Attachment 2.

On July 12, 2005, the USEPA issued a Non-Time Critical Removal Action Memorandum (NTCRAM) for Leviathan Mine. The NTCRAM provides a plan for developing year-round storage and treatment of all the known releases of acid mine drainage from Leviathan Mine. These acid mine drainage releases are the cause of the standards violations in Aspen, Leviathan and Bryant Creeks. The NTCRAM is presented in Attachment 3.

The Leviathan Mine site is in the RI/FS stage of the CERCLA process. A Record of Decision is expected in 2010.

*Data Used to Assess Water Quality:*

New data were not submitted during the listing cycle that indicated that water quality standards are met.

## **Attachments**

*Attachment 1:*

U.S. EPA Region IX, Administrative Abatement Action, Leviathan Mine, Alpine County, California, CERCLA Docket No. 2005-15, July 14, 2005.

*Attachment 2:*

U.S. EPA Region IX, Administrative Order For Early Response Actions, Remedial Investigation and Feasibility Study, Leviathan Mine, Alpine County, California  
CERCLA Docket No. 2001-05, November 22, 2000

*Attachment 3:*

U.S. EPA Region IX, Request for Approval of Engineering Evaluation/Cost Analysis (EE/CA) and Non-Time-Critical Removal Action at the Leviathan Mine, Alpine County, CA, July 12, 2005

**Attachment 1**

U.S. EPA Region IX  
Administrative Abatement Action  
Leviathan Mine, Alpine County, California  
CERCLA Docket No. 2005-15  
July 14, 2005.

ABATEMENT  
ACTION



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 9

75 Hawthorne Street  
San Francisco, CA 94105-3901

 **COPY**

Harold Singer, Executive Director  
California Regional Water Quality Control Board -  
Lahontan Region  
2501 Lake Tahoe Boulevard  
South Lake Tahoe, CA 96150

RE: Leviathan Mine: Administrative Abatement Action  
CERCLA Docket No. 2005-15

Dear Mr. Singer:

We are pleased to transmit a signed copy of the Administrative Abatement Action (AAA) for Leviathan Mine to cover work to be performed beginning in 2005 under the Non-Time Critical Removal Action Memorandum (NTCRAM), a copy of which is attached. The NTCRAM provides a road map for developing year-round storage and treatment of all the known releases of acid mine drainage from Leviathan Mine. The AAA sets forth the understanding reached between USEPA and the Lahontan Regional Water Quality Control Board for work to be performed by the Water Board during the first phase of the NTCRA. We appreciate that the LRWQCB has already initiated performance of the work.

We value the cooperation between our agencies in responding to the contamination at Leviathan Mine, and we look forward to a successful implementation of the NTCRA.

Sincerely

  
Elizabeth J. Adams, Chief  
Site Cleanup Branch  
Superfund Division

Enclosures:

Administrative Abatement Action, dated July 14, 2005

Non-Time Critical Removal Action Memorandum for Leviathan Mine, dated July 12, 2005

**UNITED STATES  
ENVIRONMENTAL PROTECTION AGENCY  
REGION IX**

**IN THE MATTER OF:**

**LEVIATHAN MINE  
ALPINE COUNTY, CALIFORNIA**

**REGIONAL WATER QUALITY  
CONTROL BOARD, LAHONTAN  
REGION, STATE OF CALIFORNIA**

**ADMINISTRATIVE ABATEMENT  
ACTION**

**U.S. EPA Region IX  
CERCLA Docket No. 2005-15**

**Proceeding Under Section 106(a) of the  
Comprehensive Environmental Response,  
Compensation, and Liability Act, as  
amended, 42 U.S.C. § 9606(a)**

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## **I. JURISDICTION AND GENERAL PROVISIONS**

1. This Administrative Abatement Action ("Administrative Action") provides for the performance by the California Regional Water Quality Control Board, Lahontan Region (the "LRWQCB") of specified portions of a non-time critical removal action ("NTCRA") in connection with the Leviathan Mine Site in Alpine County, California ("Leviathan Mine" or the "Site") selected by the United States Environmental Protection Agency ("EPA") in the EE/CA Approval and Non-Time Critical Removal Action Memorandum dated July 12, 2005 ("NTCRAM") (Appendix A). Pursuant to this Administrative Action, the LRWQCB will conduct the Work described herein to abate an imminent and substantial endangerment to the public health, welfare or the environment that may be presented by the actual or threatened release of hazardous substances, at or from the Site.

2. This Administrative Action is issued pursuant to the authority vested in the President of the United States by section 106(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 ("CERCLA"), 42 U.S.C. § 9606(a) as amended, and delegated to the Administrator of EPA by Executive Order No. 12580, January 23, 1987, 52 Federal Register 2923, as amended by Executive Order No. 13016, August 30, 1996, 61 Federal Register 45871, further delegated to the EPA Regional Administrators by EPA Delegation Nos. 14-B and further redelegated by Regional Delegations dated September 29, 1997.

3. Performance of this work, compliance with this Administrative Action, and conferring with EPA prior to issuance shall not constitute or be construed as an admission of liability, or of EPA's findings, determinations, or statements contained in this Administrative Action. Nor, by complying with this Administrative Action, does the LRWQCB or the State of California waive any claim or defense arising in connection with the Administrative Action or the Site.

## **II. DEFINITIONS**

4. Unless otherwise expressly provided herein, terms used in this Administrative Action which are defined in CERCLA or in regulations promulgated under CERCLA shall have the meaning assigned to them in CERCLA or in such regulations. Whenever terms listed below are used in this Administrative Action or in the appendices attached hereto and incorporated hereunder, the following definitions shall apply:

a. "Administrative Action" shall mean this Administrative Abatement Action and all appendices attached hereto. In the event of conflict between this Administrative Action and any appendix, this Administrative Action shall control.

b. "CERCLA" shall mean the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 U.S.C. §§ 9601, *et seq.*

c. "Day" shall mean a calendar day. In computing any period of time under this Administrative Action, where the last day would fall on a Saturday, Sunday, or federal holiday, the period shall run until the close of business of the next working day.

d. "Effective Date" shall be the effective date of this Administrative Action as provided in Section XXIV.

e. "EE/CA" shall mean the Engineering Evaluation/Cost Analysis for the non-time critical removal action at Leviathan Mine.

f. "EE/CA Approval and Non-Time Critical Removal Action Memorandum" or "NTCRAM" shall mean the EPA memorandum approving the EE/CA and selecting the removal action for the Site, as signed on July 12, 2005 by the Superfund Division Director, EPA Region IX, or his delegate, and all attachments thereto. The NTCRAM is attached as Appendix A and incorporated by reference.

g. "EPA" shall mean the United States Environmental Protection Agency and any successor departments or agencies of the United States.

h. "National Contingency Plan" or "NCP" shall mean the National Oil and Hazardous Substances Pollution Contingency Plan promulgated pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, codified at 40 C.F.R. Part 300, and any amendments thereto.

i. "Paragraph" shall mean a portion of this Administrative Action identified by an Arabic numeral.

j. "Parties" shall mean the LRWQCB and the EPA, Region IX.

k. "RCRA" shall mean the Solid Waste Disposal Act, as amended, 42 U.S.C. §§ 6901, *et seq.* (also known as the Resource Conservation and Recovery Act).

l. "Removal Action" or "NTCRA" shall mean the entire non-time critical removal action for the Site described in the NTCRAM, including the Work required by this Administrative Action as well as all other portions of the removal action described in the NTCRAM.

m. "Site" shall mean the Leviathan Mine Superfund site, as described in the National Priority List ("NPL") listing dated May 11, 2000. 65 Fed. Reg. 30482; 40 CFR Part 300, Appendix B.

n. "Subparagraph" shall mean a portion of this Administrative Action identified by a lower case letter.

o. "State" shall mean the State of California Lahontan Regional Water Quality Control Board, unless another state or state agency is specified.

p. "Statement of Work" or "SOW" shall mean any statement of work for completion of the NTCRA, issued pursuant to the NTCRAM, and any modifications made in accordance with this Administrative Action.

q. "Waste Material" shall mean 1) any "hazardous substance" under Section 101(14) of CERCLA, 42 U.S.C. § 9601(14); 2) any pollutant or contaminant under Section 101(33) of CERCLA, 42 U.S.C. § 9601(33); 3) any "solid waste" under Section 1004(27) of RCRA, 42 U.S.C. § 6903(27); and 4) any "hazardous material" under California law.

r. "Work" shall mean all activities the LRWQCB is required to perform under this Administrative Action.

### **III. FINDINGS OF FACT**

#### **A. Site Description, Ownership History, and NPL Listing**

5. The 656 acre Leviathan Mine property lies within a remote portion of northeastern Alpine County, California, on the eastern flank of the central Sierra Nevada, near the California-Nevada border, approximately 25 miles southeast of Lake Tahoe, and 6 miles east of Markleeville, California. Of the total property, approximately 253 acres are disturbed by mine related activities. With the exception of approximately 21 acres of disturbance on land managed by the United States Department of Agriculture, Forest Service ("U.S. Forest Service"), all disturbance is on the mine site owned by the State. As identified on the Topaz Lake and Mt. Siegel U.S. Geological Survey ("USGS") quadrangle sheets, the mine property is situated principally within Sections 15 and 22, Township 10 North, Range 21 East, although small portions of the workings extend into the southeastern and northwestern corners of the adjoining Sections 14 and 23, respectively.

6. Vehicular access to the mine is limited by snowfall and muddy road conditions, so that the Site is inaccessible to heavy equipment from as early as October to as late as July, depending on weather. Vehicular access to the mine is provided by unpaved roads from State Highway 89 on the southeast and from U.S. Highway 395 south of Gardnerville, Nevada, on the northeast. The California-Nevada border lies approximately three miles northeast of the mine.

7. The disturbed areas at Leviathan Mine are sparsely vegetated. Although there is some volunteer vegetation, most existing vegetation is due to localized revegetation efforts carried out by the LRWQCB. This remote mine has no potable water or power.

8. There are several sources of acid mine drainage ("AMD") at the Site, which impact Leviathan Creek. When a release from the Site occurs, it flows through the Leviathan Creek/

Bryant Creek watershed, which drains into the East Fork Carson River. The AMD released contains elevated concentrations of metals and metalloids, most notably arsenic, and also includes iron, aluminum, chromium, cobalt, copper, nickel, and zinc. The low pH and high metals content of the AMD eliminated most aquatic life in Leviathan and Bryant Creeks downstream of the mine, until response activities were initiated. These releases originate in the state of California and, at times, may flow into the state of Nevada through Washoe Tribal lands into the East Fork Carson River, which serves as a major source of water supply and a habitat for fish, including an historical habitat for the federally-listed threatened Lahontan cutthroat trout.

9. Anaconda Company owned and operated the mine from 1951 until 1962. During this period, Anaconda Company extracted sulfur ore through open pit mining. Mining ceased at the mine property around 1962. In 1977, Anaconda Company merged into Atlantic Richfield Company.

10. In 1984, the State acquired approximately 495 acres of the mine property to pursue cleanup and abatement of the water quality problems associated with historic mining. Jurisdiction over the mine property rests with the State Water Resources Control Board which, in turn, has delegated authority over the mine property to the LRWQCB.

11. On May 11, 2000 (65 Fed. Reg. 30482), pursuant to section 105 of CERCLA, 42 U.S.C. § 9605, EPA listed the Site on the National Priorities List, set forth at 40 CFR Part 300, Appendix B.

## **B. The Evaporation Ponds: Construction, Overflow, Treatment, and Enforcement**

12. In an attempt to mitigate releases of AMD, the LRWQCB constructed five lined storage and evaporation ponds on-site between 1983-1985. These ponds collect AMD from an adit (the "Adit") and a drainage system built under the mine pit ("Pit Underdrain or "PUD"). From the time of the construction of the ponds until the first successful season of treatment in 1999, evaporation during the dry summer season would decrease the total volume of AMD and concentrate the contaminants within these ponds. However, the combined flow of AMD and direct precipitation (rain and snow) into the ponds exceeded evaporation losses from the ponds in most years between 1985 and 1999, so that the ponds usually reached capacity (approximately 16 million gallons) and then overflowed into Leviathan Creek. Estimates of the overflow from a particularly wet winter range up to 9 million gallons per year. Without annual preventative action, such overflow could reoccur.

13. In the summer of 1999, the LRWQCB conducted a treatability study to evaluate a particular process for neutralizing the AMD held in the evaporation ponds. The process tested by the LRWQCB is referred to as biphasic neutralization. The treatability study demonstrated that biphasic neutralization could be used to treat the AMD to a level acceptable for discharge to Leviathan Creek, considering all of the exigencies of the situation prior to design of further response actions. Operation of this system in the summer of 1999 reduced the level of AMD in the ponds significantly. Further activity in the spring of 2000 prevented overflow that year.

14. On July 29, 2000, EPA issued an Administrative Abatement Action ("AAA") under section 106(a) of CERCLA, 42 U.S.C. § 9606(a), to the LRWQCB, pursuant to which the LRWQCB treated the AMD in the evaporation ponds. The LRWQCB successfully treated sufficient quantities of AMD in the summer of 2000 so as to prevent pond overflows in 2001.

15. The AAA was modified in each of the years 2001, 2002, 2003, and 2004, to provide for the LRWQCB to perform a similar removal action each summer, each of which has succeeded in preventing pond overflows in the following year. During the past four summers, the LRWQCB effectively emptied the ponds of AMD. Each year, EPA and the LRWQCB have further developed the treatment system, so as to respond to changing chemistry in the ponds and improve AMD treatment and sludge handling techniques.

### **C. Other AMD Releases, Early Response Actions, and the Phased RI/FS**

16. In addition to the contaminated water collected in the evaporation ponds, other sources of untreated AMD from the Leviathan Mine currently contribute year-round to the contamination of the Leviathan Creek/Bryant Creek watershed. The Channel Underdrain ("CUD") collects subsurface water from beneath a portion of the concrete Leviathan Creek diversion channel and discharges roughly 15 to 30 gallons per minute ("gpm") into Leviathan Creek. The Delta Seep area is a flow of approximately 10 gpm from the lowest portion of the mine waste rock in Leviathan Canyon, known as the Delta Slope, approximately 600 feet downstream from the end of the diversion channel. Aspen Seep is a series of flows totaling more than 10 gpm from low points of the waste rock in the Aspen Creek drainage. Water quality measurements taken by the LRWQCB indicate that these sources are somewhat less acidic and less highly concentrated in arsenic and metals than water collected in the evaporation ponds.

17. On November 22, 2000, EPA issued an Administrative Order requiring Atlantic Richfield to submit work plans for a phased Remedial Investigation/ Feasibility Study ("RI/FS") for developing a long-term response to releases from Leviathan Mine ("Administrative Order"). Additionally, the Administrative Order requires Atlantic Richfield to plan and implement Early Response Actions ("ERAs") to address releases from Leviathan Mine that are not captured in the evaporation ponds.

18. Pursuant to the Administrative Order, ARCO Environmental Remediation L.L.C. ("AERL"), has implemented ERAs on behalf of Atlantic Richfield since 2001. The ERAs have emphasized treatment of known sources of AMD, both to develop feasible methods of addressing these releases and to allow examination of whether there are other sources of contamination originating at the Site by measuring how the creeks respond to treatment of the known releases.

19. During the summers of 2001, 2002, 2003, and 2004, AERL captured and treated AMD from the CUD.

20. During 2001 and 2002, the LRWQCB conducted a geotechnical analysis of the stability of the mine wastes near the Delta Seep. In 2003 and 2004, AERL captured the Delta Seep flows and pumped this AMD uphill for treatment along with CUD flows. However, slope instability issues and mudflows from rain storms hampered Delta Seep efforts in both 2003 and 2004, and the Delta Seep effort ended early in the 2004 season. A major project sponsored by the LRWQCB to reconfigure and stabilize the Delta Slope is currently underway in 2005.

21. The seep of AMD into Aspen Creek was partially addressed by a demonstration biological treatment project operated by University of Nevada - Reno researchers. The Aspen Creek treatment utilizes a biological process to reduce sulfate to sulfide and to precipitate metal sulfides which are relatively insoluble. This project was funded by the LRWQCB until June 30, 2001, and is currently funded by AERL. Pursuant to the Administrative Order, AERL expanded and improved this biological treatment system, which began capturing and treating all AMD flowing into the Aspen Creek by the summer of 2003. This system works through the winter, and it is anticipated that it will continue to be operated and maintained by Atlantic Richfield for the duration of the NTCRA.

22. An integral part of past and future pond water treatment and other response actions includes assessment of the effectiveness of the action through water quality monitoring at the Site and in downstream waters as well as measurement of streamflow and meteorologic conditions throughout the year. The LRWQCB has monitored water quality since its first involvement, and has increased the intensity of the investigation of site characteristics since 1998.

23. The ERAs to date have demonstrated effective technologies for seasonal treatment of the discharges at the Site and confirmed that the known releases contribute the majority of contaminants affecting the streams during the dry season. Based on what has been learned over the past few years through ERAs performed by AERL, the removals performed by the LRWQCB, the initial stages of RI/FS activity, and the comments of other stakeholders, EPA, on November 13, 2003, directed Atlantic Richfield to prepare an EE/CA to evaluate options for capturing and treating the AMD year-round to stringent discharge standards. It is necessary to intercept and treat these known releases year-round, both to improve water quality in the affected streams on a year-round basis and to provide an opportunity to determine the scope of the subsequent phases of the RI/FS, given that such interception and treatment can be expected to substantially alter the nature and extent of the threats posed by the Site. Year-round treatment will greatly improve water quality in Leviathan and Bryant Creeks on a year-round basis and set the stage for the long term RI/FS, because the elimination of the major known discharges will make it possible to study the effect of sediments and any other remaining sources.

24. Atlantic Richfield developed the EE/CA with input from EPA and other stakeholders and submitted the EE/CA on April 5, 2004. The LRWQCB had a reasonable opportunity to review and comment on the proposed EE/CA pursuant to section 106(a) of CERCLA, 42 U.S.C. §9606(a), and 40 CFR § 300.500. EPA received comments from the public, in writing and in a public meeting held on Tuesday, May 4, 2004. EPA responded to significant comments and approved the EE/CA in the NTCRAM pursuant to 40 C.F.R. § 300.415(n)(4)(iv).

25. The NTCRA is supported by an Administrative Record that includes the documents and information upon which EPA based the selection of the NTCRA.

26. In the NTCRAM, EPA selected a Non-Time Critical Removal Action at Leviathan Mine including on-site winter treatment of known AMD sources to be implemented in two phases. Phase 1 includes design, construction and operation of a new on-site winterized treatment system to test the reliability and effectiveness for year-round treatment of AMD from the CUD and Delta Seep. During Phase 1, AMD from the Adit and PUD will continue to be captured during the winter for separate summer treatment. If Phase 1 proves successful, the NTCRAM calls for advancement to Phase 2, when the winterized treatment system would be reconfigured to test the reliability and effectiveness of year-round treatment of combined flows from the Adit, PUD, CUD and Delta Seeps. The bio-reactor treatment of the Aspen Seep will continue during both phases.

27. This Administrative Action provides for implementation of portions of Phase 1 of the NTCRA, including those portions related to year-round capture and seasonal treatment of the flows from the Adit and PUD, as well as continued maintenance of the Site. If Phase 1 proves successful, this Administrative Action may need to be amended, supplemented, or superseded by another administrative action or agreement to provide for implementation of Phase 2. Performance of this Administrative Action will further contribute to the efficient performance of the anticipated long-term remedial action, as required by 40 C.F.R. § 300.415(d). EPA remains committed to a full RI/FS process that will lead to a final Record of Decision for the entire Site.

#### **IV. CONCLUSIONS OF LAW AND DETERMINATIONS**

28. Based on the Findings of Fact set forth above, and the Administrative Record supporting the NTCRA, EPA has determined that:

a. The Site is a "facility" as defined by Section 101(9) of CERCLA, 42 U.S.C. § 9601(9).

b. The contamination found at the Site, as identified in the Findings of Fact above, includes "hazardous substances" as defined by Section 101(14) of CERCLA, 42 U.S.C. § 9601(14).

c. The State is a "person" as defined by Section 101(21) of CERCLA, 42 U.S.C. § 9601(21).

d. The State is a current owner of the site and is subject to this Administrative Action under section 106(a) of CERCLA, 42 U.S.C. § 9606(a).

e. For all purposes under the NCP and CERCLA, including but not limited to sections 106(b) and 107(c)(3) of CERCLA, 42 U.S.C. §§ 9606(b), 9607(c)(3), this

Administrative Action is an order under section 106(a) of CERCLA, 42 U.S.C. § 9606(a).

f. The conditions at the Site described in the Findings of Fact above constitute an actual or threatened "release" as defined in section 101(22) of CERCLA, 42 U.S.C. § 9601(22).

g. The actual or threatened release of one or more hazardous substances from the facility may present an imminent and substantial endangerment to the public health or welfare or the environment.

h. The Work required by this Administrative Action is necessary to protect the public health, welfare, or the environment and, if carried out in compliance with the terms of this Administrative Action, will be considered consistent with the NCP, as provided in Section 300.700(c)(3)(ii) of the NCP.

## **V. NOTICE TO AFFECTED JURISDICTIONS**

29. By April 15, 2005, prior to issuing this Administrative Action, EPA gave notice of this action to the states of California and Nevada and the Washoe Tribe of Nevada and California that EPA would be issuing this Administrative Action. With respect to this Administrative Action, for purposes of notice under section 106(a) and involvement by the state of California under 40 CFR § 300.500 in any response activity at the Site, the LRWQCB is the designated state agency acting on behalf of the state of California.

## **VI. IMPLEMENTATION OF ACTION**

30. Based upon the foregoing Findings of Fact, Conclusions of Law, Determinations, and the Administrative Record for this Site, the LRWQCB shall comply with the following provisions including the attachment to this Administrative Action, all documents incorporated by reference into this Administrative Action, and all schedules and deadlines in this Administrative Action, attached to this Administrative Action, or incorporated by reference into this Administrative Action. All such Work is contingent upon the availability of funding duly appropriated by the California Legislature into the LRWQCB's budget for such Work. Any failure to comply with the approved Work Plans without sufficient cause shall be a violation of this Administrative Action.

## **VII. NOTICE OF INTENT TO COMPLY**

31. The Parties have discussed this Administrative Action prior to its issuance. Within seven days of the effective date of this Administrative Action, the LRWQCB shall provide written notice to EPA's Remedial Project Manager ("RPM") stating that it intends to perform all Work required by this Administrative Action during a one year period, contingent upon the availability of funding duly appropriated by the California Legislature into the LRWQCB's budget for such Work. For each year that the first phase of the NTCRA continues, the RPM may provide written

notice to the LRWQCB of the necessity to continue the Work for an additional year. Within seven days of the receipt of such notice, the LRWQCB shall provide written notice to the RPM stating that it intends to perform all Work required by this Administrative Action during an additional one year period, contingent upon the availability of funding duly appropriated by the California Legislature into the LRWQCB's budget for such Work, which the LRWQCB shall request for that year.

## **VIII. PARTIES BOUND**

32. This Administrative Action shall apply to the LRWQCB and its successors.

33. The LRWQCB shall provide a copy of this Administrative Action to each contractor, sub-contractor, laboratory, or consultant retained to perform any Work under this Administrative Action, within five working days after the date of receipt of this Administrative Action or on the date such services are retained, whichever date occurs later. The LRWQCB shall also provide a copy of this Administrative Action to each person representing the LRWQCB with respect to the Site or the Work and shall condition all contracts and subcontracts entered into hereunder upon performance of the Work in conformity with the terms of this Administrative Action. With regard to the activities undertaken pursuant to this Administrative Action, each contractor and subcontractor shall be deemed to be related by contract to the LRWQCB within the meaning of section 107(b)(3) of CERCLA, 42 U.S.C. § 9607(b)(3); but shall be considered "response action contractors" within the meaning of section 119 of CERCLA, 42 U.S.C. § 9619, and subject to all provisions of that section. Notwithstanding the terms of any contract, the LRWQCB is responsible for compliance with this Administrative Action and for ensuring that its contractors, subcontractors and agents comply with this Administrative Action, and perform any Work in accordance with this Administrative Action.

34. Not later than sixty (60) days prior to any transfer of any real property interest in any property included within the Site, the LRWQCB shall submit a true and correct copy of the transfer document(s) to EPA, and shall identify the transferee by name, principal business address and effective date of the transfer.

## **IX. WORK TO BE PERFORMED**

35. The LRWQCB shall cooperate with EPA in providing information regarding the Work to the public. As requested by EPA, the LRWQCB shall participate in the preparation of such information for distribution to the public and in public meetings which may be held or sponsored by EPA to explain activities at or relating to the Site.

36. All aspects of the Work to be performed by the LRWQCB pursuant to this Administrative Action shall be under the direction and supervision of a qualified project manager. The LRWQCB has designated Chris Stetler, Senior Water Resource Control Engineer, as its project manager. If at any time the LRWQCB proposes to use a different project manager, the

LRWQCB shall notify EPA's RPM before the new project manager performs any Work under this Administrative Action.

37. The LRWQCB will conduct the following Work as described in Section V of the NTCRAM:

- i. Continue the existing summer bi-phasic treatment of the flows from the Adit and PUD, captured year-round in the existing ponds, for each year EPA directs continued implementation of Phase I of the NTCRA;
- ii. Maintain the Site as described in the approved Work Plan, including the ponds, drainage and diversion channels, and gates and fences;
- iii. Monitor conditions at the Site as described in the approved Work Plan, including flow rate measurements, surface water quality and meteorological information.

38. Within thirty (30) days of sending any written Notice of Intent to Comply pursuant to Paragraph 31, the LRWQCB shall submit to EPA for approval a draft Work Plan for Work generally described in the preceding paragraph, unless the schedule is extended by the RPM.

39. Each draft Work Plan shall provide a description of, and an expeditious schedule for, the actions required by this Administrative Action. Each draft Work Plan shall include preparation of a Quality Assurance Project Plan ("QAPP") as described in Paragraph 59, or appropriate modification of the existing QAPP, as part of the Work Plan.

40. EPA may approve, disapprove, require revisions to, or modify any draft Work Plan in whole or in part, as described in Section XII of this Administrative Action. The LRWQCB shall implement each Work Plan as approved in writing by EPA in accordance with the schedule approved by EPA. Once approved, or approved with modifications, each Work Plan, the schedule, and any subsequent modifications shall be incorporated into and become fully enforceable under this Administrative Action.

41. The LRWQCB shall not commence any Work except in conformance with the terms of this Administrative Action. The LRWQCB shall not commence implementation of the Work Plan developed hereunder until receiving written EPA approval pursuant to the preceding paragraph.

42. Health and Safety Plan. Concurrent with the submittal of each Work Plan, The LRWQCB shall submit for EPA review and comment a plan that ensures the protection of the public health and safety during performance of on-Site Work under this Administrative Action. This plan shall be prepared in accordance with EPA's Standard Operating Safety Guide (PUB 9285.1-03, PB 92-963414, June 1992). In addition, the plan shall comply with all currently applicable Occupational Safety and Health Administration ("OSHA") regulations found at 29

C.F.R. Part 1910. If EPA determines that it is appropriate, the plan shall also include contingency planning. The LRWQCB shall incorporate all changes to the plan recommended by EPA and shall implement the plan during the pendency of the associated Work Plan.

43. The LRWQCB shall submit three copies of all plans, reports or other submissions required by this Administrative Action, or any approved Work Plan. Documents which the LRWQCB has in electronic form shall also be sent by electronic mail, to the electronic mail address specified by the RPM.

44. Upon request by EPA, the LRWQCB shall provide to EPA the QA/QC procedures followed by all sampling teams and laboratories performing data collection and/or analysis under the direction of the LRWQCB.

45. Upon request by EPA, the LRWQCB shall allow EPA or its authorized representatives to take split and/or duplicate samples. The LRWQCB shall notify EPA not less than 3 days in advance of any sample collection activity for receiving waters, unless shorter notice is agreed to by EPA. No advance notice is required for routine monitoring associated with pond water treatment activities. If any unanticipated situation arises that the LRWQCB chooses to monitor through sample collection, the LRWQCB shall notify EPA as soon as practicable concerning both the unanticipated situation and the sample collection activity. EPA shall have the right to take any additional samples that EPA deems necessary. Upon request, EPA shall allow the LRWQCB to take split or duplicate samples of any samples it takes as part of its oversight of the LRWQCB's implementation of the Work.

46. The LRWQCB has retained contractors to perform, under the oversight of the LRWQCB, some or all of the NTCRA required by this Administrative Action. The names and qualifications of such contractors shall be set forth in the Work Plans submitted by the LRWQCB. The LRWQCB shall notify EPA of the name(s) and qualifications of any other contractor(s) or subcontractor(s) retained to perform the NTCRA under this Administrative Action at least ten (10) day prior to commencement of such Work.

47. The Work performed by the LRWQCB pursuant to this Administrative Action shall, at a minimum, achieve the Performance Standards specified in the NTCRAM and in the Work Plans.

48. Notwithstanding any action by EPA, the LRWQCB remains fully responsible for achievement of the Performance Standards in the NTCRAM and Work Plans. Nothing in this Administrative Action, or in EPA's approval of a Work Plan, or in the NTCRAM, or approval of any other submission, shall be deemed to constitute a warranty or representation of any kind by EPA that full performance of the NTCRA, or Work Plans, will achieve the Performance Standards set forth for such Work in the NTCRAM or in the Work Plans. The LRWQCB's compliance with such approved documents does not foreclose EPA from seeking additional work to achieve the applicable performance standards.

49. The off-site shipment of any hazardous substance, pollutant, or contaminant as defined under CERCLA sections 101(14) and (33), 42 U.S.C. §§ 101(14) and (33), from the Site is subject to 40 CFR § 300.440. The LRWQCB shall, prior to any off-site shipment of hazardous substances from the Site to an out-of-state waste management facility, provide written notification to the appropriate state environmental official in the receiving state and to EPA's RPM of such shipment of hazardous substances. However, the notification of shipments shall not apply to any off-Site shipments when the total volume of all shipments from the Site to the State will not exceed ten (10) cubic yards.

a. The notification shall be in writing, and shall include the following information, where available: (1) the name and location of the facility to which the hazardous substances are to be shipped; (2) the type and quantity of the hazardous substances to be shipped; (3) the expected schedule for the shipment of the hazardous substances; and (4) the method of transportation. The LRWQCB shall notify the receiving state of major changes in the shipment plan, such as a decision to ship the hazardous substances to another facility within the same state, or to a facility in another state.

b. The identity of the receiving facility and state, if any, will be determined by the LRWQCB. The LRWQCB shall provide all relevant information, including information under the categories noted in subparagraph a above, on the off-site shipments as soon as practicable after arrangements for shipping are made, and before the hazardous substances are actually shipped.

50. Within thirty (30) days after the LRWQCB concludes that the seasonal work on the NTCRA has been fully performed, the LRWQCB shall so notify EPA and shall schedule and conduct a pre-certification inspection to be attended by the LRWQCB and EPA. The pre-certification inspection shall be followed by a written report submitted within ninety (90) days of the inspection by the LRWQCB's Project Coordinator certifying that all work to date on the NTCRA has been completed in full satisfaction of the requirements of this Administrative Action. At a minimum this annual report shall: (1) describe the actions which have been taken to comply with this Administrative Action during the prior year; (2) include all results of sampling and tests and all other data received by the LRWQCB and not previously submitted to EPA; and (3) describe all problems encountered and any anticipated problems, any actual or anticipated delays, and solutions developed and implemented to address any actual or anticipated problems or delays.

## X. EPA PERIODIC REVIEW

51. Under section 121(c) of CERCLA, 42 U.S.C. § 9621(c), and any applicable regulations, EPA may review the Site to assure that the Work performed pursuant to this Administrative Action adequately protects human health and the environment.

## **XI. ENDANGERMENT AND EMERGENCY RESPONSE**

52. In the event of any action or occurrence directly related to the performance of the Work which causes or threatens to cause a release of a hazardous substance or which may present an immediate threat to public health or welfare or the environment, the LRWQCB shall immediately take all appropriate action to prevent, abate, or minimize the threat, and shall immediately notify EPA's RPM or, if the RPM is unavailable, the EPA Emergency Response Office, Region IX. The LRWQCB shall take such action in consultation with EPA's RPM and in accordance with all applicable provisions of this Administrative Action, including but not limited to the Health and Safety Plan.

53. Nothing in the preceding Paragraph shall be deemed to limit any authority of the United States to take, direct, or order all appropriate action to protect human health and the environment or to prevent, abate, or minimize an actual or threatened release of hazardous substances on, at, or from the Site.

## **XII. EPA REVIEW OF SUBMISSIONS**

54. After review of any deliverable, plan, report or other item which is required to be submitted for review and approval pursuant to this Administrative Action, EPA may: (a) approve the submission; (b) approve the submission with modifications; (c) disapprove the submission and direct the LRWQCB to re-submit the document after incorporating EPA's comments; or (d) disapprove the submission and assume responsibility for performing all or any part of the NTCRA. As used in this Administrative Action, the terms "approval by EPA," "EPA approval," or a similar term means the actions described in clauses (a) or (b) of this Paragraph.

55. In the event of approval or approval with modifications by EPA, the LRWQCB shall proceed to take any action required by the plan, report, or other item, as approved or modified by EPA.

56. Upon receipt of a notice of disapproval or a request for a modification, the LRWQCB shall, within twenty-one (21) days or such longer time as specified by EPA in its notice of disapproval or request for modification, correct the deficiencies and resubmit the plan, report, or other item for approval. Notwithstanding the notice of disapproval, or approval with modifications, the LRWQCB shall proceed, at the direction of EPA, to take any action required by any non-deficient portion of the submission.

57. If any submission is disapproved by EPA, and the LRWQCB fails to correct such deficiency within the twenty-one (21) day or longer time period allowed by EPA to correct any such deficiency, the LRWQCB shall be deemed to be in violation of this Administrative Action.

### **XIII. QUARTERLY PROVISION OF DATA**

58. In addition to the other deliverables set forth in this Administrative Action, the LRWQCB shall, on a quarterly schedule, make available to EPA all sampling and monitoring data collected with respect to actions and activities undertaken pursuant to this Administrative Action. The data shall be made available on or before the fifth day of each January, April, July, and October following the effective date of this Administrative Action. The data shall either be mailed to EPA or provided to the Leviathan Mine database operated by Atlantic Richfield under the direction of EPA. The LRWQCB's obligation to submit data shall continue until completion of the Administrative Action.

### **XIV. QUALITY ASSURANCE, SAMPLING AND DATA ANALYSIS**

59. The LRWQCB shall use the quality assurance/quality control procedures described in the EPA Region 9 "Sampling and Analysis Plan Guidance and Template, Version 2" March 2000. For long-term monitoring activities, EPA Order 5360.1, Change 1, 1998, requires that data collection activities conform to the requirements in American National Standard ANSI/ASQC E4-1994, *Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs*. A QAPP must be developed for the long-term monitoring activities planned. The EPA guidance documents, "EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations," (EPA QA/R-5, Draft Final, October, 1997), and Guidance for Quality Assurance Project Plans (EPA QA/G-5, February, 1998) or any guidance that supersedes these documents should be used when preparing the QAPP. These are available at [www.epa.gov/quality1/qatools.html](http://www.epa.gov/quality1/qatools.html) (Also see, "Requirements for Non-EPA Organizations" at this website for a more complete discussion.) The QAPP is to be approved by EPA's Region 9 Quality Assurance Manager. To provide quality assurance and maintain quality control, the LRWQCB shall:

- a. Use only laboratories which have a documented Quality Assurance Program that complies with EPA guidance document EPA QA/ R-5.
- b. Ensure that the laboratory used by the LRWQCB for analyses performs according to a method or methods deemed satisfactory to EPA and submits all protocols to be used for analyses to EPA.
- c. Ensure that EPA personnel and EPA's authorized representatives are allowed access to the laboratory and personnel utilized by the LRWQCB for analyses.

### **XV. COMPLIANCE WITH APPLICABLE LAWS**

60. All activities by the LRWQCB pursuant to this Administrative Action shall be performed in accordance with all applicable local, state and federal laws and regulations to the extent required by the NTCRAM. EPA has determined that the activities contemplated by this

Administrative Action are consistent with the NCP.

61. Except as provided in section 121(e) of CERCLA and the NCP, no permit shall be required for any portion of the Work conducted entirely on-site.

62. This Administrative Action is not, and shall not be construed to be, a permit issued pursuant to any federal or state statute or regulation.

#### **XVI. REMEDIAL PROJECT MANAGER**

63. All communications, whether written or oral, from the LRWQCB to EPA shall be directed to EPA's RPM. The LRWQCB shall submit to EPA three (3) copies of all documents, including plans, reports, and other correspondence, which are developed pursuant to this Administrative Action, and shall send these documents by first class mail. EPA's RPM is:

Kevin Mayer  
75 Hawthorne Street SFD 7-2  
San Francisco, CA 94105  
(415) 972-3176

64. EPA has the unreviewable right to change its RPM. If EPA changes its RPM, EPA will inform the LRWQCB in writing of the name, address, and telephone number of the new RPM.

65. EPA's RPM shall have the authority lawfully vested in a RPM and On-Scene Coordinator by the NCP, 40 CFR Part 300. EPA's RPM shall have authority, consistent with the NCP, to halt any work required by this Administrative Action, and to take any necessary response action.

#### **XVII. LRWQCB'S ACCESS TO SITE**

66. The property surrounding Leviathan Mine, and over which access to the Site is gained, is owned by the United States and managed by the U.S. Forest Service. Notwithstanding that the LRWQCB believes it may own an easement over Leviathan Mine Road, in June 1999, the LRWQCB entered into an agreement regarding road access and uses of the National Forest with the U.S. Forest Service. The agreement authorizes the LRWQCB, other state agencies, and their contractors, representatives and agents, use of the Leviathan Mine Road to access the Site to, among other things, pursue cleanup and abatement of water quality contamination at the Site.

#### **XVIII. SITE ACCESS AND DATA/DOCUMENT AVAILABILITY**

67. The LRWQCB shall allow EPA and its authorized representatives and contractors to enter and freely move about all property at the Site and off-Site areas subject to or affected by the Work under this Administrative Action or where documents required to be prepared or maintained

by this Administrative Action are located, for the purposes of inspecting conditions, activities, the results of activities, records, operating logs, and contracts related to the Site or the LRWQCB and its representatives or contractors pursuant to this Administrative Action; reviewing the progress of the LRWQCB in carrying out the terms of this Administrative Action; conducting tests as EPA or its authorized representatives or contractors deem necessary; using a camera, sound recording device or other documentary type equipment; and verifying the data submitted to EPA by the LRWQCB. The LRWQCB shall allow EPA and its authorized representatives to enter the Site, to inspect and copy all non-privileged records, files, photographs, documents, sampling and monitoring data, and other writings related to work undertaken in carrying out this Administrative Action. Nothing herein shall be interpreted as limiting or affecting EPA's right of entry or inspection authority under federal law. No claim of confidentiality shall be made with respect to any data, including, but not limited to, all sampling, analytical, monitoring, hydrogeologic, scientific, chemical, or engineering data. Furthermore, no document, report or other information created or generated pursuant to the requirements of this Administrative Action shall be withheld on the grounds that it is privileged.

68. The LRWQCB may assert a claim of business confidentiality covering part or all of the information submitted to EPA pursuant to the terms of this Administrative Action under 40 CFR § 2.203, provided such claim is not inconsistent with section 104(e)(7) of CERCLA, 42 U.S.C. § 9604(e)(7) or other provisions of law. This claim shall be asserted in the manner described by 40 CFR § 2.203(b) and substantiated by the LRWQCB at the time the claim is made. Information determined to be confidential by EPA will be given the protection specified in 40 CFR Part 2. If no such claim accompanies the information when it is submitted to EPA, it may be made available to the public by EPA without further notice to the LRWQCB.

## **XIX. RECORD PRESERVATION**

69. At EPA's request, the LRWQCB shall make available for inspection and copying, or shall copy and furnish to EPA at the option and expense of the LRWQCB, all non-privileged documents and information within its possession and/or control or that of its contractors or agents relating to the Work or to the implementation of this Administrative Action, including but not limited to sampling, analysis, chain of custody records, manifests, trucking logs, receipts, reports, sample traffic routing, correspondence, or other documents or information related to the Work. The LRWQCB shall also make available to EPA for purposes of investigation, information gathering, or testimony, its employees, agents, or representatives with knowledge of relevant facts concerning the performance of the Work.

70. Until ten (10) years after the effective date of this Administrative Action, the LRWQCB shall preserve and retain all records and documents in its possession or control, including the documents in the possession or control of its contractors and agents on and after the effective date of this Administrative Action that relate in any manner to the hazardous substances found on or released from the Site. At the conclusion of this document retention period, the

LRWQCB shall notify the United States at least ninety (90) calendar days prior to the destruction of any such records or documents, and upon request by the United States, the LRWQCB shall grant EPA access to non-privileged documents for purposes of inspection or copying by EPA, or shall copy and furnish to EPA such documents at the option and expense of the LRWQCB.

71. Until ten (10) years after the effective date of this Administrative Action, the LRWQCB shall preserve, and shall instruct its contractors and agents to preserve, all documents, records, and information of whatever kind, nature or description relating to the performance of the Work. Upon the conclusion of this document retention period, the LRWQCB shall notify the United States at least ninety (90) days prior to the destruction of any such records, documents or information, and, upon request of the United States, the LRWQCB shall grant EPA access to non-privileged documents for purposes of inspection or copying by EPA, or shall copy and furnish to EPA such documents at the option and expense of the LRWQCB.

## **XX. DELAY IN PERFORMANCE**

72. Any delay in performance of this Administrative Action that, in EPA's judgment, is not properly justified by the LRWQCB under the terms and conditions of this Administrative Action, shall be considered a violation of this Administrative Action. Any delay in performance of this Administrative Action shall not affect the LRWQCB's obligations to fully perform all obligations under the terms and conditions of this Administrative Action.

73. The LRWQCB shall notify EPA of any delay or anticipated delay in performing any requirement of this Administrative Action. Such notification shall be made by telephone to EPA's RPM within forty-eight (48) hours after the LRWQCB first knew or should have known that a delay might occur. The LRWQCB shall adopt all reasonable measures to avoid or minimize any such delay. Within five (5) business days after notifying EPA by telephone, the LRWQCB shall provide written notification fully describing the nature of the delay, any justification for delay, any reason why the LRWQCB should not be held strictly accountable for failing to comply with any relevant requirements of this Administrative Action, the measures planned and taken to minimize the delay, and a schedule for implementing the measures that will be taken to mitigate the effect of the delay. Increased costs or expenses associated with implementation of the activities called for in this Administrative Action are not a justification for any delay in performance.

## **XXI. ASSURANCE OF ABILITY TO COMPLETE WORK**

74. Once the California Legislature approves the State budget for the relevant fiscal year, the LRWQCB will demonstrate its ability to complete the Work required by this Administrative Action by presenting to EPA information regarding its legislative appropriation for the purpose of conducting activities which include the Work. EPA acknowledges that the LRWQCB's ability to complete the Work is contingent upon the availability of funding duly appropriated by the California Legislature into the LRWQCB's budget for such Work. Lack of such funding for the Work shall not constitute a violation of this Administrative Action.

75. The LRWQCB shall require its contractors and subcontractors to have adequate insurance coverage for liabilities for injuries or damages to persons or property which may result from the activities to be conducted by or on behalf of the LRWQCB pursuant to this Administrative Action, to the extent such insurance is required by the State Contracting Manual. The LRWQCB shall ensure that such insurance is maintained for the duration of the Work required by this Administrative Action.

## **XXII. OTHER CLAIMS**

76. The EPA, by issuance of this Administrative Action, assumes no liability on its own behalf or on behalf of the United States for any injuries or damages to persons or property resulting from acts or omissions by the LRWQCB, or its directors, officers, employees, agents, representatives, successors, assigns, contractors, or consultants in carrying out any action or activity pursuant to this Administrative Action. Neither EPA nor the United States may be deemed to be a party to any contract entered into by the LRWQCB or its directors, officers, employees, agents, successors, assigns, contractors, or consultants in carrying out any action or activity pursuant to this Administrative Action.

77. This Administrative Action does not constitute a pre-authorization of funds under section 111(a)(2) of CERCLA, 42 U.S.C. § 9611(a)(2).

78. Nothing in this Administrative Action shall constitute a satisfaction of or release from any claim or cause of action against the LRWQCB, the state of California, or any person not a party to this Order, for any liability such person may have under CERCLA, other statutes, or the common law, including but not limited to any claims of the United States for costs, damages and interest under section 106(a) and 107(a) of CERCLA, 42 U.S.C. § 9606(a) and 9607(a).

## **XXIII. ENFORCEMENT, RESERVATIONS AND MODIFICATIONS**

79. EPA reserves the right to bring an action against the LRWQCB under section 107 of CERCLA, 42 U.S.C. § 9607, for recovery of any response costs incurred by the United States related to this Administrative Action and not reimbursed by the LRWQCB. This reservation shall include but not be limited to past costs, direct costs, indirect costs, the costs of oversight, and the costs of compiling the cost documentation to support any oversight cost demand, as well as accrued interest as provided in section 107(a) of CERCLA.

80. Notwithstanding any other provision of this Administrative Action, at any time during the NTCRA, EPA may perform its own studies, complete the NTCRA (or any portion of the NTCRA) as provided in CERCLA and the NCP, and seek reimbursement from the LRWQCB for its costs, or seek any other appropriate relief.

81. Nothing in this Administrative Action shall preclude EPA from taking any additional enforcement actions, including modification of this Administrative Action or issuance of additional Administrative Actions, and/or additional remedial or removal actions as EPA may deem necessary, or from requiring the LRWQCB in the future to perform additional activities pursuant to CERCLA, 42 U.S.C. § 9606(a), et seq., or any other applicable law.

82. Modifications to any Work Plan or schedule may be made in writing by the RPM. Any other modification of this Administrative Action may only be made in writing by signature of an EPA Superfund Division Branch Chief. If the LRWQCB seeks permission to deviate from any approved Work Plan or schedule, the LRWQCB's project manager shall submit a written request to EPA for approval outlining the proposed modification and its basis. No informal advice, guidance, suggestion, or comment by EPA regarding reports, plans, specifications, schedules, or any other writing submitted by the LRWQCB shall relieve the LRWQCB of its obligation to obtain such formal approval as may be required by this Administrative Action, and to comply with all requirements of this Administrative Action unless it is formally modified.

83. Notwithstanding any provision of this Administrative Action, the United States hereby retains all of its information gathering, inspection and enforcement authorities and rights under CERCLA, RCRA and any other applicable statutes or regulations.

84. The LRWQCB shall be subject to civil penalties under section 106(b) of CERCLA, 42 U.S.C. § 9606(b), of not more than \$32,500 for each day in which the LRWQCB willfully violates, or fails or refuses to comply with this Administrative Action without sufficient cause. In addition, failure to properly provide response action under this Administrative Action, or any portion hereof, without sufficient cause, may result in liability under section 107(c)(3) of CERCLA, 42 U.S.C. § 9607(c)(3), for punitive damages in an amount at least equal to, and not more than three times the amount of any costs incurred by the Fund as a result of such failure to take proper action.

85. Nothing in this Administrative Action shall constitute or be construed as a release from any claim, cause of action or demand in law or equity against any person for any liability it may have arising out of or relating in any way to the Site.

86. If a court with jurisdiction over the United States issues an order that invalidates any provision of this Administrative Action or finds that the LRWQCB has sufficient cause not to comply with one or more provisions of this Administrative Action, the LRWQCB shall remain bound to comply with all provisions of this Administrative Action not invalidated by the court's order.

#### **XXIV. EFFECTIVE DATE AND COMPUTATION OF TIME**

87. This Administrative Action shall be effective the day it is signed by the Director of the Superfund Division or his delegatee. All times for performance of activities under this Administrative Action shall be calculated from this effective date.

## XXV. OPPORTUNITY TO CONFER

88. EPA conferred with the LRWQCB prior to the issuance of this Administrative Action. This conference was not an evidentiary hearing, and did not constitute a proceeding to challenge this Administrative Action; nor did it constitute concurrence by the LRWQCB or the state of California with the Administrative Action. It did not give the LRWQCB a right to seek review of this Administrative Action, or to seek resolution of potential liability, and no official stenographic record of the conference was made. Because this conference has taken place, no further opportunity to confer is extended by this Administrative Action.

BY: Elizabeth J. Adams  
Elizabeth J. Adams  
Chief, Site Cleanup Branch, Superfund Division  
Region IX  
U.S. Environmental Protection Agency

DATE: July 14, 2005

**Attachment 2**

U.S. EPA Region IX  
Administrative Order For Early Response Actions, Remedial Investigation and  
Feasibility Study  
Leviathan Mine, Alpine County, California  
CERCLA Docket No. 2001-05  
November 22, 2000

ADMIN  
ORDER

UNITED STATES  
ENVIRONMENTAL PROTECTION AGENCY  
REGION IX

IN THE MATTER OF:

LEVIATHAN MINE  
ALPINE COUNTY, CALIFORNIA

ATLANTIC RICHFIELD  
COMPANY,

Respondent

ADMINISTRATIVE ORDER  
FOR EARLY RESPONSE ACTIONS,  
REMEDIAL INVESTIGATION  
AND FEASIBILITY STUDY

U.S. EPA Region IX  
CERCLA

Docket No. ~~2000-09-05~~  
2001-05

Proceeding under Section  
106(a) of the Comprehensive  
Environmental Response,  
Compensation, and Liability  
Act, as amended, 42 U.S.C. § 9606(a).

I. INTRODUCTION AND JURISDICTION

1. This Administrative Order ("Order") directs Atlantic Richfield Company ("Respondent") to prepare and perform at the Leviathan Mine Site ("the Site") a phased Remedial Investigation/ Feasibility Study ("RI/FS") including Early Response Actions as described in the attached Statement of Work ("SOW") (Attachment 1), and to reimburse EPA for all costs incurred by EPA in connection with the phased RI/FS. Pursuant to this Order, Respondent will conduct the phased RI/FS described herein to abate an imminent and substantial endangerment to the public health, welfare or the environment that may be presented by the actual or threatened release of hazardous substances, at or from the Site.
2. This Order is issued pursuant to the authority vested in the President of the United States by section 106(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 U.S.C. § 9606(a) as amended ("CERCLA"), and delegated to the Administrator of

the United States Environmental Protection Agency ("EPA") by Executive Order No. 12580, January 23, 1987, 52 Fed. Reg. 2923, as amended by Executive Order No. 13016, August 30, 1996, 61 Fed. Reg. 45871, further delegated to the EPA Regional Administrators by EPA Delegation Nos. 14-B and further redelegated to the Superfund Division Director by Regional Delegations dated September 29, 1997.

3. In issuing this Order, the objectives of EPA are: (a) to determine the nature and extent of contamination and any threat to the public health, welfare, or the environment caused by the release or threatened release of hazardous substances, pollutants or contaminants at or from the Site; (b) to determine and evaluate alternatives for remedial action to prevent, mitigate or otherwise respond to or remedy any release or threatened release of hazardous substances, pollutants or contaminants at or from the Site, by implementing Early Response Actions, as defined in Section VI of this Order, and conducting a feasibility study; and (c) to recover response and oversight costs incurred by the United States with respect to this Order.

4. The activities conducted under this Order are subject to approval by EPA and Respondent shall provide all appropriate necessary information for the RI/FS, and for a record of decision that is consistent with CERCLA and the National Contingency Plan, ("NCP"), 40 C.F.R. Part 300. The activities under this Order shall be conducted in compliance with all applicable EPA guidances, policies, and procedures.

## II. FINDINGS OF FACT

5. The 656 acre Leviathan Mine property lies within a remote portion of northeastern Alpine County, California, on the eastern flank of the central Sierra Nevada, near the California-Nevada border, approximately 25 miles southeast of Lake Tahoe, and 6 miles east of Markleeville, California. Of the total property, approximately 253 acres are disturbed by mine related activities. With the exception of approximately 21 acres of disturbance on United States Forest Service lands, all disturbance is on the mine property, which is owned by the State of California. As identified on the Topaz Lake and Mt. Siegel U.S. Geological Survey ("USGS") quadrangle

sheets, the mine property is situated principally within Sections 15 and 22, Township 10 North, Range 21 East, although small portions of the workings extend into the southeastern and northwestern corners of the adjoining Sections 14 and 23, respectively.

6. Access to the mine property is dependent on the weather, but is provided by unpaved roads from State Highway 89 on the southeast and from U.S. Highway 395 south of Gardnerville, Nevada, on the northeast. The California-Nevada border lies approximately three miles northeast of the mine property. The mine property is isolated from approximately mid-November through late April due to impassable road conditions.

7. There are several sources of Acid Mine Drainage ("AMD") at the mine property which impact Leviathan Creek. When a release from the mine property occurs, it flows through the Leviathan Creek/ Bryant Creek watershed, which drains into the East Fork Carson River. The AMD released contains elevated concentrations of metals, most notably arsenic, and also includes iron, aluminum, chromium, cobalt, copper, nickel, and zinc. The low pH and high metals content of the AMD have eliminated most aquatic life in Leviathan and Bryant Creeks downstream of the mine. These releases originate in the state of California and, at times, may flow into the state of Nevada through Washoe Tribal lands into the East Fork Carson River, which serves as a major source of water supplies and a habitat for fish, including an historical habitat for the federally-listed threatened Lahontan cutthroat trout.

8. The Leviathan Mine pit is sparsely vegetated. Although there is some volunteer vegetation, most existing vegetation is due to localized revegetation efforts carried out by the Lahontan Regional Water Quality Control Board ("LRWQCB"). This remote mine has no potable water or power.

9. Anaconda Company, owned and operated the mine from 1954 until 1962. During this period, Anaconda Company extracted sulfur ore through open pit mining. Mining ceased at the mine property around 1962. In 1977, Anaconda Company merged into Atlantic Richfield

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Company, the Respondent. In 1984, the State of California acquired the mine property to pursue cleanup and abatement of the water quality problems associated with historic mining. Jurisdiction over the mine property rests with the State Water Resources Control Board which, in turn, has delegated authority over the mine property to the LRWQCB. In an attempt to mitigate releases of AMD, the LRWQCB constructed 5 lined evaporation ponds on-site in 1983-1985, which collect AMD from on-site sources throughout the year. During the dry summer season, evaporation decreases the total volume of AMD and concentrates the contaminants within these ponds. The combined flow of AMD and direct precipitation (rain and snow) into the ponds exceeds evaporation losses from the ponds in most years, so that the ponds usually reach capacity (approximately 16 million gallons) and then overflow into Leviathan Creek, unless action is taken to create additional capacity in the ponds. Estimates of the overflow range from 3 to 9 million gallons per year.

10. On May 11, 2000 (65 Fed. Reg. 30482), pursuant to section 105 of CERCLA, 42 U.S.C. § 9605, EPA listed the Site on the National Priorities List, set forth at 40 CFR Part 300, Appendix B.

11. In May 1998, EPA issued to Respondent an Administrative Order on Consent for Removal Action ("AOC"). Under the AOC, Respondent agreed to remove liquids collected in the evaporation ponds, to collect specified information on site conditions, and to reimburse EPA, other agencies of the United States, and the Washoe Tribe of Nevada and California ("the Tribe") for all costs incurred on or after March 1, 1998, not inconsistent with the NCP. Respondent was not successful in removing sufficient quantities of AMD from the evaporation ponds.

12. EPA and Respondent modified the AOC on February 18, 2000. The modification to the AOC required Respondent to perform a Riparian Conservation Project, and it provided that Respondent's obligations under the 1998 AOC would be terminated 30 days after receipt of payment for response costs incurred between March 1, 1998 and the effective date of the modification to the AOC, which was February 18, 2000.

13. In the summer of 1999, the LRWQCB conducted a treatability study to evaluate a particular process for neutralizing the AMD held in the evaporation ponds. This process is referred to as biphasic neutralization. The treatability study demonstrated that biphasic neutralization could be used to treat the AMD to a level acceptable for discharge to Leviathan Creek, considering all of the exigencies of the situation prior to design of further response actions. Operation of this system in the summer of 1999 reduced the level of AMD in the ponds to a significant extent. Further LRWQCB activity in the spring of 2000 prevented overflow in 2000.

14. On July 29, 2000, EPA issued an Administrative Abatement Action under section 106(a) of CERCLA, 42 U.S.C. § 9606(a), to the LRWQCB, pursuant to which the LRWQCB treated the AMD in the evaporation ponds. The LRWQCB successfully treated sufficient quantities of AMD in the summer of 2000 so as to minimize the possibility of pond overflows in 2001. It is anticipated that inflows of AMD in 2001 will necessitate treatment by the LRWQCB in the summer of 2001 to avoid overflows from the evaporation ponds in 2002.

15. In addition to the contaminated water collected in the evaporation ponds, other sources of untreated AMD from the Leviathan Mine currently contribute year round to the contamination of the Bryant Creek watershed. The Channel Underdrain collects subsurface water from beneath a portion of the concrete Leviathan Creek diversion channel and discharges roughly 20 to 30 gallons per minute ("gpm") into Leviathan Creek. The Delta Seep area is a flow of approximately 10 gpm from the lowest portion of the mine waste rock in Leviathan Canyon, approximately 600 feet downstream from the end of the diversion channel. Aspen Seep is a series of flows totaling more than 10 gpm from low points of the waste rock in the Aspen Creek drainage. Flows from these sources may vary considerably from season to season. All of these sources discharge directly into Leviathan or Aspen Creeks without treatment, except for a relatively small portion of the Aspen Seep which is diverted into an experimental biological treatment system. Water quality measurements taken by LRWQCB indicate that these sources

are somewhat less acidic and less highly concentrated in arsenic and metals than water collected in the evaporation ponds.

### III. CONCLUSIONS OF LAW AND DETERMINATIONS

16. The Leviathan Mine Site is a "facility" as defined in section 101(9) of CERCLA, 42 U.S.C. § 9601(9).

17. Respondent is a "person" as defined in section 101(21) of CERCLA, 42 U.S.C. § 9601(21).

18. Respondent or its predecessor owned and operated the Leviathan Mine during a period of time when hazardous substances were disposed there, and is therefore a "liable" party as defined in section 107(a) of CERCLA, 42 U.S.C. § 9607(a), and is subject to this Order under section 106(a) of CERCLA, 42 U.S.C. § 9606(a).

19. The substances listed in Paragraph 7 of this Order are found at the Site and are "hazardous substances" as defined in section 101(14) of CERCLA, 42 U.S.C. § 9601(14).

20. The hazardous substances contained in the evaporation ponds threaten to be released from the Site into the surface water in the future. Furthermore, hazardous substances from the other sources described in Paragraph 7 are being released from the Site into the surface water.

21. The conditions at the Site described above constitute an actual or threatened "release" as defined in section 101(22) of CERCLA, 42 U.S.C. § 9601(22).

22. The actual or threatened release of one or more hazardous substances from the facility may present an imminent and substantial endangerment to the public health or welfare or the environment.

23. The phased RI/FS required by this Order is necessary to protect the public health, welfare, and the environment, and is consistent with the NCP and CERCLA.

24. The contamination and endangerment at this Site constitute an indivisible injury. The actions required by this Order are necessary to protect the public health, welfare, and the environment.

#### IV. NOTICE TO THE STATE

25. On November 17, prior to issuing this Order, EPA notified the State of California, LRWQCB, that EPA would be issuing this Order.

#### V. ORDER

26. Based on the foregoing, Respondent is hereby ordered to comply with the following provisions, including but not limited to all attachments to this Order, all documents incorporated by reference into this Order, and all schedules and deadlines in this Order, attached to this Order, or incorporated by reference into this Order.

#### VI. DEFINITIONS

27. Unless otherwise expressly provided herein, terms used in this Order which are defined in CERCLA or in regulations promulgated under CERCLA shall have the meaning assigned to them in the statute or its implementing regulations. Whenever terms listed below are used in this Order or in the documents attached to this Order or incorporated by reference into this Order, the following definitions shall apply:

a. "CERCLA" shall mean the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 U.S.C. §§ 9601 et seq.

b. "Day" shall mean a calendar day unless expressly stated to be a working day. "Working day" shall mean a day other than a Saturday, Sunday, or federal holiday. In

computing any period of time under this Order, where the last day would fall on a Saturday, Sunday, or federal holiday, the period shall run until the end of the next working day.

c. "Early Response Action" shall mean those activities to investigate and respond to the known risks from the untreated source areas, such as a Time Critical Removal Action, Non-Time Critical Removal Action, or Interim Remedial Action, to be undertaken by Respondent to implement the final plans and specifications submitted by Respondent pursuant to the SOW and approved by EPA.

d. "EPA" shall mean the United States Environmental Protection Agency.

e. "National Contingency Plan" or "NCP" shall mean the National Contingency Plan promulgated pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, codified at 40 C.F.R. Part 300, including any amendments thereto.

f. "Paragraph" shall mean a portion of this Order identified by an arabic numeral.

g. "Response Costs" shall mean all costs, including direct costs, indirect costs, and accrued interest incurred by the United States to perform or support response actions at the Site. Response costs include but are not limited to the costs of overseeing the Work, such as the costs of reviewing or developing plans, reports and other items pursuant to this Order and costs associated with verifying the Work.

h. "Statement of Work" or "SOW" shall mean the statement of work for implementation of the phased RI/FS as set forth in Attachment 1 to this Order. The SOW is incorporated into this Order and is an enforceable part of this Order.

i. "Section" shall mean a portion of this Order identified by a roman numeral and includes one or more Paragraphs.

j. "Site" shall mean the Leviathan Mine Superfund site, as described in the NPL listing.

k. The "State" shall mean the State of California, Lahontan Regional Water Quality Control Board.

l. "Tribe" shall mean the Washoe Tribe of Nevada and California.

m. "United States" shall mean the United States of America.

n. "Work" shall mean all activities Respondent is required to perform under this Order, including any activities described in the SOW.

#### VII. NOTICE OF INTENT TO COMPLY

28. Respondent shall provide, not later than 10 days after the effective date of this Order, written notice to EPA's Remedial Project Manager ("RPM") stating whether it will comply with the terms of this Order. If Respondent does not unequivocally commit to perform the Work as provided by this Order, it shall be deemed to have violated this Order and to have failed or refused to comply with this Order. Respondent's written notice shall describe, using facts that exist on or prior to the effective date of this Order, any "sufficient cause" defenses asserted by Respondent under sections 106(b) and 107(c)(3) of CERCLA. The absence of a response by EPA to the notice required by this Paragraph shall not be deemed to be acceptance of Respondent's assertions. It is anticipated that ARCO Environmental Remediation, L.L.C. ("AERL") will act as Respondent's implementing agent.

#### VIII. PARTIES BOUND

29. This Order shall apply to and be binding upon Respondent and upon its directors, officers, employees, agents, successors, and assigns. Respondent is jointly and severally responsible for carrying out all activities required by this Order. No change in the ownership,

corporate status, or other control of any of the entities referenced in this Paragraph shall alter any of Respondent's responsibilities under this Order.

30. Respondent shall provide a copy of this Order to any prospective owners or successors before a controlling interest in Respondent's assets, property rights, or stock are transferred to the prospective owner or successor. Respondent shall provide a copy of this Order to each contractor, sub-contractor, laboratory, or consultant retained to perform any Work under this Order, within five days after the effective date of this Order or on the date such services are retained, whichever date occurs later. Respondent shall also provide a copy of this Order to each person representing any Respondent with respect to the Site or the Work and shall condition all contracts and subcontracts entered into hereunder upon performance of the Work in conformity with the terms of this Order. With regard to the activities undertaken pursuant to this Order, each contractor and subcontractor shall be deemed to be related by contract to Respondent within the meaning of section 107(b)(3) of CERCLA, 42 U.S.C. § 9607(b)(3). Notwithstanding the terms of any contract, Respondent is responsible for compliance with this Order and for ensuring that its contractors, subcontractors and agents comply with this Order, and perform any Work in accordance with this Order.

#### **IX. WORK TO BE PERFORMED**

31. Respondent shall cooperate with EPA in providing information regarding the Work to the public. As requested by EPA, Respondent shall participate in the preparation of such information for distribution to the public and in public meetings which may be held or sponsored by EPA to explain activities at or relating to the Site.

32. All aspects of the Work to be performed by Respondent pursuant to this Order shall be under the direction and supervision of a qualified project manager the selection of which shall be subject to approval by EPA. Within 10 days after the effective date of this Order, Respondent shall notify EPA in writing of the name and qualifications of the project manager, including

primary support entities and staff, proposed to be used in carrying out Work under this Order. If at any time Respondent proposes to use a different project manager, Respondent shall notify EPA and shall obtain approval from EPA before the new project manager performs any Work under this Order.

33. EPA will review Respondent's selection of a project manager according to the terms of this Paragraph and Section XVI of this Order. If EPA disapproves of the selection of the project manager, Respondent shall submit to EPA within 30 days after receipt of EPA's disapproval of the project manager previously selected, a list of project managers, including primary support entities and staff, that would be acceptable to Respondent. EPA will thereafter provide written notice to Respondent of the names of the project managers that are acceptable to EPA. Respondent may then select any approved project manager from that list and shall notify EPA of the name of the project manager selected within 21 days of EPA's designation of approved project managers.

34. Respondent shall conduct activities and submit deliverables as provided by SOW. All such work shall be conducted in accordance with CERCLA, the NCP, and EPA guidance including, but not limited to, the "Interim Final Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA"(OSWER Directive # 9355.3-01), "Guidance for Data Usability in Risk Assessment" (OSWER Directive #9285.7-05) and guidances referenced therein, and guidances referenced in the SOW, as may be amended or modified by EPA. The general activities that Respondent is required to perform are identified below in the list of deliverables. The tasks that Respondent must perform are described more fully in the SOW and guidances. The activities and deliverables identified below shall be developed as provided in the SOW, and shall be submitted to EPA as provided. All work performed under this Order shall be in accordance with the schedules herein, and in full accordance with the standards, specifications, and other requirements of the SOW, as initially approved or modified by EPA, and as may be amended or modified by EPA from time to time.

35. Respondent shall provide EPA with the following deliverables:

A. Within 30 days of the effective date of this Order, Respondent shall submit to EPA the Site Management Plan ("SMP") as described in the SOW. If EPA disapproves of or requires revisions to the SMP, in whole or in part, Respondent shall amend and submit to EPA a revised SMP which is responsive to the directions in all EPA comments, within 15 days of receiving EPA's comments.

B. Within 30 days of receiving notice from EPA that it has approved the SMP, Respondent shall submit to EPA a Work Plan for the First Phase RI/FS, as described in the SOW. If EPA disapproves of or requires revisions to the Work Plan for the First Phase RI/FS, in whole or in part, Respondent shall amend and submit to EPA a revised Work Plan for the First Phase RI/FS which is responsive to the directions in all EPA comments, within 15 days of receiving EPA's comments.

C. Within 45 days of receiving notice from EPA that it has approved the SMP, Respondent shall submit to EPA a Work Plan for implementation of Early Response Actions, as described in the SOW. If EPA disapproves of or requires revisions to the Work Plan for implementation of Early Response Actions, in whole or in part, Respondent shall amend and submit to EPA a revised Work Plan for implementation of Early Response Actions which is responsive to the directions in all EPA comments, within 15 days of receiving EPA's comments.

D. Following implementation of Early Response Actions at the Site, and within 90 days of receiving notice from EPA, Respondent shall submit to EPA a Work Plan for Long-term Response RI/FS, as described in the SOW. It is anticipated that implementation of Early Response Actions will take place during 2001 and the summer of 2002, so that a Work Plan for Long-term Response RI/FS will be needed in the second half of 2002. If EPA disapproves of or requires revisions to the Work Plan for Long-term Response RI/FS, in whole or in part, Respondent shall amend and submit to EPA a revised Work Plan for Long-term Response RI/FS

which is responsive to the directions in all EPA comments, within 30 days of receiving EPA's comments.

36. In the event that Respondent amends or revises a report, plan or other submittal upon receipt of EPA comments, if EPA subsequently disapproves of the revised submittal, or if subsequent submittals do not fully reflect EPA's directions for changes, EPA retains the right to seek statutory penalties; perform its own studies, complete the Work (or any portion of the Work under CERCLA and the NCP), and seek reimbursement from Respondent for its costs; and/or seek any other appropriate relief.

37. Respondent shall perform each approved work plan according to the schedule provided therein.

38. In the event that EPA takes over some of the tasks, but not the preparation of the Long-term Response RI/FS, Respondent shall incorporate and integrate information supplied by EPA into the final Long-term Response RI/FS report.

39. Neither failure of EPA to expressly approve or disapprove of Respondent's submissions within any time period, nor the absence of comments, shall be construed as approval by EPA. Whether or not EPA gives express approval for Respondent's deliverables, Respondent is responsible for preparing deliverables acceptable to EPA.

40. Respondent shall, prior to any off-site shipment of hazardous substances from the site to an out-of-state waste management facility, provide written notification to the appropriate state environmental official in the receiving state and to EPA's RPM of such shipment of hazardous substances. However, the notification of shipments shall not apply to any such off-site shipments when the total volume of such shipments will not exceed 10 cubic yards.

(a) The notification shall be in writing, and shall include the following information, where available: (1) the name and location of the facility to which the hazardous substances are to be

shipped; (2) the type and quantity of the hazardous substances to be shipped; (3) the expected schedule for the shipment of the hazardous substances; and (4) the method of transportation. Respondent shall notify the receiving state of major changes in the shipment plan, such as a decision to ship the hazardous substances to another facility within the same state, or to a facility in another state.

(b) The identity of the receiving facility and state will be determined by Respondent following the award of the contract for any phase of the Work. Respondent shall provide all relevant information, including information under the categories noted in Subparagraph (a) above, on the off-site shipments, as soon as practical after the award of the contract and before the hazardous substances are actually shipped.

#### **X. MODIFICATION OF THE WORK PLANS**

41. In the event of conditions posing an immediate threat to human health or welfare or the environment, Respondent shall notify EPA and the state immediately. In the event of unanticipated or changed circumstances at the site, Respondent shall notify the EPA RPM by telephone within 24 hours of discovery of the unanticipated or changed circumstances. In addition to the authorities in the NCP, in the event that EPA determines that the immediate threat or the unanticipated or changed circumstances warrant changes in a work plan, EPA shall modify or amend the work plan in writing accordingly. Respondent shall perform each approved work plan as modified or amended.

42. EPA may determine that in addition to tasks defined in an initially approved work plan, other additional work may be necessary to accomplish the objectives of the Early Response Actions and phased RI/FS as set forth in the SOW. EPA may require that Respondent perform these response actions in addition to those required by the initially approved SOW, including any approved modifications, if it determines that such actions are necessary for completion of any Early Response Action or the RI/FS. Respondent shall confirm its willingness to perform the additional work in writing to EPA within 15 days of receipt of the EPA. Respondent shall implement the additional tasks which EPA determines are necessary. The additional work shall

be completed according to the standards, specifications, and schedule set forth or approved by EPA in a written modification to the work plan or written work plan supplement. EPA reserves the right to conduct the work itself at any point, to seek reimbursement from Respondent, and/or to seek any other appropriate relief.

#### **XI. FINAL REPORTS, PROPOSED PLANS, RECORD OF DECISION AND ADMINISTRATIVE RECORD**

43. EPA retains the responsibility for the release to the public of the report on any phase of the phased RI/FS. EPA retains responsibility for the preparation and release to the public of the proposed plan and record of decision in accordance with CERCLA and the NCP.

44. EPA shall provide Respondent with the final report on any phase of the phased RI/FS as well as any record of decision.

45. EPA will determine the contents of the administrative record file for selection of any response action. Respondent must submit to EPA documents developed during the course of the phased RI/FS upon which selection of a response action may be based. Respondent shall provide copies of plans, task memoranda for further action, quality assurance memoranda and audits, raw data, field notes, laboratory analytical reports and other reports. Respondent must additionally submit any previous studies conducted under state, local or other federal authorities relating to selection of the response action, and all communications between Respondent and state, local or other federal authorities concerning selection of the response action. EPA may require Respondent to establish a community information repository at or near the Site, to house one copy of the administrative record.

#### **XII. PROGRESS REPORTS AND MEETINGS**

46. Respondent shall make presentations at, and participate in, meetings at the request of EPA during the initiation, conduct, and completion of the RI/FS. In addition to discussion of the

technical aspects of the RI/FS, topics will include anticipated problems or new issues. Meetings will be scheduled at EPA's discretion.

47. In addition to the deliverables set forth in this Order, Respondent shall provide to EPA monthly progress reports by the 10<sup>th</sup> day of the following month. At a minimum, with respect to the preceding month, these progress reports shall (1) describe the actions which have been taken to comply with this Order during that month, (2) include all results of sampling and tests and all other data received by Respondent, (3) describe work planned for the next two months with schedules relating such work to the overall project schedule for the Work and (4) describe all problems encountered and any anticipated problems, any actual or anticipated delays, and solutions developed and implemented to address any actual or anticipated problems or delays.

### XIII. SAMPLING, ACCESS, AND DATA AVAILABILITY/ADMISSIBILITY

48. All results of sampling, tests, modeling or other data (including raw data) generated by Respondent, or on Respondent's behalf, during implementation of this Order, shall be submitted to EPA in the subsequent monthly progress report as described in Section XII of this Order.

49. Respondent will verbally notify EPA at least 15 days prior to conducting significant field events as described in the SOW, work plan or sampling and analysis plan. At EPA's verbal or written request, or the request of EPA's contractor, Respondent shall allow split or duplicate samples to be taken by EPA (and its authorized representatives) of any samples collected by Respondent in implementing this Order.

50. Respondent may assert a claim of business confidentiality covering part or all of the information submitted to EPA pursuant to the terms of this Order under 40 C.F.R. Section 2.20, provided such claim is allowed by section 104(e)(7) of CERCLA, 42 U.S.C. Section 9604(e)(7). This claim shall be asserted in the manner described by 40 C.F.R. Section 2.203(b) and substantiated at the time the claim is made. Information determined to be confidential by EPA will be given the protection specified in 40 C.F.R. Part 2. If no such claim accompanies the

information when it is submitted to EPA, it may be made available to the public by EPA or the state without further notice to Respondent. Respondent agrees not to assert confidentiality claims with respect to any data related to site conditions, sampling, or monitoring.

51. Respondent will obtain, or use its best efforts to obtain, site access agreements with owners of property where the Work must be performed. Such agreements shall provide access for EPA, its contractors and oversight officials, the state and its contractors, and Respondent or its authorized representatives, and such agreements shall specify that Respondent is not EPA's representative with respect to liability associated with site activities. Copies of such agreements shall be provided to EPA prior to Respondent's initiation of field activities. If access agreements are not obtained within 60 days after the effective date of this Order, Respondent shall immediately notify EPA of its failure to obtain access. EPA may obtain access for Respondent, perform those tasks or activities with EPA contractors, or terminate the Order in the event that Respondent cannot obtain access agreements. In the event that EPA performs those tasks or activities with EPA contractors and does not terminate the Order, Respondent shall perform all other activities not requiring access to that site, and shall reimburse EPA for all costs incurred in performing such activities. Respondent additionally shall integrate the results of any such tasks undertaken by EPA into its reports and deliverables.

#### XIV. RECORD PRESERVATION

52. Respondent shall preserve all records and documents in its possession that relate in any way to the site during the conduct of this Order and for a minimum of 10 years after commencement of construction of any response action. Respondent shall acquire and retain copies of all documents that relate to the site and are in the possession of its employees, agents, accountants, contractors, or attorneys. After this 10 year period, Respondent shall notify EPA at least 90 days before the documents are scheduled to be destroyed. If EPA requests that the documents be saved, Respondent shall, at no cost to EPA, give EPA the documents or copies of the documents.

## **XV. ENDANGERMENT AND EMERGENCY RESPONSE**

53. In the event of any action or occurrence during the performance of the Work which causes or threatens to cause a release of a hazardous substance or which may present an immediate threat to public health or welfare or the environment, Respondent shall immediately take all appropriate action to prevent, abate, or minimize the threat, and shall immediately notify EPA's RPM. If the RPM is unavailable Respondent shall notify the EPA Office of Emergency Response, Region IX. Respondent shall take such action in consultation with EPA's RPM and in accordance with all applicable provisions of this Order, including but not limited to the Health and Safety Plan and the Contingency Plan. In the event that Respondent fails to take appropriate response action as required by this Section, and EPA takes that action instead, Respondent shall reimburse EPA for all costs of the response action not inconsistent with the NCP. Respondent shall pay the response costs in the manner described in Section XXVI of this Order, within 30 days of Respondent's receipt from EPA of a demand for payment and a summary of the costs incurred.

54. Nothing in the preceding Paragraph shall be deemed to limit any authority of the United States to take, direct, or order all appropriate action to protect human health and the environment or to prevent, abate, or minimize an actual or threatened release of hazardous substances on, at, or from the Site.

## **XVI. EPA REVIEW OF SUBMISSIONS**

55. After review of any deliverable, plan, report or other item which is required to be submitted for review and approval pursuant to this Order, EPA may: (a) approve the submission; (b) approve the submission with modifications; (c) disapprove the submission and direct Respondent to re-submit the document after incorporating EPA's comments; or (d) disapprove the submission and assume responsibility for performing all or any part of the response action. As used in this Order, the terms "approval by EPA," "EPA approval," or a similar term means the action described in Subparagraphs (a) or (b) of this Paragraph.

56. In the event of approval or approval with modifications by EPA, Respondent shall proceed to take any action required by the plan, report, or other item, as approved or modified by EPA.

57. Upon receipt of a notice of disapproval or a request for a modification, Respondent shall, within 15 days or such longer time as specified by EPA or in Paragraph 35 (D) of this Order, correct the deficiencies and resubmit the plan, report, or other item for approval. Notwithstanding the notice of disapproval, or approval with modifications, Respondent shall proceed, at the direction of EPA, to take any action required by any non-deficient portion of the submission.

58. If any submission is disapproved by EPA pursuant to Paragraph 55 (d) of this Order, Respondent shall be deemed to be in violation of this Order.

#### **XVII. COMPLIANCE WITH APPLICABLE LAWS**

59. All activities by Respondent pursuant to this Order shall be performed in accordance with the requirements of all federal and state laws and regulations. EPA has determined that the activities contemplated by this Order are consistent with the NCP.

60. Except as provided in section 121(e) of CERCLA and the NCP, no permit shall be required for any portion of the Work conducted entirely on-Site. Where any portion of the Work requires a federal or state permit or approval, Respondent shall submit timely applications and take all other actions necessary to obtain and to comply with all such permits or approvals.

61. This Order is not, and shall not be construed to be, a permit issued pursuant to any federal or state statute or regulation.

### XVIII. REMEDIAL PROJECT MANAGER

62. All communications, whether written or oral, from Respondent to EPA shall be directed to EPA's RPM or Alternate RPM. Respondent shall submit to EPA three copies of all documents, including plans, reports, and other correspondence, which are developed pursuant to this Order, and shall send these documents by certified mail, return receipt requested or overnight delivery. Documents which Respondent has in electronic form shall also be sent by electronic mail.

EPA's RPM is:

Kevin Mayer  
75 Hawthorne Street SFD 7-2  
San Francisco, CA 94105

(415) 744-2448  
mayer.kevin@epa.gov

EPA's Alternate RPM is:

Kathi Moore  
75 Hawthorne Street SFD 7-2  
San Francisco, CA 94105

(415) 744-2221  
moore.kathi@epa.gov

63. EPA has the unreviewable right to change its RPM or Alternate RPM. If EPA changes its RPM or Alternate RPM, EPA will inform Respondent in writing of the name, address, and telephone number of the new RPM or Alternate RPM.

64. EPA's RPM and Alternate RPM shall have the authority lawfully vested in a RPM and an On-Scene Coordinator ("OSC") by the National Contingency Plan, 40 C.F.R. Part 300. EPA's RPM or Alternate RPM shall have authority, consistent with the National Contingency Plan, to halt any work required by this Order, and to take any necessary response action.

65. Within 10 days after the effective date of this Order, Respondent shall designate a Project Coordinator and shall submit the name, address, and telephone number of the Project Coordinator to EPA for review and approval. Respondent's Project Coordinator shall be responsible for overseeing Respondent's implementation of this Order. If Respondent wishes to change his/her Project Coordinator, Respondent shall provide written notice to EPA, 5 days prior to changing the Project Coordinator, of the name and qualifications of the new Project Coordinator. Respondent's selection of a Project Coordinator shall be subject to EPA approval.

#### XIX. DELAY IN PERFORMANCE

66. Any delay in performance of this Order that, in EPA's judgment, is properly justified by Respondent under the terms of this Section shall not be considered a violation of this Order. Any delay in performance of this Order shall not affect Respondent's obligations to fully perform all obligations under the terms and conditions of this Order.

67. Respondent shall notify EPA of any delay or anticipated delay in performing any requirement of this Order. Such notification shall be made by telephone to EPA's RPM or Alternate RPM within 48 hours after Respondent first knew or should have known that a delay might occur. Respondent shall adopt all reasonable measures to avoid or minimize any such delay. Within 5 business days after notifying EPA by telephone, Respondent shall provide written notification fully describing the nature of the delay, any justification for delay, any reason why Respondent should not be held strictly accountable for failing to comply with any relevant requirements of this Order, the measures planned and taken to minimize the delay, and a schedule for implementing the measures that will be taken to mitigate the effect of the delay. EPA may, in its sole and unreviewable discretion, grant an extension of any schedule for good cause shown. Increased costs or expenses associated with implementation of the activities called for in this Order are not a justification for any delay in performance. EPA may find a justification for delay in Respondent's performance where either: (a) Respondent has complied with the requirements of this Section and the requirements of Paragraph 51 of this Order, and a property owner has denied Respondent access with the result that Respondent's performance of a requirement of this Order

has been delayed; or (b) Respondent has complied with the requirements of this Section and the requirements of Paragraph 60 of this Order, and an authority with jurisdiction to issue a permit has denied or delayed issuance of a required permit with the result that Respondent's performance of a requirement of this Order has been delayed.

#### **XX. ASSURANCE OF ABILITY TO COMPLETE WORK**

68. Within 30 days after approval of any Work Plan for any response action, Respondent shall demonstrate its ability to complete the Work specified by the Work Plan and to pay all claims that arise from the performance of such Work by obtaining and presenting to EPA within 30 days after approval of the Work Plan one of the following: (1) a performance bond; (2) a letter of credit; (3) a guarantee by a third party; or (4) internal financial information to allow EPA to determine that Respondent has sufficient assets available to perform the Work. Respondent shall demonstrate financial assurance in an amount no less than the estimate of cost for the response action described in the Work Plan. If Respondent seeks to demonstrate ability to complete the response action by means of internal financial information, or by guarantee of a third party, it shall re-submit such information annually. If EPA determines that such financial information is inadequate, Respondent shall, within 30 days after receipt of EPA's notice of determination, obtain and present to EPA for approval one of the other three forms of financial assurance listed above.

69. At least 7 days prior to commencing any Work at the Site pursuant to this Order, Respondent shall submit to EPA a certification that Respondent or its contractors and subcontractors have adequate insurance coverage or have indemnification for liabilities for injuries or damages to persons or property which may result from the activities to be conducted by or on behalf of Respondent pursuant to this Order. Respondent shall ensure that such insurance or indemnification is maintained for the duration of the Work required by this Order.

## **XXI. REIMBURSEMENT OF RESPONSE COSTS**

70. Respondent shall reimburse EPA, upon written demand, for all response costs, not inconsistent with the NCP, incurred by it. Response costs are all costs including, but not limited to, direct and indirect costs and interest, that the EPA incurs in overseeing Respondent's implementation of the requirements of this Order, including development of this Order, reviewing or developing plans, reports and other items pursuant to this Order, verifying the Work, or otherwise implementing, overseeing, or enforcing this Order or in performing any response action which Respondent fails to perform in compliance with this Order. Response costs shall also include all costs, including direct and indirect costs, paid or incurred by EPA in connection with the Site between February 18, 2000 and the effective date of this Order.

71. On a periodic basis, EPA may submit to Respondent bills for response costs that include an itemized Cost Summary.

72. Respondent shall, within 30 days of receipt of each bill, remit a certified or cashier's check for the amount of those costs. Interest shall accrue from the later of the date that payment of a specified amount is demanded in writing or the date of the expenditure. The interest rate is the rate established by the Department of the Treasury pursuant to 31 U.S.C. § 3717 and 4 C.F.R. § 102.13.

73. For payments described in this Section, Respondent shall remit a check made payable to the Hazardous Substances Superfund and shall include the name of the Site, the Site identification number, the account number and the title of this Order. Respondent shall send such checks to:

U.S. Environmental Protection Agency  
Superfund Accounting  
P.O. Box 3608  
Pittsburgh, PA 15251  
Attn: Catherine Shen

74. Respondent shall simultaneously transmit a copy of the check to the Deputy Director, Superfund Division, U.S. EPA Region 9. Payments shall be designated as "Response Costs - Leviathan Mine Site" and shall reference the payor's name and address, the EPA site identification number 091A, and the docket number of this Order.

75. In the event that the payments for response costs are not made as required above, Respondent shall pay interest on the unpaid balance. Interest is established at the rate specified in section 107(a) of CERCLA. Interest shall accrue at the rate specified through the date of the payment. Payments of interest made under this Paragraph shall be in addition to such other remedies or sanctions available to the United States by virtue of Respondent's failure to make timely payments under this Section.

76. Respondent may dispute all or part of a bill for response costs submitted under this Order, if Respondent alleges that EPA, another federal agency, or the Tribe has made an accounting error, or if Respondent alleges that a cost item is inconsistent with the NCP. If any dispute over costs is resolved before payment is due, the amount due will be adjusted as necessary. If a dispute with EPA is not resolved before payment is due, Respondent shall pay the full amount of the uncontested costs into the Hazardous Substance Fund as specified above on or before the due date. Respondent shall pay to the prevailing party the amounts upon which it prevails plus interest within 15 days after the dispute is resolved.

## XXII. UNITED STATES NOT LIABLE

77. The United States, by issuance of this Order, assumes no liability for any injuries or damages to persons or property resulting from acts or omissions by Respondent, or its directors, officers, employees, agents, representatives, successors, assigns, contractors, or consultants in carrying out any action or activity pursuant to this Order. Neither EPA nor the United States may be deemed to be a party to any contract entered into by Respondent or its directors, officers, employees, agents, successors, assigns, contractors, or consultants in carrying out any action or activity pursuant to this Order.

### XXIII. ENFORCEMENT AND RESERVATIONS

78. EPA reserves the right to bring an action against Respondent under section 107 of CERCLA, 42 U.S.C. § 9607, for recovery of any response costs incurred by the United States and not reimbursed by Respondent. This reservation shall include but not be limited to past costs, direct costs, indirect costs, the costs of oversight, the costs of compiling the cost documentation to support oversight cost demand, as well as accrued interest as provided in section 107(a) of CERCLA.

79. Notwithstanding any other provision of this Order, at any time during the response action, EPA may perform its own studies, complete the response action (or any portion of the response action) as provided in CERCLA and the NCP, and seek reimbursement from Respondent for its costs, or seek any other appropriate relief.

80. Nothing in this Order shall preclude EPA from taking any additional enforcement actions, including modification of this Order or issuance of additional Orders, and/or additional remedial or removal actions as EPA may deem necessary, or from requiring Respondent in the future to perform additional activities pursuant to CERCLA, 42 U.S.C. § 9606(a), *et seq.*, or any other applicable law. Respondent shall be liable under CERCLA section 107(a), 42 U.S.C. § 9607(a), for the costs of any such additional actions.

81. Notwithstanding any provision of this Order, the United States hereby retains all of its information gathering, inspection and enforcement authorities and rights under CERCLA, RCRA and any other applicable statutes or regulations.

82. Respondent shall be subject to civil penalties under section 106(b) of CERCLA, 42 U.S.C. § 9606(b), of not more than \$27,500 for each day in which Respondent willfully violates, or fails or refuses to comply with this Order without sufficient cause. In addition, failure to properly provide response action under this Order, or any portion hereof, without sufficient cause, may

result in liability under section 107(c)(3) of CERCLA, 42 U.S.C. § 9607(c)(3), for punitive damages in an amount at least equal to, and not more than three times the amount of any costs incurred by the Fund as a result of such failure to take proper action.

83. Nothing in this Order shall constitute or be construed as a release from any claim, cause of action or demand in law or equity against any person for any liability it may have arising out of or relating in any way to the Site.

84. If a court issues an order that invalidates any provision of this Order or finds that Respondent has sufficient cause not to comply with one or more provisions of this Order, Respondent shall remain bound to comply with all provisions of this Order not invalidated by the court's order.

#### XXIV. ADMINISTRATIVE RECORD

85. Upon request by EPA, Respondent must submit to EPA all documents related to the selection of the response action for possible inclusion in the administrative record file.

#### XXV. EFFECTIVE DATE AND COMPUTATION OF TIME

86. This Order shall be effective on the day it is signed by the Superfund Division Director. All times for performance of ordered activities shall be calculated from this effective date.

#### XXVI. OPPORTUNITY TO CONFER

87. Respondent may, within 10 days after the date this Order is signed, request a conference with EPA's Superfund Division Branch Chief to discuss this Order. If requested, the conference shall occur on December 14, 2000 at 75 Hawthorne Street, San Francisco, California.

88. The purpose and scope of the conference shall be limited to issues involving the implementation of the response actions required by this Order and the extent to which Respondent intends to comply with this Order. This conference is not an evidentiary hearing, and does not

constitute a proceeding to challenge this Order. It does not give Respondent a right to seek review of this Order, or to seek resolution of potential liability, and no official stenographic record of the conference will be made. At any conference held pursuant to Respondent's request, Respondent may appear in person or by an attorney or other representative.

89. Requests for a conference must be by telephone followed by written confirmation mailed that day to the RPM.

So Ordered, this 22 day of November, 2000.

BY: Keith Takata  
Keith Takata  
Director, Superfund Division  
U.S. Environmental Protection Agency

130

ATTACHMENT 1

Clearwater Creek

LAHONTAN  
SINGER.

31 JAN. 06

ATTACHMENT

To #130

ATTACH 1  
CLEARWATER  
CREEK

**Region 6**

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**Water Segment:** Clearwater Creek  
East Walker River Hydrologic Unit, Mono County

**Pollutant:** Sedimentation/Siltation

**Recommendation:** Delist

**Weight of Evidence:** Based on the readily available data and information, the weight of evidence indicates there is sufficient justification in favor of removing this water segment-pollutant combination from the section 303(d) list of Water Quality Limited Segments. This conclusion is based on staff review of data indicating water quality standards are not exceeded.

Data reviewed included 1995 bioassessment surveys conducted on three creeks in the Bodie Hills watershed. Two sites on Clearwater Creek were selected as "reference" sites for the study, and indicated good biologic health at those sites (see Herbst, 1995, attached). Bioassessment integrates the ecologic integrity of the waterbody, representing physical, chemical and biologic health.

Tetra Tech, under contract with the USEPA, visited two sites on Clearwater Creek in 2003 as part of a watershed assessment. Tetra Tech performed geomorphologic (Rosgen level II) characterizations on two sites in 2003 (Tetra Tech, 2005). Tetra Tech's surveys do not provide any evidence indicating beneficial use impairment or water quality standards exceedances in Clearwater Creek. Based on the bioassessment data from 1995 indicating good biologic health, staff recommends delisting for Clearwater Creek.

**Lines of Evidence:** Listing was based on limited and out-of-date information (1988 stream surveys). No numeric data to indicate water quality standards exceedances were submitted. Board staff is not aware of evidence to indicate current water quality standards exceedances or beneficial use impacts related to the listing for this pollutant. Most recent quantitative data indicates good biologic community health at two locations in the creek.

FACT SHEET  
REVISION

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<i>Numeric Line of Evidence</i>	Biologic condition score
<i>Beneficial Use:</i>	COLD (Cold Freshwater Habitat)
<i>Matrix:</i>	Water
<i>Water Quality Objective/ Water Quality Criterion:</i>	Narrative sediment-related objectives in the Lahontan Basin Plan
<i>Data Used to Assess Water Quality:</i>	Biologic Assessment/Index of Biologic Integrity
<i>Spatial Representation:</i>	Two sites on Clearwater Creek
<i>Temporal Representation:</i>	1995

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**References:** Hersbt, David, 1995. Bioassessment Report – October 26, 1995.  
Tetra Tech, 2005. Status of Bodie Hills 303d Impairments.

**Bioassessment Report - October 26, 1995**

**Location:** Bodie Hills, Mono County [Clearwater Creek, Bodie Creek, Aurora Creeek]

**Project:** Demonstration project for continuing education workshop (UC cooperative extension) to establish biomonitoring comparisons and baseline among streams under varied grazing exposure and enclosure

**Summary:** Prior to sampling, BLM management personnel were consulted on the condition of streams in the Bodie Hills in order to select area-specific reference (or control) streams for comparison to streams exposed to livestock grazing. In many situations reference streams will not represent the ideal or pristine condition but only the least impacted with respect to the source problem under study (in this case cattle grazing). Based on minimum grazing criteria, two sites on Clearwater Creek were selected to establish the reference comparison because they were ungrazed, though they were exposed to some trampling from sheep trailing in the area. Of the sites on Bodie Creek, BC21 was within an enclosure (3 years), and BC31 was grazed. Both sites on Aurora Creek (AC51 & AC21) were also within cattle grazing areas. BLM site function ratings (based on soil, vegetative bank cover and water status) and grazing impact categories are given below for each of the six study sites:

<u>Stream Study Site Code</u>	<u>Overall Site Function Rating</u>	<u>Grazing Impact</u>
CW11	2.45	ungrazed but trampled
CW12	2.32	ungrazed but trampled
BC21 (enclosure)	3.03	high
BC31	2.63	extreme
AC51	2.85	extreme
AC21	2.23	extreme

**Biological Condition Score and Impairment Assessment (see EPA rapid bioassessment handout)**

The biological condition score is a "multi-metric" index, a score that integrates several metrics or measures of biological health based on aquatic invertebrate indicators. Combining measures produces an index that looks at the community as a composite and is less likely to be biased by reliance on a single measure of health. Six metrics are combined here: the **HBI** or biotic index which indicates composite pollution tolerance (unhealthy communities have more pollution tolerant species though fewer species overall); **S** or species richness, the total number of taxa declining under pollution impact; **EPT** index is the number of sensitive mayfly, stonefly and caddisfly taxa that also decline under pollution stress; **Dom** or dominance which increases under polluted conditions as one tolerant group comes to dominate the community; **%C** the percent of tolerant chironomidae midges, and **% Sim.** the percent of tolerant simuliidae blackflies, both of which increase under polluted conditions; **EPT/C** is the ratio of the most common sensitive taxa to the most common tolerant taxa (decreases as stream health deteriorates); and **CLI** the community loss index which indicates the number of species lost at subject sites relative to the reference community. These measures thus combine community structure and tolerance in evaluating pollution impacts which here are derived from non-point sources, especially sedimentation. Scores at the study sites are based on comparison to the combined reference on Clearwater Creek (32 points possible).

Biological Assessment

Percent of reference and (score) - see EPA rating sheet on following page

Site Code	S	HBI	EPT	Dom.	EPT/C	CLI	(%) and Sum Score	Level of Impairment
BC21 enclosure	98% (6)	92% (6)	>100% (6)	38% (2)	19% (0)	0.55 (4)	75% 24	slight
BC31 grazed	66% (4)	89% (6)	36% (0)	41% (0)	11% (0)	1.06 (4)	44% 14	moderate
AC51 grazed	60% (4)	>100% (6)	36% (0)	55% (0)	>100% (6)	1.19 (4)	63% 20	slight
AC21 grazed	>100% (6)	>100% (6)	>100% (6)	50% (0)	>100% (6)	0.59 (4)	88% 28	unimpaired

**Interpretation:** This assessment indicates that the grazed site on Bodie Creek is the most impaired of the sites (moderate), while the site under exclosure on Bodie Creek is only slightly impaired, indicating signs of recovery (significant increases in species richness and the number of EPT taxa relative to the grazed Bodie Creek location). While this is consistent with the BLM site function ratings for Bodie Creek (higher on the exclosed area), the bioassessment ratings do not agree on either Aurora Creek or Clearwater Creek. While one grazed site on Aurora Creek was rated as slightly impaired, the other site (AC21) is unimpaired and for 4 of the metrics is in fact superior to the reference condition though it has the lowest site function rating. This suggests that in-stream aquatic community health may be poorly indicated by stream bank and vegetation features and that both should be evaluated to obtain a complete picture of stream and riparian health. What favors the healthy community at AC21? Site AC21 was the only site with canopy cover (32%), and also had a relatively steep gradient (5%) and rocky substrates, favoring good flows, water oxygenation, and an armored channel. Canopy contributes shading and input of vegetation litter food sources (CPOM), and along with the rocky substrate may protect the channel from grazing impacts. Clearwater Creek also had lower site function ratings though was generally superior to the other study sites when all bioassessment metrics are considered. As indicated in the monitoring study plan, prior impacts to the reference sites were anticipated to be a possible source of bias in evaluating impairment on the grazed sites. Because the Clearwater Creeks may themselves be in the process of recovery, it would be useful to identify other reference sites and continue monitoring over time at all sites to follow the progress of recovery.

**Biological Condition Scoring Criteria for Metrics:**

(selected examples based on Plafkin et al. 1989, EPA-RBP level III)

Metric	Biological Condition Scores			
	6	4	2	0
Richness	>80%	60-80%	40-60%	<40%
Biotic Index	>85%	70-85%	50-70%	<50%
EPT Index	>90%	80-90%	70-80%	<70%
Dominance	<20%	20-30%	30-40%	>40%
Community Loss	<0.5	0.5-1.5	1.5-4.0	>4.0

**BIOASSESSMENT IMPAIRMENT EVALUATION**

(US EPA-RBP III protocol 1989)

Condition Score Sum as Percent of Reference (range)	Biological Condition Category	Attributes
> 83 % [or quartile > 75%?]	Nonimpaired	Comparable to the best situation to be expected in ecoregion. Balanced trophic and community structure for stream habitat type.
54 - 79 % [or quartile 50-75%?]	Slightly Impaired	Community structure less than expected. Reduced total and sensitive species. More tolerant taxa in community.
21 - 50 % [or quartile 25-50%?]	Moderately Impaired	Fewer species and loss of most sensitive (e.g. EPT) forms. Biotic index higher, domination by few taxa, functional group imbalance.
< 17 % [or quartile <25%?]	Severely Impaired	Few species present, dominated by 1 or 2 taxa; with pollution tolerant species sometimes abundant. High biotic index.

**Bodie Hills Stream Bioassessment:**

**Metric Summary for Calculation of Integrated Biological Condition Scores and Assessment of Impairment**

<b>Summary Means for bioassessment metrics (standard deviation values below)</b>									
<u>Sample Sites:</u>	<u>Codes:</u>	<u>HBI</u>	<u>S</u>	<u>EPT</u>	<u>Dom</u>	<u>% C</u>	<u>% Sim</u>	<u>EPT/C</u>	<u>%C+Sim</u>
Clearwater Creek (sheep grazing)	CW11	<b>4.94</b>	<b>18.3</b>	<b>3.0</b>	<b>0.455</b>	<b>0.198</b>	<b>0.279</b>	<b>2.218</b>	<b>0.477</b>
		0.43	1.5	0.0	0.075	0.056	0.180	1.411	0.219
Clearwater Creek (sheep grazing)	CW12	<b>5.36</b>	<b>17.0</b>	<b>2.7</b>	<b>0.293</b>	<b>0.500</b>	<b>0.181</b>	<b>0.407</b>	<b>0.681</b>
		0.09	0.0	0.6	0.051	0.122	0.091	0.160	0.035
Bodie Creek (exclosure)	BC21	<b>5.60</b>	<b>17.3</b>	<b>3.0</b>	<b>0.375</b>	<b>0.570</b>	<b>0.214</b>	<b>0.252</b>	<b>0.784</b>
		0.23	1.5	2.0	0.042	0.137	0.115	0.214	0.086
Bodie Creek (grazed)	BC31	<b>5.81</b>	<b>11.7</b>	<b>1.0</b>	<b>0.414</b>	<b>0.600</b>	<b>0.282</b>	<b>0.139</b>	<b>0.882</b>
		0.07	0.6	0.0	0.153	0.256	0.244	0.074	0.038
Aurora Creek (grazed)	AC51	<b>4.83</b>	<b>10.7</b>	<b>1.0</b>	<b>0.553</b>	<b>0.135</b>	<b>0.254</b>	<b>4.286</b>	<b>0.390</b>
		0.23	1.2	0.0	0.099	0.027	0.103	1.445	0.122
Aurora Creek (grazed)	AC21	<b>4.32</b>	<b>20.0</b>	<b>7.0</b>	<b>0.500</b>	<b>0.156</b>	<b>0.045</b>	<b>3.990</b>	<b>0.201</b>
		0.03	1.0	1.0	0.052	0.021	0.036	0.683	0.017
All sites on Bodie and Aurora Creeks compared to combined samples from Clearwater Creek (used as reference area)									
		CW11+CW12 as pooled reference:							
		<u>HBI</u>	<u>S</u>	<u>EPT</u>	<u>Dom</u>	<u>% C</u>	<u>% Sim</u>	<u>EPT/C</u>	<u>%C+Sim</u>
		<b>5.15</b>	<b>17.7</b>	<b>2.8</b>	<b>0.374</b>	<b>0.349</b>	<b>0.230</b>	<b>1.31</b>	<b>0.579</b>
		0.36	1.2	0.4	0.106	0.186	0.138	1.34	0.179
<p>HBI = Hilsenhoff Biotic Index. This is a biological index of pollution, calculated as the summed product of abundance and tolerance values for the community. The higher the value, the more the community is dominated by pollution-tolerant species.</p> <p>S = The total number of species or taxa in the sample (richness). More species are generally found in clean water environments.</p> <p>EPT = The number of taxa belonging to the sensitive mayfly, stonefly and caddisfly groups. Indicators of good water quality.</p> <p>Dom = Dominance, the proportion of individuals in a sample belonging to one species or taxon (indicates an imbalance).</p> <p>%C = percent chironomidae, the midges, generally indicators of polluted waters (sediment fouling, algal growth, low oxygen...).</p> <p>%Sim = percent simuliidae, the blackflies, also pollution-tolerant and feed on suspended sediments (erosion/organic particles).</p> <p>%C+Sim = combines the numbers in these two pollution-tolerant groups of flies (dipterans)</p>									

**Bodie Hills Stream Bioassessment Species List**

Species Composition Summaries:			Collection Locations:						
			Tolerance	Clearwater	Bodie	Bodie	Aurora	Aurora	
Order	Family	Genus - species	Values	Reference (n = 6)	BC21 (n = 3)	BC31 (n = 3)	AC61 (n = 3)	AC21 (n = 3)	
Ephemeroptera (mayflies)	Baetidae	<i>Baetis sp.</i>	4	443	210	44	267	434	
	Leptophlebiidae	<i>Paraleptophlebia sp.</i>	1	30	2			1	
	Heptageniidae	<i>Epeorus sp.</i>	0		2				
Odonata (dragon-/damselflies)	Coenagrionidae	<i>undetermined (sm. specimen)</i>	9					1	
Plecoptera (stoneflies)	Perlodidae	<i>Isoperla (patricia)</i>	2		2			19	
	Nemouridae	<i>Malenka sp.</i>	2	1				12	
	Pteronarcyidae	<i>Pteronarcella (regularis)</i>	0	1				2	
Coleoptera (beetles)	Elmidae	<i>Optioservus quadrimaculatus</i>	4	69	67			116	
		<i>Optioservus divergens</i>	4					20	
	Dryopidae	<i>Postelichus immsi</i>	4	1					
	Dytiscidae	<i>Agabus sp.</i>	5	18	2	7	4		
	Hydrophilidae	<i>Tropisternus sp.</i>	5		1				
Megaloptera (alderflies)	Sialidae	<i>Sialis sp.</i>	4		1				
Trichoptera (caddisflies)	Glossosomatidae	<i>Agapetus sp.</i>	0					2	
	Hydroptilidae	<i>Ochrotrichia sp.</i>	4	4				11	
		<i>Hydroptila sp.</i>	6	1					
	Rhyacophilidae	<i>Rhyacophila sp.</i>	0		3				
	Hydropsychidae	<i>Hydropsyche sp.</i>	4	1				39	
	Limnephilidae	<i>Dicosmoecus sp.</i>	2					2	
Diptera (true flies)		<i>Psychoglypha sp.</i>	1		1				
	Muscidae	<i>Limnophora sp.</i>	6	16	7	11	9		
	Tabanidae	<i>Tabanus sp.</i>	8					2	
		<i>Chrysops sp.</i>	6		1				
	Tipulidae	<i>Antocha sp.</i>	3					6	
		<i>Dicranota sp.</i>	3	2	1			1	
		<i>Erioptera sp.</i>	6		1				
		<i>nr. Ormosia sp.</i>	6		1				
	Simuliidae	<i>Simulium sp.</i>	6	381	274	179	131	44	
	Ceratopogonidae	<i>Bezzia/Palpomylia sp.</i>	6	5		1	1	5	
	Scathophagidae	<i>undetermined</i>	6	1					
	Chironomidae	Orthocladinae	<i>Cricotopus sp.</i>	6	161	530	171	33	
			<i>Cricotopus (nr. tremulus)</i>	6	5				36
			<i>Cricotopus (nr. bicinctus)</i>	6				4	
			<i>Cricotopus (nr. elegans)</i>	6					8
			<i>Tvetenia sp.</i>	6	105	62	26	1	
			<i>Eukiefferiella sp.</i>	6	48	64		2	35
			<i>Eukiefferiella (claripennis)</i>	6					20
			<i>Cardiocladius sp.</i>	6	25	38	6		
			<i>Psectrocladius (sordidellus)</i>	6		2		2	
			<i>Psectrocladius (semicirculatus)</i>	6				8	
			<i>Corynoneura (scutellata)</i>	6			1		
			<i>undetermined</i>	6	1		12		
		Tanypodinae	<i>Thienemannimyia sp.</i>	6	20		7		
			<i>Larsia sp.</i>	6	19		5		3
			<i>Alotanypus sp.</i>	6			6		
		Chironominae	<i>Paracladopelma sp.</i>	6	21	6		3	
			<i>Chironomus sp.</i>	6			6		
		<i>Micropsectra sp.</i>	6	28	25	31	11	20	
		<i>Microtendipes sp.</i>	6	13	5	102			
		<i>Phaenopsectra sp.</i>	6	74	34		1		
	<i>Paratanytarsus sp.</i>	6	1						
Diamesinae	<i>Pagastia sp.</i>	6	5			2	7		
	<i>Diamesa sp.</i>	6		1			1		
<b>Non-Insects:</b>									
Oligochaeta	undetermined	<i>undetermined</i>	4	88	20	9	12	14	
Amphipoda	Talitridae	<i>Hyallela azteca</i>	8	1					
Gastropoda	Lymnaeidae	<i>undetermined (sm. specimen)</i>	6	2					
	Planorbidae	<i>nr. Gyraulus sp.</i>	8		5				
Bivalvia	Sphaeriidae	<i>Pisidium sp.</i>	8		1				
Nematomorpha	undetermined	<i>undetermined</i>	4					1	
<b>TOTAL TAXA COLLECTED:</b>			<b>59</b>	<b>32</b>	<b>29</b>	<b>17</b>	<b>16</b>	<b>27</b>	

# **STATUS of BODIE HILLS 303(d) Impairments**

**December 2005**

Prepared for  
**LAHONTAN REGIONAL WATER QUALITY CONTROL  
BOARD, REGION 6**

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STATUS OF  
BODIE HILLS  
IMPAIRMENT  
Tetra

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## 1. INTRODUCTION AND PURPOSE

Five waterbodies in the Bodie Hills (Aurora Canyon Creek, Clark Canyon Creek, Clearwater Creek, Hot Springs Canyon Creek, and Rough Creek) in eastern California were placed on the 1991 Section 303(d) list due to sedimentation/siltation or habitat alteration impairments. Listings were based on findings of stream condition assessments performed at various times and locations throughout the period 1988 to 1994. Tetra Tech was contracted by the U.S. Environmental Protection Agency (EPA) to develop Total Maximum Daily Loads (TMDLs) for these waters in 2003. During development of the TMDLs, stream surveys were performed at several locations in the watersheds and it was apparent, from conditions witnessed, that beneficial uses in the watersheds, despite the original listing, may be supported in at least parts of the area. These findings led to several questions about the original listings and what course to pursue with regard to TMDL development, including:

- What data were used for the original listings?
- Can a determination be made that TMDLs are no longer necessary (by comparing original listing information with that collected more recently)?
- Have the various Best Management Practices (BMPs) implemented subsequent to the original listings resulted in improvements of waterbodies relative to their condition when the original studies were completed?

The purpose of this document is to reassess (to the extent possible) information and conditions in the listed Bodie Hills watersheds to guide development of an appropriate regulatory strategy. It is assumed that the original listings were valid and were based on the prescribed listing methodology being used by the Regional Water Quality Control Board at the time. It should be recognized that current listing methodologies are different. Thus, had present listing practices been in use in 1991, streams in the region may or may not have been listed as they were at the time. Nevertheless, goals of this effort were to accomplish the following tasks:

- Review the impairment status of the watersheds with respect to the original listing information
- Review results of surveys conducted subsequent to the listing surveys and implementation activities and if possible compare results (assuming methodologies and parameters are comparable)
- Review management activities that have been conducted in the watersheds
- Highlight where data gaps prevent determination of use support
- Recommend appropriate regulatory actions (i.e., delisting, additional monitoring, TMDL development, etc.)

## 2. WATERSHED DESCRIPTION

The five watersheds cover a combined area of approximately 107 square miles (68,200 acres) in Mono County, California. They are located adjacent to the City of Bridgeport, 180 miles east of San Francisco and 125 miles southeast of Sacramento. The watersheds (Figure 1) form the western and northern slopes of Bodie Mountain in the Eastern Sierra Nevada Mountain Range and drain to the East Walker River (HUC 16050301).

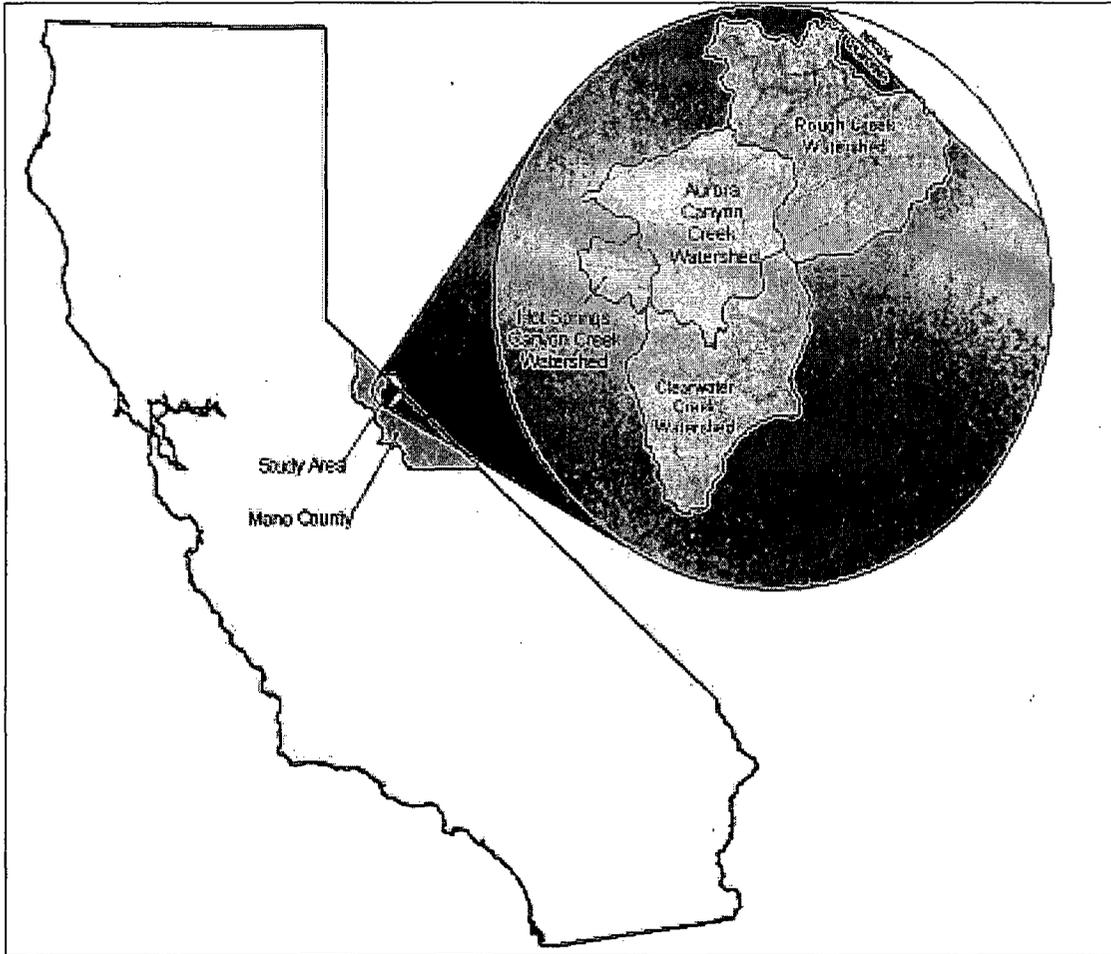


Figure 1. Location of Watersheds

### Land Use/Land Cover

The watersheds in the study area are in the high desert zone and support livestock foraging and recreational activities. Shrubland (sagebrush species), evergreen forest (pinyon pine and juniper), and grassland (mixed desert grasses) cover 99.7 percent of the combined watersheds.

STATUS OF BODIE HILLS 303(D) LISTED WATERBODIES

(Brussad et al. 1999) Other categories (bare rock/sand/clay, deciduous forest, mixed forest, open water, and low-intensity residential) cover 0.3 percent of the combined watersheds.

Landuse/land cover in the Bodie Hills were determined using the Multi-Resolution Land Characteristics (MRLC) dataset. Table 1 presents the distribution of land uses in the watershed. Figure 2 shows the MRLC land use coverage for the five watersheds.

Table 1. Land Use Categories Areas (in Acres)

Land Use Category	Rough Creek	Hot Springs Canyon Creek	Clear-water Creek	Aurora Canyon Creek*	Clark Canyon Creek	All Creeks
Shrubland	22,641	1,863	18,390	14,216	7,345	57,110
Evergreen Forest	1,890	961	2,132	2,834	1,796	7,818
Grassland	1,457	296	753	573	267	3,080
Exposed Rock/Sand/Clay	35	4	4	117	116	160
Decidious Forest	9	4	25	5	4	43
Mixed Forest	-	1	8	1	1	10
Open Water	5	-	-	-	-	5
Residential	-	1	-	2	-	2

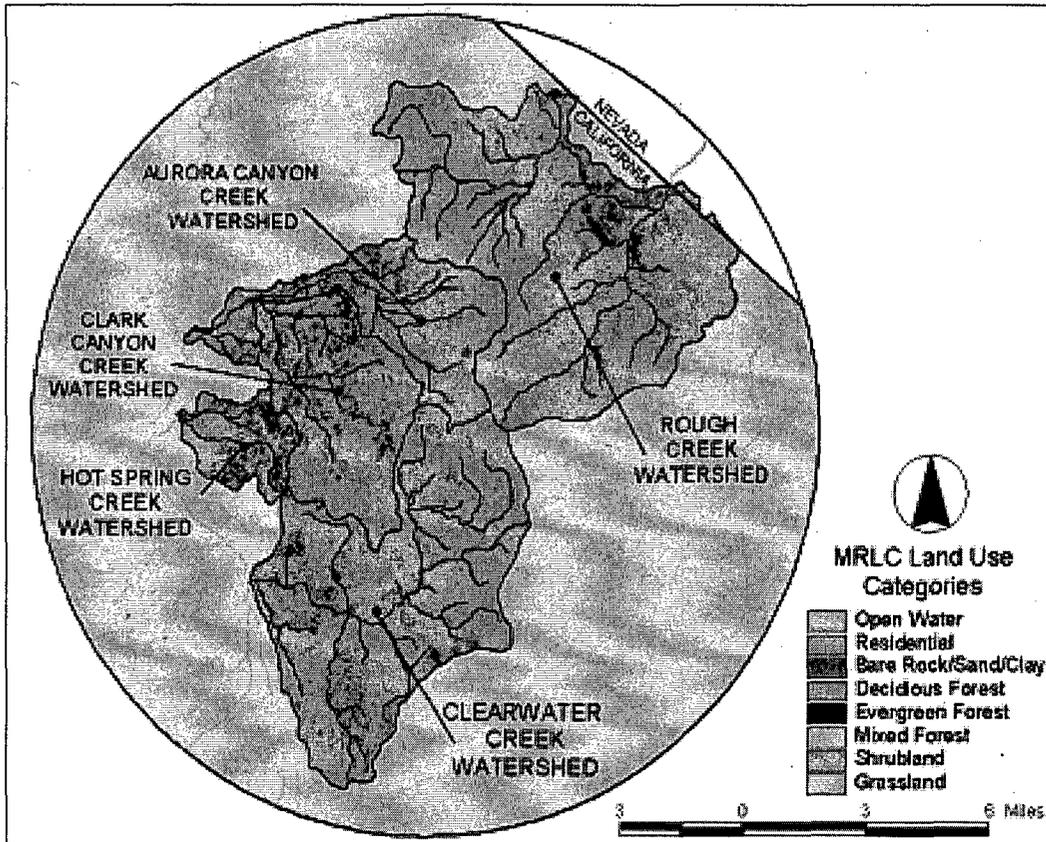


Figure 2. Land use

### Land Ownership

The Bureau of Land Management (BLM) manages 87 percent, 89 percent, and 74 percent of the land in Aurora Canyon Creek, Clearwater Creek, and Rough Creek, respectively, as well as 21 percent of the land in Hot Springs Canyon Creek watershed. The majority (79 percent) of Hot Springs Canyon Creek watershed is privately owned (Figure 3). Table 2 lists the percentage of land ownership in each watershed.

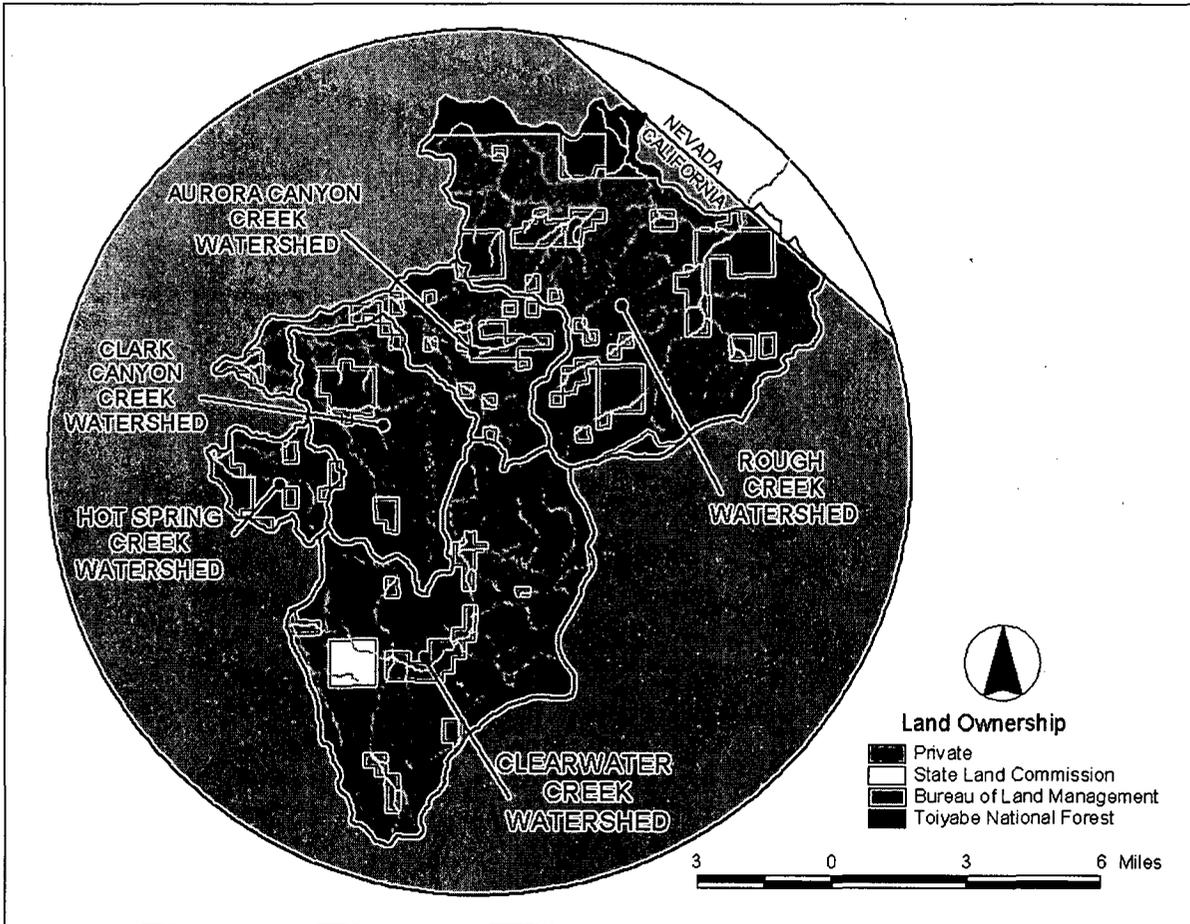


Figure 3. Land Ownership

STATUS OF BODIE HILLS 303(D) LISTED WATERBODIES

Table 2. Percentage Land Ownership in Each Watershed

Ownership	Aurora Canyon Creek <sup>a</sup>	Clear-water Creek	Hot Spring Canyon Creek	Rough Creek	All
Private	13%	8%	79%	19%	15%
State lands–State Lands Commission	0%	3%	0%	0%	1%
U.S. Bureau of Land Management	87%	89%	21%	74%	82%
Toiyabe National Forest (Region 4)	0%	0%	0%	6%	2%

<sup>a</sup> Includes Clark Canyon Creek

## Topography

The watersheds are on the eastern slopes of the Sierra Nevada Range, which forms the western edge of the Great Basin region. The watersheds contain areas with steep, often unstable slopes and narrow valleys. The elevation in the watersheds ranges from 6,500 feet National Geodetic Vertical Datum (NGDV) to more than 10,000 feet NGDV (Figure 4).

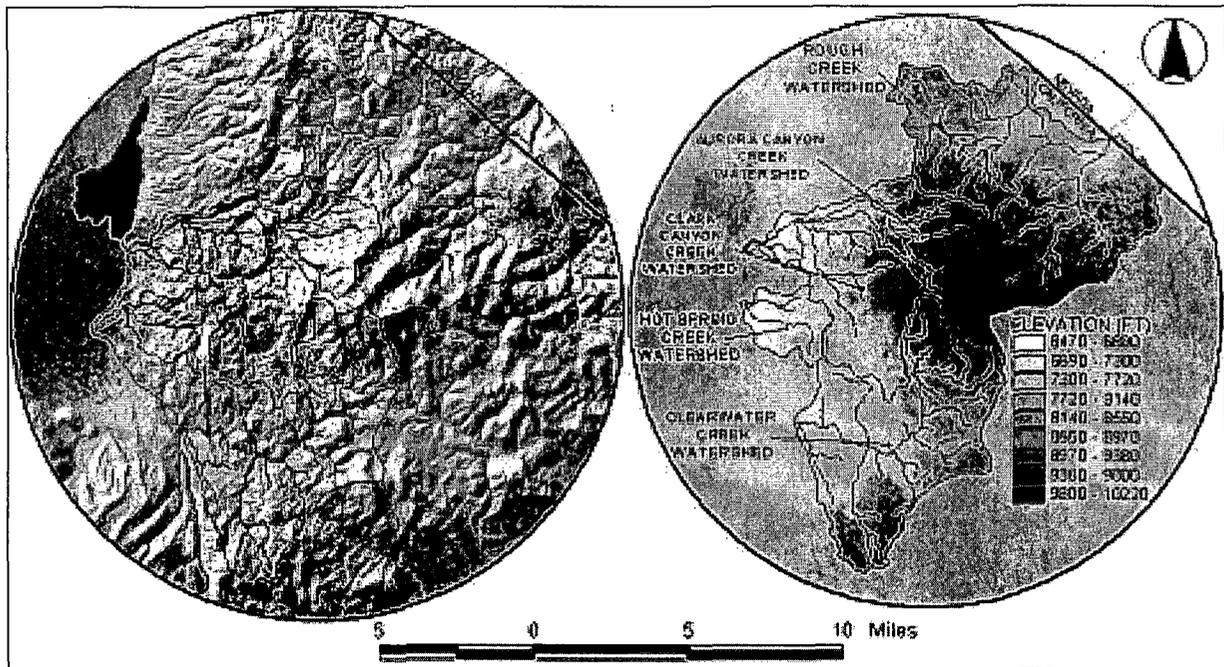


Figure 4. Topography and Elevation

## Soils

Soil composition has a significant impact on erosion patterns. The K factor, or soil erodibility factor represents the susceptibility of soil to erosion and transport (Table 3). Soil K factors were derived from the State Soil Geographic Database (STATSGO). The majority of soils in the Bodie Hills fall in the lower end of the moderate erodibility category with K factors of 0.27 and

STATUS OF BODIE HILLS 303(D) LISTED WATERBODIES

0.28. A small portion of the Clearwater Creek watershed has a K factor of 0.21, just outside the low range (Figure 5).

**Table 3. Soil Erodibility Characteristics**

Erodibility	K Factor Range	Soil Texture and Drainage
Low	0.05 to 0.20	Typically soils characterized by one of the following: <ul style="list-style-type: none"> <li>• Fine soils with high clay content soils that resist detachment,</li> <li>• Highly organic soils that resist detachment and increase infiltration thus decreasing surface run off.</li> <li>• Coarse soils with high sand content that increase infiltration rates thus decreasing surface run off.</li> </ul>
Moderate	0.25 to 0.40	Typically moderately textured soils with a silty loam mixture.
High	0.40 <	Typically silty soils that are easily detached, tend to crust and produce high rates of run off.

## STATUS OF BODIE HILLS 303(D) LISTED WATERBODIES

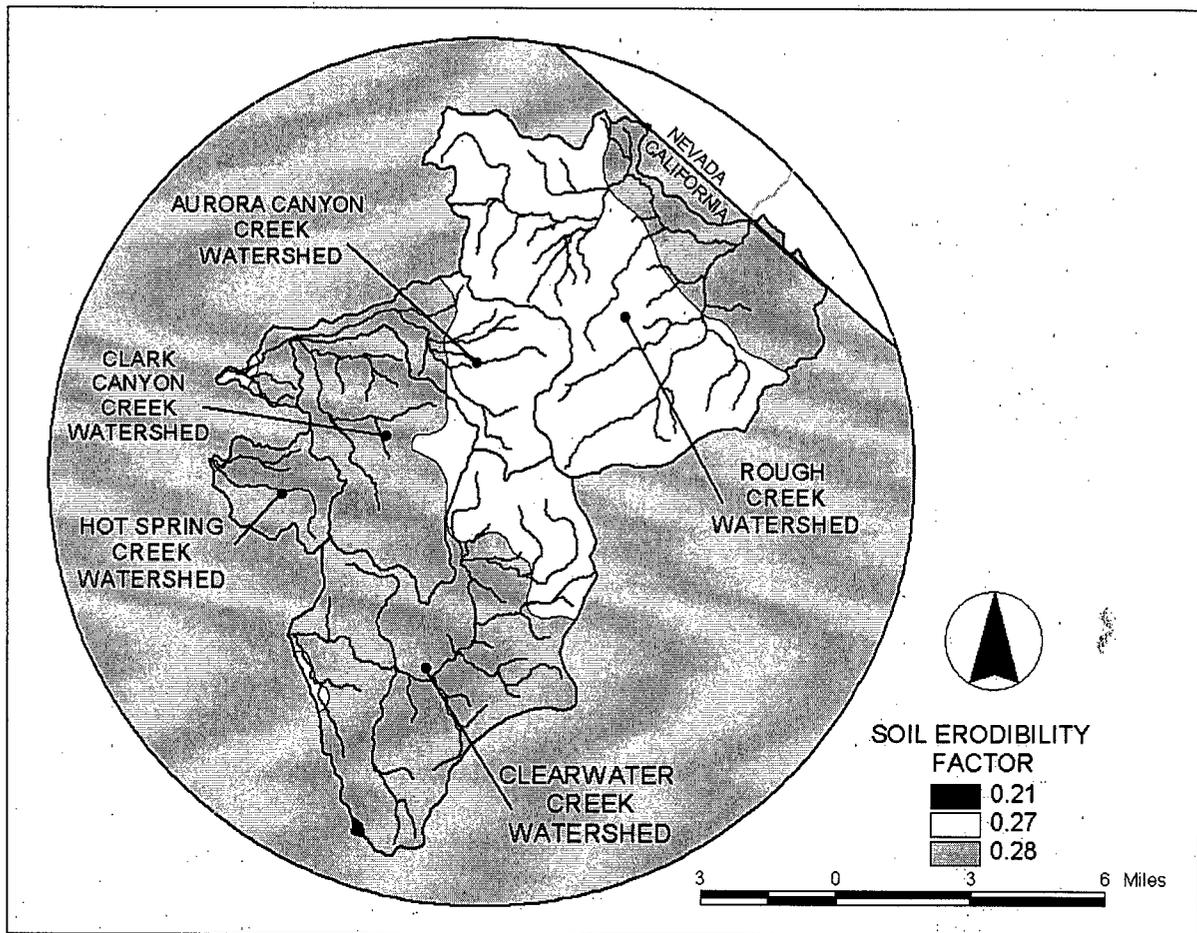


Figure 5. Soil Erodibility (K Factor) Map

## Climate

A cool, semiarid climate is typical in the higher elevations of the eastern Sierra Nevada Range. The prevailing westerly winds force warm, moist air from the Pacific Ocean to climb the western slopes of the range. As the air rises, condensation occurs and the moisture falls as precipitation. As the air descends the eastern slopes, it is warmed by compression and little precipitation occurs. The precipitation that does fall tends to occur during the midwinter as snowfalls and the late spring and the early summer as rainstorms (BLM 1983).

### 3. 303(D) LISTING

Three waterbodies (Aurora Canyon Creek, Clark Canyon Creek, and Rough Creek) were included on the 1991 California Section 303(d) list as impaired by habitat alteration from riparian and/or upland range grazing. Hot Springs Canyon Creek was included on the 1991 California Section 303(d) list as impaired by sedimentation/siltation from riparian and/or upland range grazing. Clearwater Creek was included on the 1991 California Section 303(d) list as impaired by sedimentation/siltation from riparian and/or upland range grazing, construction/land development, and highway maintenance and runoff. The 303(d) list indicates that Clark Canyon Creek, Clearwater Creek, and Hot Springs Canyon Creek were given medium priority for TMDL development and Aurora Canyon Creek and Rough Creek were given low priority for TMDL development. Figure 6 and Table 4 provide information on the 303(d) listed segments.

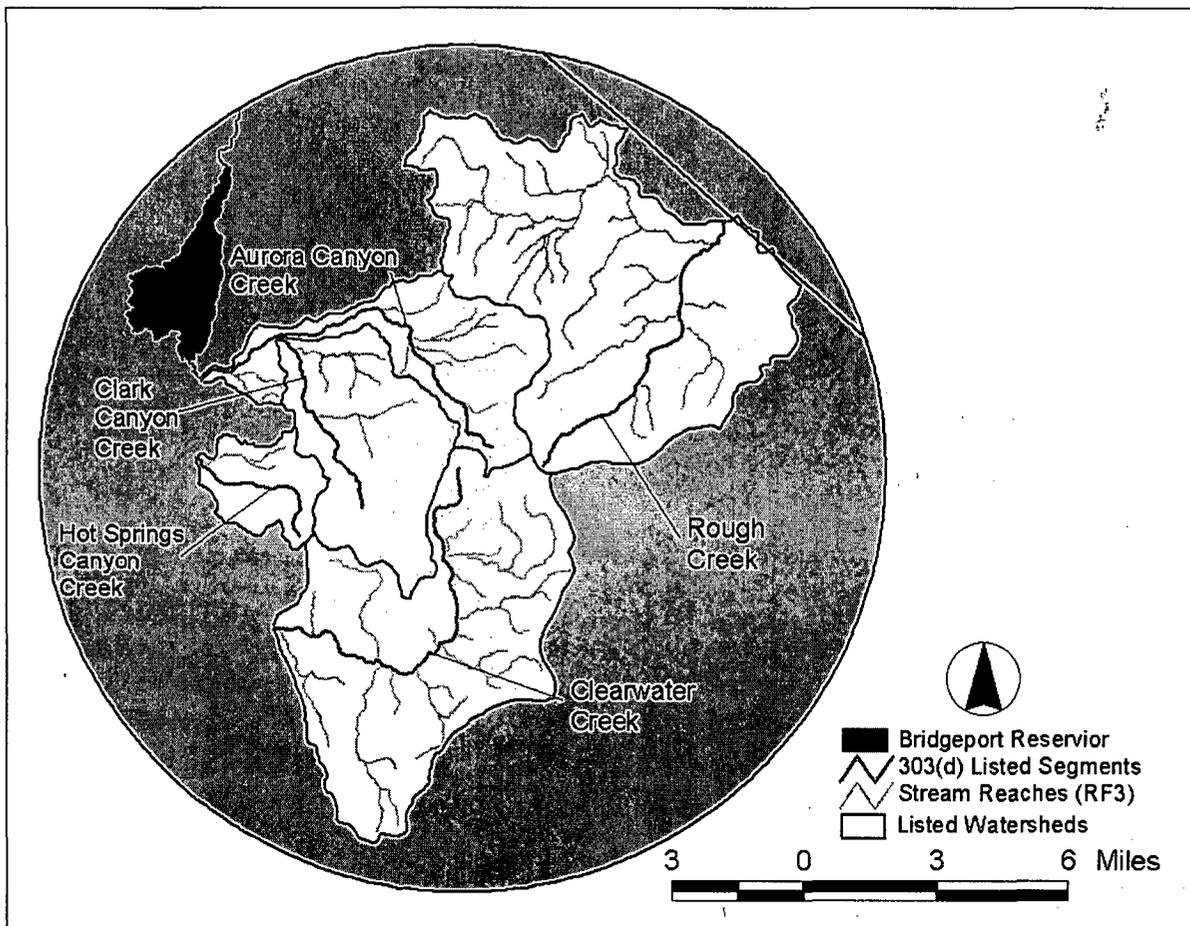


Figure 6. Section 303(d) Impaired Segments

STATUS OF BODIE HILLS 303(D) LISTED WATERBODIES

Table 4. 303(d) Listing Information

Waterbody	Cause	Source	Priority	Length Affected
Aurora Canyon Creek	Habitat Alteration <sup>a</sup>	Range Grazing-Riparian and/or Upland	Low	8.1 miles
Clark Canyon Creek	Habitat Alteration <sup>a</sup>	Range Grazing-Riparian and/or Upland	Medium	5.0 miles
Clearwater Canyon Creek	Sedimentation/Siltation	Range Grazing-Riparian and/or Upland; Construction/Land Development; Highway Maintenance and Runoff	Medium	12.0 miles
Hot Springs Canyon Creek	Sedimentation/Siltation	Range Grazing-Riparian and/or Upland	Medium	2.9 miles
Rough Creek	Habitat Alteration <sup>a</sup>	Range Grazing-Riparian and/or Upland	Low	15.0 miles

<sup>a</sup> BLM reports indicate that habitat alteration impairments in Aurora Canyon Creek, Clark Canyon Creek, and Rough Creek are due primarily to grazing impacts.

These listings were largely based on BLM findings in the 1991 *Bishop Resource Management Plan and Environmental Impact Statement* (BLM 1991). Additionally, findings from a Draft Environmental Impact Statement, the 1983 *Proposed Livestock Grazing Management for the Bodie-Coleville Planning Units*, were used to support the listing determination. Findings of the two EIS documents are summarized below:

The impairments in all five waters are associated primarily with livestock grazing and with roadway activities in Clearwater Creek (BLM 1991).

Continual season-long grazing with concentrated livestock distributions has adversely affected aquatic, riparian, and upland vegetation. Diminished aquatic and riparian vegetative cover has caused bank destabilization and stream channel gulying. BLM surveyed 66 miles of perennially flowing streams in the Bodie Hills region and found 27 miles (41 percent) in gullied channels. The entire length of Hot Springs Canyon Creek and 74 percent of Rough Creek were in gullied channels (BLM 1983). Diminished upland vegetative cover and soil compaction have increased the vulnerability of upland areas, especially meadows and springs, to rill and sheet erosion leading to added sediment loads to the stream channel.

Roadway construction and maintenance in close proximity to stream channels has caused stream bank destabilization and stream channel gulying. Roadways run adjacent to the stream channel for significant distances in Aurora and Clearwater Canyons (BLM 1983).

Because sediment/siltation patterns can influence aquatic habitat, water chemistry, and stream morphology and hydrology, a primary concern in the Bodie Hills region is what impact excessive sediment/siltation may have on aquatic habitat. Increased sediment deposition can choke spawning gravels, impair fish food sources, fill in rearing pools, and reduce habitat complexity. In addition, increased sediment suspension can make it more difficult for fish to find prey, and can cause physical harm at high levels (USEPA 1999). Lack of shading from riparian vegetation can lead to temperatures in excess of that which is necessary for health and

STATUS OF BODIE HILLS 303(D) LISTED WATERBODIES

propagation of cold water species. Due to the potential for these impacts and the findings of the BLM documents, the streams were placed on the 303(d) impaired waterbody list.

#### 4. BENEFICIAL USES AND WATER QUALITY OBJECTIVES

The California Porter-Cologne Water Quality Control Act establishes the responsibilities and authorities of the nine Regional Water Quality Boards who are directed to “formulate and adopt water quality control plans for all areas within the region.” The Water Quality Control Plan for the Lahontan Region establishes, for all waters within the Lahontan Region, the beneficial uses for each waterbody to be protected, the water quality objectives that protect those uses, and an implementation plan that accomplishes those objectives. Table 5 lists the beneficial uses for 303(d)-listed waterbodies in the Bodie Hills. Those most likely to be impacted by the listed impairments are in **bold**.

Table 5. Beneficial Uses for 303(d) Listed Waterbodies in the Study Area

Beneficial Use	Waterbody Name				
	Aurora Canyon Creek	Clark Canyon Creek	Clearwater Creek	Hot Springs Canyon Creek	Rough Creek
Municipal and Domestic Supply	•	•	•	•	•
Agricultural Supply	•	•	•	•	•
<b>Ground Water Recharge</b>	•	•	•	•	•
Freshwater Replenishment	•	•		•	
Water Contact Recreation	•	•	•	•	•
Non-contact Water Recreation	•	•	•	•	•
Commercial and Sport Fishing	•	•	•	•	•
<b>Cold Freshwater Habitat</b>	•	•	•	•	•
<b>Wildlife Habitat</b>	•	•	•	•	•
<b>Rare, Threatened, or Endangered Species</b>					•
<b>Migration of Aquatic Organisms</b>	•	•		•	
<b>Spawning Reproduction and/or Early Development</b>	•	•		•	•
<b>Water Quality Enhancement</b>	•	•		•	

The Lahontan Water Quality Control Plan contains water quality objectives for all surface waters, which serve as water quality standards for purposes of the Clean Water Act. Water quality objectives applicable to these 303d-listings address suspended materials, settleable material, sediment, turbidity, and temperature and are listed in Table 6.

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**Table 6. Applicable General Water Quality Objectives**

Parameter	General Objective
Suspended materials	Waters shall not contain suspended material in concentrations that cause nuisance or adversely affect beneficial uses. For natural high quality waters, the concentration of the total suspended materials shall not be altered to the extent that such alterations are discernable at the 10 percent significance level.
Settleable materials	Waters shall not contain settleable material in concentrations that result in deposition of material that causes nuisance or adversely affects beneficial uses. For natural high quality waters, the concentration of settleable materials shall not be raised by more than 0.1 milliliter per liter
Sediment	The suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses.
Turbidity	Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses. Increases in turbidity shall not exceed natural levels by more than 10 percent.
Temperature	For waters designated COLD, the temperature shall not be altered (above or below the natural temperature).

## 5. SUMMARY OF AVAILABLE DATA

The majority of data collected on stream reaches in the Bodie Hills region were obtained through stream and riparian surveys conducted by the BLM (1988, 1991, 1993, 1994) and a Rosgen stream classification survey conducted in 2003 by Tetra Tech. A bioassessment study designed to establish comparisons between grazing impacted and reference streams was also conducted in the Clearwater Creek, Bodie Creek, and Aurora Creek watersheds in 1995 (Herbst 1995).

In the materials reviewed for this analysis, other studies related to water quality and habitat condition in the Bodie Hills area were also mentioned, particularly inventories conducted in the mid to late 1970s. However, copies of results or summary reports were not available for these earlier inventories. Due to the age of the observations, this is not considered a significant problem with respect to evaluating current conditions. Despite the unavailability of most of the earliest reports, available materials provided at least some text summaries of findings. Table 7 below, lists studies, reports, and/or documents pertaining to the Bodie Hills region and whether or not they were available for review as part of this effort.

Table 7. Bodie Hills Related Reports and Data Availability

Study	Year	Available to Tt
BLM Stream Inventory	1979	Not reviewed
BLM Water Resource Inventory	1979	Not reviewed
BLM Spring Inventory	1980	No
BLM Water Quality Monitoring (14 sites)	1984	Yes, combined report for
	1985	'84-'85 raw data not available
	1986	No
BLM Stream Monitoring Surveys (stream and riparian)	1988	Yes
BLM Stream Monitoring Surveys (stream)	1994	Yes
Bodie Hills Coordinated Resource Management Program	1984	Yes, summary information
Bioassessment Report (Sierra Nevada Aquatic Research Lab)	1995	Yes, summary report
Tt Rosgen Classification	2003	Yes

### BLM Water Quality Monitoring

Early water resource investigations conducted in the Bodie Hills region by BLM in 1979 and 1980 suggested that water quality in the area was being impacted by livestock grazing, mining and recreational use of streams. A sample excerpt from the "general remarks and narrative watershed condition" included with the raw data pages for the 1979 stream inventory at Rough Creek Tributary 2 includes the following description of grazing impacts:

...The only significant impact on the stream comes from livestock grazing. Recreational use is limited to hunting.... Cattle grazing in the drainage is heavy with resulting damage

## STATUS OF BODIE HILLS 303(D) LISTED WATERBODIES

to the stream. Trailing throughout the canyon is heavy and riparian vegetation is extensively hedged. The streambanks are trampled and disturbed and the sediment load in the stream is large.... The aquatic habitat in the stream is poor because of low flows, large amounts of sediment, warm water, heavy nutrient load, lack of riparian vegetation, and degraded banks. (BLM 1979).

In response, the BLM conducted water quality monitoring in the mid 1980s at 14 sites (exact locations not known) revealed as adversely affected at the time of the inventories, and compared the results to water quality standards and criteria. Raw data for this monitoring were not available for our review; however, excerpts from the summary report were available in photocopied materials provided by the Regional Board. Turbidity results from these sampling events were most relevant in terms of comparison to typical sediment parameters; temperature results were also discussed. Sample results were compared to a cold water aquatic life turbidity criteria of  $\leq 10$  NTU<sup>1</sup>. Turbidity was found to exceed this limit at the locations shown in Table 8:

Table 8. Water Quality Monitoring Data, Turbidity

Watershed	Exceedence
Clearwater Canyon Creek	(3 out of 5 samples)
Hot Springs Canyon Creek	(1 out of 5 samples)
Aurora Canyon Creek	(1 out of 5 samples)
Rough Creek	(4 out of 4 samples)

Overall, it was found that mid-summer water temperatures were quite warm. Clearwater Canyon Creek, Rough Creek and Aurora Canyon Creek exceeded the criteria for the maximum summer temperature tolerated by cold water aquatic species. On July 10, 1984, Clark Canyon Creek was measured at 21°C compared to the cold-water aquatic life criterion of 23°C<sup>2</sup> (Gradek 1986).

### BLM Stream Monitoring Inventories

Beginning in 1988, the Bakersfield District of BLM began a new data collection effort, which included stream and riparian inventories. Stream monitoring reports included measurements of stream characteristics (flow, water temperature, sinuosity, pool length, run length, riffle length, depth and canopy cover), and ratings of bank characteristics (soil alteration, vegetation bank protection, subsurface water status, site functionality, and grazing impacts) on a scale from zero to four. The riparian monitoring reports include descriptions of the stream substrate, channel geometry, vegetative community, erosional processes and ratings of soil alteration, vegetative bank protection, and subsurface water status. Overall site functionality was rated as a composite of the soil alteration, vegetative bank protection and subsurface water status ratings, on a scale

<sup>1</sup> 10 NTU is not a current numeric water quality objective for turbidity under the Regional Water Quality Control Plan. It is assumed the NTU standard was applicable at the time the BLM performed the monitoring and thus it was used to evaluate water quality data. This information is provided as an excerpt of the summary report. It did not have the actual report to reference; however the summary information was considered relevant to the review and was therefore included in this review.

<sup>2</sup> California Regional Water Quality Control Board, 1963 Water Quality Objectives (in a handwritten reference on the summary report).

from zero to four. Additionally, data sheets often included text comments further elaborating on the condition of the sites.

### ***Intensive Stream Monitoring***

The goal of the intensive stream monitoring program was two-fold:

- Establish permanent stations for use in long-term riparian habitat and trend studies, and
- Complete baseline data collection on permanent stream stations (BLM undated report).

The survey methodology employed a combination of repeatable quantitative and qualitative habitat measurements; the methodology differed from that used for the 1979 and 1980 investigations.

Sampling transects (five per site) were set up along homogeneous stretches of stream reaches and a variety of parameters were scored (Figure 7). The stream monitoring survey evaluated both water and bank characteristics. Field data on pool length, riffle length, run length, soil alteration, vegetation bank protection, and, subsurface water status were collected. On the basis of visual assessment, the impact of grazing on streams was also recorded. These individual characteristics were rated on a scale from one to four, and the scores were combined into a composite Stream Functionality Rating, also reported on a scale from one to four (one representing poorly functioning sites and four representing unimpacted, well-functioning sites). No details regarding scoring methodologies for stream characteristics were included in materials reviewed for this analysis.

STATUS OF BODIE HILLS 303(d) LISTED WATERBODIES

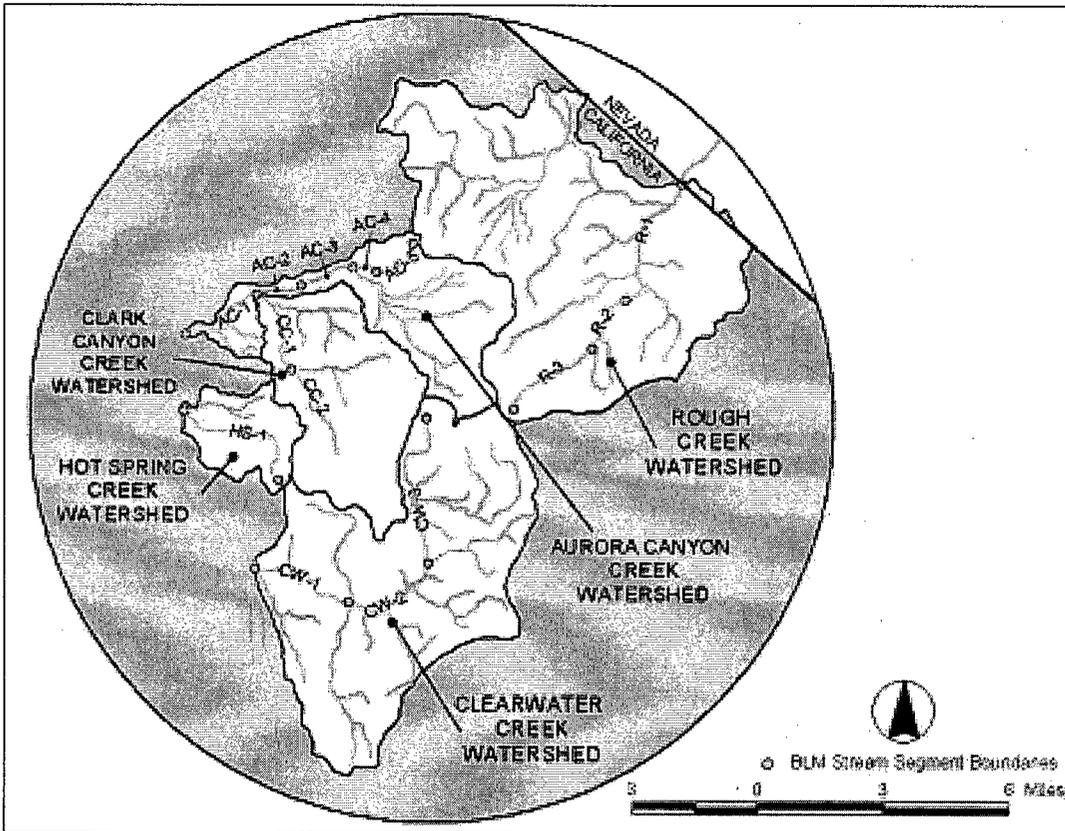


Figure 7. Surveyed Segments in the Bodie Hills Watersheds

### ***Extensive Riparian Survey***

A riparian inventory was conducted again in 1993 to assess any changes in condition of the stream reaches assessed in 1988. Riparian characteristics, erosion processes, and substrate material were evaluated under the riparian inventory survey. For the evaluation, field data on riparian width, side slope gradient, soil alteration, vegetation bank protection, subsurface water status, substrate materials, and erosion processes were collected. A scoring system, similar to that used for stream functionality ratings was employed to determine the riparian functionality rating. Table 9 shows what parameters were measured and/or evaluated and additional details regarding the scoring methodology are provided in the following paragraphs.

STATUS OF BODIE HILLS 303(D) LISTED WATERBODIES

Table 9. Characteristics Rated by BLM Monitoring (Riparian)

Parameter	Descriptions
Vegetative use by grazing animals	Scored as a percent, four categories from light to extreme
Streambank Soil Alteration Rating	Assesses the extent of bank modification and instability, four classes from stable to severely altered
Vegetative Bank Protection Rating	Assess the quality of protection from erosive forces provided by vegetation growing on streambanks, four classes from poor to excellent.
Subsurface Water Status Rating	Uses the presence and condition of hydrophytic plant species as an indicator of shallow aquifer status. Dominance of upland species is indicative of disturbance; four classes from poor to excellent.
Riparian Site Function Rating 4: Excellent 3: 3.9 – Good 2: 2.9 – Fair 1: 1.9 – Poor	An overall rating of the hydrologic function for the site being monitored. Based on evaluation of three interdependent factors that influence riparian quality: streambank soil alteration rating, vegetative bank protection rating, subsurface water status rating.
Cross-Channel Profile Measurements	Monitor effects of erosion and deposition on local streambank movement
Water Column Measurements	Monitor changes in channel morphology. Measurements include: <ul style="list-style-type: none"> <li>• Stream width at waterline</li> <li>• Water depths</li> <li>• Channel substrate (% bottom materials)</li> </ul>
Canopy Closure and Density	Measured with a concave spherical densiometer

**Vegetative Use by Grazing Animals**

This was evaluated using a four category scale (Table 10). Vegetative use along the transect line within 5 feet of the shoreline was rated visually.

**Table 10. Vegetative Use by Grazing Animals (Platts et al 1983<sup>3</sup>)**

Rating	Percent	Description
Light	0 to 25	Vegetation use is very light or none at all. Almost all of the potential plant biomass at present stage of development remains. The vegetative cover is very close to that which would occur naturally without use. If bare areas exist (i.e., bedrock), they are not because of loss of vegetation from past use.
Moderate	26 to 50	Vegetative use is moderate and at least half of the potential plant biomass remains. Average plant stubble height is greater than half of its potential height at present stage of development. Plant biomass no longer on site because of past grazing is considered as vegetation that has been used.
High	51 to 75	Vegetative use is high and less than half of the potential plant biomass remains. Plant stubble height averages over 2 inches. Plant biomass no longer on site because of past grazing use is considered as vegetation that has been used.
Extreme	76 to 100	Use of streamside vegetation is very high. Vegetation has been removed to 2 inches or less in average stubble height. Almost all the potential vegetative biomass has been used. Only the root system and part of the stem remain. The potential plant biomass that is now nonexistent because of past elimination by grazing is considered as vegetation that has been used.

**Riparian Site Function**

This was scored in an effort to present an overall rating of the hydrologic function for the site. The rating is based on an evaluation of three interdependent factors that influence riparian quality: streambank soil alteration rating, the vegetative bank protection rating, and the subsurface water status rating.

**Streambank Soil Alteration Rating**

This rating assesses the extent of bank modification and instability resulting from the combined effects of natural and artificial forces. Evaluation is based on how far the streambank deviates from the optimum conditions expected in an undisturbed state for the respective habitat type. This parameter is scored as a percent using four categories:

- Rating = 4: (0 to 25%) streambanks stable with no alterations or stable with less than 25% of bank receiving any kind of stress. Less than 25 percent of the bank is false, broken down, or eroding<sup>4</sup>.
- Rating = 3: (26 to 50%) at least 50 percent of the streambank is in a natural stable condition; less than 50 percent is false, broken down, or eroding.
- Rating = 2: (51 to 75%) major alterations along the transect line; less than 50 percent is in a stable condition. Over 50 percent is false, broken down, or eroding. Any false banks which may have regained some vegetative cover is still rated as altered.

<sup>3</sup> It does not have this reference; it was cited in the undated BLM methodology report.

<sup>4</sup> False banks are those which have been cut back by cattle and are no longer immediately adjacent to the stream.

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- Rating = 1: (76 to 100%) Streambanks severely altered. Less than 25 percent is in a stable condition; over 75 percent is false, broken down, or eroding.

### *Vegetative Bank Protection Rating*

This rating is an assessment of the quality of protection from erosive forces provided by vegetation growing on the streambanks. This parameter is classified into 4 categories for scoring.

- Rating = 4: Excellent—trees, shrubs, grass, and forbs combined cover more than 90 percent of the ground; any openings are small and evenly dispersed. A deep, dense root mat is inferred.
- Rating = 3: Good—plants cover 70 to 90 percent of the ground and shrub species are more prevalent than trees. Canopy openings are larger than space resulting from loss of single mature individuals. Deep root mat is not continuous and more serious erosive incursions are possible in the openings.
- Rating = 2: Fair—plant cover ranges from 50 to 70 percent; lack of vigor evident; no seedling production.
- Rating = 1: Poor—less than 50 percent of ground is covered; trees essentially absent; shrubs exist in scattered clumps.

### *Subsurface Water Status Rating*

This rating uses the presence and condition of hydrophytic plant species as an indicator of shallow aquifer status. With lateral erosion or incision, recharging of the aquifer is impaired, hydrophytic species decline and are replaced by upland species. This is rated similar to the vegetative bank protection parameter.

- Rating = 4: Excellent—riparian vegetation dominated by hydrophytic plants; little or no encroachment of upland plants.
- Rating = 3: Good—riparian vegetation dominated by hydrophytic plants; evidence of hydrophytic species decline and corresponding increase in upland plants.
- Rating = 2: Fair—riparian vegetation composition a roughly equal mix of hydrophytic and upland plants; upland species reproducing; little to no reproduction among hydrophytes.
- Rating = 1: Poor—site vegetation completely dominated by upland species, some extending to channel edge; in extreme cases, hydrophytic species may be totally lacking; former aquifer presence may be indicated only by isolated hydrophytic remnants such as Salix stumps.

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The Riparian Site Function Rating is the mean of the three factors described above, scoring categories are shown in Table 11.

**Table 11. Riparian Site Function Rating Criteria (U.S. Department of Interior 1987<sup>5</sup>)**

Mean Rating Score	Rating
4	Excellent
3—3.9	Good
2—2.9	Fair
1—1.9	Poor

Finally, additional stream characteristics were measured such as cross channel profiles and water column measurements (including stream width at waterline, water depth, substrate and canopy closure and density). The methodology also required completion of station summary forms, on which investigators were also to include measurements of stream flow, water temperature, sinuosity, pool, run and riffle lengths and pool/run/riffle ratios. These measurements were not always recorded.

Overall, the intensive stream monitoring surveys captured data related to both riparian habitat (bank characteristics) and stream characteristics. Table 12 summarizes the various parameters measured or evaluated during the stream monitoring and riparian surveys. Stream characteristics generally reflected riparian characteristics; however, occasionally riparian characteristics were not representative of stream characteristics (e.g., extreme grazing impacts and poor riparian site function ratings were associated with moderate or even good stream characteristics).

**Table 12. Stream Parameters Assessed During Surveys**

Stream Characteristics	Bank Characteristics
Flow	Grazing impacts
Water temperature	Site functionality
Sinuosity	<ul style="list-style-type: none"> <li>• Vegetative bank protection</li> <li>• Subsurface water status</li> <li>• Soil alteration</li> </ul>
Pool length	
Run length	
Riffle length	
Depth	
Canopy cover	

<sup>5</sup> It does not have this reference; it was cited in the undated BLM survey methodology report.

## Tetra Tech Site Evaluation Data

The focus of Tt's survey and analysis was to understand the river morphology and hydraulic characteristics of the streams and the impact of impairment on these characteristics. The data collection effort and evaluation were designed to perform a Level II Rosgen assessment to provide a moderate understanding of geomorphic characterization and stream functions, which could be used to compare to stream function ratings assigned in earlier surveys.

Rosgen (1994) developed a river classification system or a hierarchy of river morphology based on extensive field observations and quantitative investigation of hundreds of stable stream systems over a period of 27 years. The Rosgen system has formed the basis for restoration of many rivers and river reaches. According to this system, a stream can be grouped into a general class referred to as a "Rosgen Class." Streams in a class are similar in river behavior, physical appearance, hydraulic and sediment relationship, stream characteristics, and river morphological conditions. The classification system is comprised of four assessment levels that vary from a broad geomorphic characterization (Level I), down to very detailed, specific description and assessment (Level IV) (Table 13). Rosgen Level II classification is used as a tool to assess stream stability, infer geomorphic processes, predict future geomorphic response, and guide stream restoration or rehabilitation activities.

**Table 13. Hierarchy of Rosgen Levels and Assessment**

<b>Assessment Type</b>	<b>Description</b>
<i>Level I</i> Classify stream type: results in streams classified as "A" through "G"	Description of geomorphic qualities based on basin characteristics, valley types, land forms; coarse scale determination possible from topography and landform maps.
<i>Level II</i> Refined classification of stream types "A1-A6" ..... "G1-G6" based on channel materials present (silt/clay, sand, gravel, cobble, boulders, bedrock)	More detailed morphological description of stream types extrapolated from field determined reach information (channel entrenchment, dimensions, patterns, profile, materials quantified).
<i>Level III</i> Describes stream "state" or existing condition	Describes existing condition as it relates to the stream's stability, response potential and function. Additional field parameters evaluated include riparian vegetation, sediment supply, flow regime, debris occurrence, depositional features, channel stability, bank erodibility and direct channel disturbances.
<i>Level IV</i> Validation Level	Measurements taken to verify process relationships inferred from preceding levels of analyses.

Tt field measurements included channel cross section parameters, longitudinal profile parameters, and plan-form features as well as cobble count analysis. These measurements could also provide some data to allow for comparison between more recent conditions and those existing at the time of the earlier surveys.

Of the channel cross section characteristics measured in the Level II Rosgen assessment, the width/depth (W/D) ratio is the most sensitive and positive indicator of channel instability trends. It is defined as the ratio of the bankfull surface width to the mean depth of the bankfull channel<sup>6</sup>. The W/D ratio helps illuminate the distribution of available energy within a channel, and the ability of various discharges occurring within the channel to move sediment. Determination of the W/D ratio provides a rapid, visual assessment of channel stability. Comparison of ratio values can be used to interpret shifts in channel stability following disturbances to channels or watersheds (Rosgen 1996). Channel dimension, profile, and stream types change with significant changes in W/D ratio, which may vary by  $\pm 2$  units without necessarily indicating a change in morphology or type. Generally, decreases in W/D ratio values indicate a trend toward stability.

From a management perspective, a given classification of a river reach does not mean that the reach is in a stable pattern. The Level II classification describes only "existing" morphological conditions. Stream systems tend to exhibit stabilization properties and have a natural tendency to evolve into a particular form. As a result, channel adjustments will occur in response to changes in streamflow magnitude or timing, sediment supply, direct channel disturbance or riparian vegetation alteration. These changes will manifest themselves in progressive stream type changes. Land-use activities such as livestock grazing, can lead to streambank trampling and heavy utilization of riparian vegetation which in turn results in decreased streambank stability and initiation of a shift in stream type. Such a process might incur a channel adjustment process where an original stream type E4 after undergoing some alteration, changes to C4 to G4 to F4 and back to E4. Design of management and restoration activities should be compatible with a stream's "most probable stable form." Leopold (1994) describes processes and characteristics that lead to a most probable form for river reaches.

Long term collection of field evidence such as survey data and aerial photographs can provide insight into the evolutionary morphology of a reach. In the case of the Bodie Hills streams, no such directly comparable record was available for this review and such a record may not exist; however, given the history of the area and management practices implemented in response to stream disturbances, current classifications of streams in the region may be reflective of waterbodies undergoing channel adjustments in response to removal of disturbances. In the Tt survey conducted in 2003, each reach was classified into a Level II Rosgen Class and evaluated as to how the observations fit or differ from a general stream of its kind. For locations where BLM survey data also exists, W/D ratios were compared in an effort to discern changes in reach morphologies. However, these comparisons have limited value in that BLM width values represent stream width at water line and not bankfull width.

## **Bioassessment Reports**

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Conducted in 1995, the goal of the bioassessment surveys was to establish biomonitoring baselines and comparisons among streams under various grazing exposure and enclosure

<sup>6</sup> The bankfull stage is the flow that just fills the channel to the top of its banks and at a point where the water begins to overflow onto a floodplain.

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(excluded from grazing) regimes (Herbst 1995). For the assessment, BLM staff proposed two sites on Clearwater Creek for reference conditions because they were ungrazed (though they were exposed to some trampling due to sheep trailing in the area). Biological conditions at six sites were scored using an index representing the integration of multiple aquatic invertebrate indicator metrics. Composite scores of the assessment could result in assessed impairment levels of unimpaired, slightly impaired, moderately impaired or severely impaired (relative to the reference). For the six study sites selected (specific locations were not available) the results of the bioassessment results as well as BLM Site Function Ratings and grazing impacts are summarized in Table 14. Impairment scores at the BC and AC sites were based on comparison to the CW reference sites, which were selected due to the lack of grazing not because they were initially characterized by unimpaired aquatic habitat.

Table 14. Bioassessment Results

Study Site Code	Site Function Rating	Grazing Impacts	Level of Impairment (based on Bioassessment)
CW11 (reference)	2.45	Ungrazed but trampled	Reference
CW12 (reference)	2.32	Ungrazed but trampled	Reference
BC21 (exclosure)	3.03	High	Slight
BC31	2.63	Extreme	Moderate
AC51	2.85	Extreme	Slight
AC21	2.23	Extreme	Unimpaired

Bioassessment scores indicated that the grazed site on Bodie Creek was most impaired<sup>7</sup>. Site AC21 on Aurora Canyon Creek was unimpaired yet had the lowest Site Function Rating and had extreme grazing impacts. The bioassessment also found that Clearwater Creek (used as the reference) had low Site Function Ratings yet were generally better than all the other sites in terms of the biomonitoring metrics. In sum, the biomonitoring results suggest that bank characteristics and vegetation features are not the only relevant indicators of aquatic community health and that a range of factors should also be examined, including canopy cover and bed substrate, to predict aquatic community health.

<sup>7</sup> This stream was not included on the Section 303(d) list of impaired waterbodies.

## 6. COMPARISON OF SURVEY RESULTS

This section discusses the individual watersheds in the study area, summarizes the findings of the major investigations conducted in each watershed, and highlights, where possible, significant differences and/or similarities between the findings of the different surveys. Note that the direct comparison of data between studies was problematic for two major reasons. First, the lack of data recorded at the same site locations for multiple investigations limited the number of sites where such comparisons could possibly be made. And second, the use of nonidentical sampling methodologies limits the usefulness of conclusions drawn (i.e., it is not necessarily useful to compare two data sets if they weren't collected in the same way). The reader may find it useful to refer back to pages 17 through 21 for descriptions of the inventory ratings.

### **Aurora Creek**

Aurora Canyon Creek watershed (including Clark Canyon Creek watershed) covers approximately 30 square miles on the upper western slope of Bodie Mountain (Figure 8). Elevations in the watershed range from more than 10,000 feet National Geodetic Vertical Datum (NGDV) at the summits of Bodie Mountain and Potato Peak to 6,500 feet NGDV at the mouth of the creek. Aurora Canyon Creek flows west for 8 miles from its headwaters to its confluence with the East Walker River about 1 mile upstream of the Bridgeport Reservoir. It is joined by Clark Canyon Creek, a major tributary, about 2 miles from its mouth. Aurora Canyon Creek has a total drop of 2,000 feet and an average slope of 0.045. Throughout the canyon, Aurora Canyon Road runs adjacent to the creek for virtually its entire length, approximately 18 miles. Grading activities have historically been a source of sediment directly to the creek (BLM 1979b). The Aurora Canyon Creek watershed was divided into five segments for the BLM stream survey; It surveyed two sites. A detailed discussion of survey results for Aurora Canyon Creek segments is provided below.

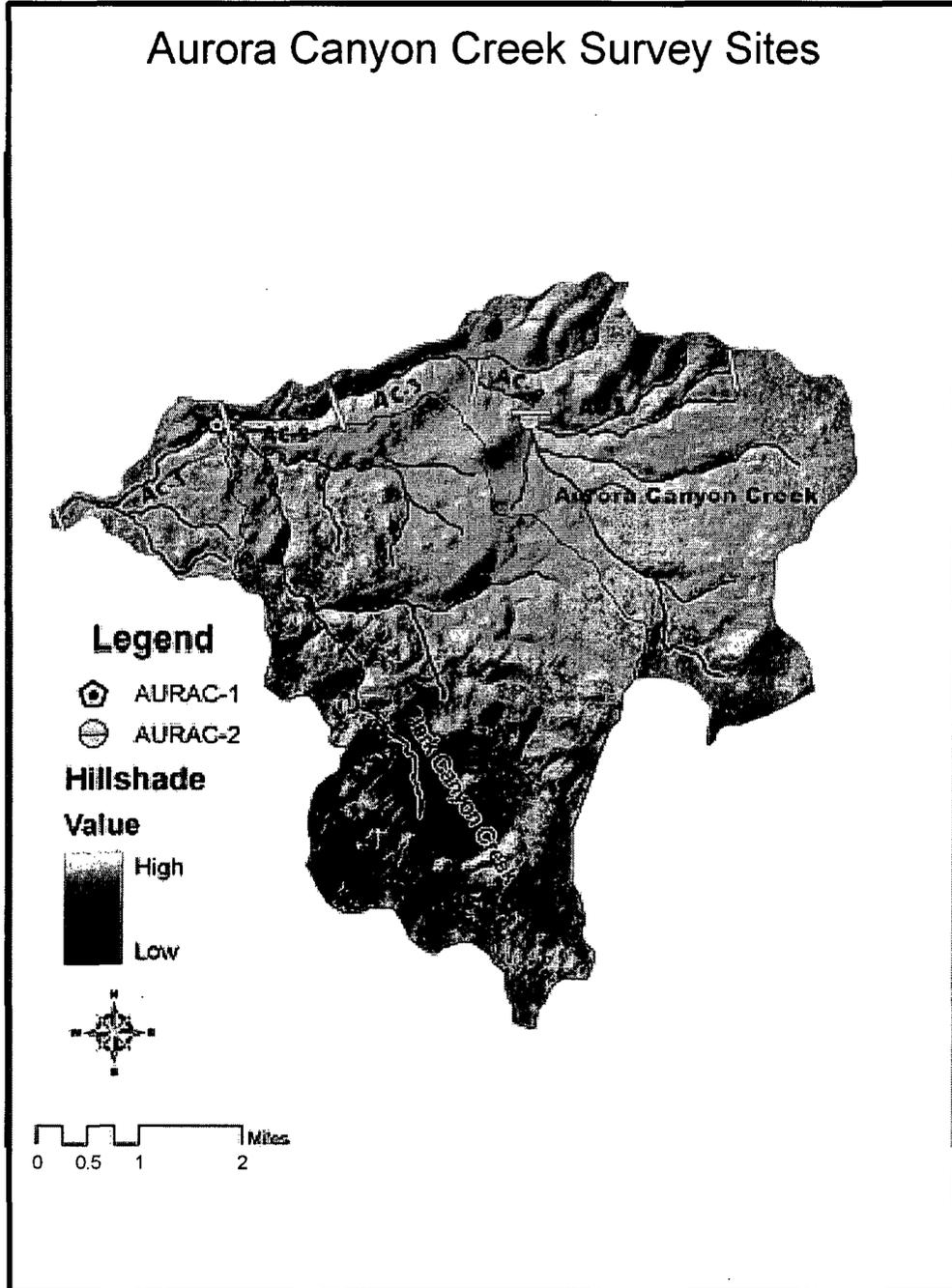


Figure 8. Survey Sites—Aurora Canyon Creek

### ***Aurora Canyon Creek Reach 1 (AC-1)***

#### ***BLM Surveys***

Aurora Creek Reach 1 represents a mainstem channel that carries the flow from all tributaries of Aurora Canyon Creek and Clark Canyon Creek. BLM surveyed this segment at one location each in 1988 for riparian and stream characteristics.

#### ***Stream Survey***

In the stream survey, a moderate score of 2.56 was given to water characteristics that include the status of pools and riffles. The left bank received a poor score of 2.33 and the right bank received a moderate score of 2.8. In addition, the BLM survey indicated that the left bank had extreme impact of grazing, and the right bank had high impact of grazing.

#### ***Riparian Survey***

In the riparian inventory survey, soil alteration rating and bank protection received poor score of 2, and subsurface water status received a good score of 3. Overall, the site received a poor score of 2.33. According to the riparian survey, all types of soils except bedrock were present in the site. The survey also noted that the erosion process at this site was associated with gullying, sheet erosion, bank collapsing, and livestock trampling.

#### ***Tt Survey***

The more recent survey conducted by Tt found that this segment is slightly entrenched with very low W/D ratio, low sinuosity, and low slope. It also has moderately graded soil particles with the dominance of fine materials. The surface protection was about 65 percent at this site. Except for sinuosity, the rest of the parameters fit into "E4" Rosgen Class. E4 stream banks are generally stabilized with extensive riparian or wetland vegetation that forms densely rooted sediments from grasses and woody species. This type is very stable unless the stream banks are disturbed. E4 streams are very sensitive to disturbances, including the changes associated with increases in stream flow and watershed sediment load. It is highly influenced by changes in riparian vegetation. This type has high bank erosion potential. However, if instability is corrected, E4 streams have very good potential for natural recovery. Prior disturbances in this reach, as indicated by the BLM surveys, would have resulted in stream instability and accelerated erosion processes. In the event that specific management measures have addressed this area, it is likely this site/reach has undergone some stabilization.

### ***Aurora Canyon Creek Reach 2 (AC-2)***

BLM surveyed at one location each for riparian and stream characteristics at this reach in 1988. BLM also conducted a stream monitoring survey at this reach in 1994. None of the Tt's survey sites were located in this reach.

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### **BLM Surveys**

#### *Stream Survey*

In the stream survey of 1988, a poor score of 2.23 was given to water characteristics that include the status of pools and riffles. The left bank received a poor score of 2.13 and the right bank received a poor score of 2.33. In addition, the BLM survey of 1988 indicated that both the left and right banks had extreme impact of grazing. However, the stream survey of 1994 showed a substantial improvement in the stream. A moderate score of 2.65 was given to water characteristics. The left bank received a good score of 2.9 and the right bank still received a poor score of 2.4. The BLM survey of 1994 indicated that both the left and right banks had no grazing impacts.

#### *Riparian Survey*

In the riparian inventory survey, soil alteration rating received an extremely poor score of 1, bank protection a received poor score of 2, and subsurface water status received a good score of 3. Overall, the site received a poor score of 2. The soil materials were silt, sand, gravel and rubble. The survey also noted that the erosion process at this site was associated with gullyng, sheet erosion, bank collapsing, and livestock trampling

#### **Tt Survey**

No monitoring conducted.

### ***Aurora Canyon Creek Reach 3 (AC-3)***

#### **BLM Surveys**

BLM surveyed at one location each for riparian inventory survey and stream monitoring survey at this reach in 1988. BLM also conducted a stream monitoring survey at this reach in 1994. None of the Tt survey sites were located in this reach.

#### *Stream Survey*

In the stream survey of 1988, a poor score of 2.23 was given to water characteristics that include the status of pools and riffles. The left bank received a poor score of 2.13 and the right bank received a poor score of 2.33. In addition, BLM survey of 1988 indicated that both the left and right banks had extreme impact of grazing. However, the stream survey of 1994 showed a substantial improvement in the stream. A moderate score of 2.65 was given to water characteristics. The left bank received a good score of 2.9 and the right bank still received a poor score of 2.4. BLM survey of 1994 indicated that both the left and right banks had no grazing impacts.

#### *Riparian Survey*

In the riparian inventory survey, soil alteration rating received an extremely poor score of 1, bank protection a received poor score of 2, and subsurface water status received a good score of 3. Overall, the site received a poor score of 2. The soil materials were silt, sand, gravel and

## STATUS OF BODIE HILLS 303(D) LISTED WATERBODIES

rubble. The survey also noted that the erosion process at this site was associated with gullyng, sheet erosion, bank collapsing, and livestock trampling.

### ***Tt Survey***

No monitoring conducted.

## ***Aurora Canyon Creek Reach 4 (AC-4)***

### ***BLM Surveys***

BLM conducted a riparian inventory survey at this reach in 1988

#### *Stream Survey*

Only a riparian inventory was conducted at this segment.

#### *Riparian Survey*

Soil alteration was rated as poor (2), bank protection received a good score (3), and subsurface water status received a good score (3). Overall, the site received a moderate score of 2.66. The survey identified the presence of silt, muck, gravel and rubble at the site and noted that the erosion process at this site was associated with gullyng, sheet erosion, bank collapsing, and livestock trampling.

### ***Tt Survey***

No monitoring conducted.

## ***Aurora Canyon Creek Reach 5-1 (AC-5-1)***

### ***BLM Surveys***

BLM surveyed at one location each for riparian inventory survey and stream monitoring survey within this reach in 1988. BLM also conducted a stream monitoring survey at this reach in 1994. Tt surveyed at one location (AURAC-2) within this reach.

#### *Stream Survey*

In the stream survey of 1988, a good score of 2.85 was given to water characteristics that include the status of pools and riffles. The left bank received a good score of 2.7 and the right bank received a good score of 3. The 1988 survey indicated that both the left and right banks had extreme impact of grazing. The stream survey of 1994 showed a substantial improvement in the stream. A good score of 3.25 was given to water characteristics that include the status of pools and riffles. The left bank received a good score of 3 and the right bank still received a very good score of 3.5. BLM survey of 1994 indicated that both the left and right banks had no grazing impacts.

#### *Riparian Survey*

In the riparian inventory survey, soil alteration rating received an extremely poor score of 1, bank protection received a good score of 3, and subsurface water status received a good score of

3. Overall, the site received a poor score of 2.33. All types of soils except boulder and bedrock were present in the site. The survey noted that the erosion process at this site was associated with head cutting, gullyng, sheet erosion, bank collapsing, and livestock trampling.

#### ***Tt Survey***

Site AURAC-2 represents the lower mainstem channel of Aurora Canyon Creek. It observed entrenched conditions, moderate W/D ratio, very high sinuosity, and moderate slope. The site has moderately graded soil particles with a dominance of fine materials. The surface protection was about 90 percent at this site. As the pebble count data was not available for this site, it was assumed that the bed materials were similar or larger than that of AURAC-1, the down stream site on the same creek. Based on these parameters, the stream at this site fit into "F4b" Rosgen Class. F4 stream banks are generally eroding unless stabilized with massive riparian vegetation. Streams of this type are extremely sensitive to disturbances, including the changes associated with increases in stream flow and watershed sediment load. Riparian vegetation plays a marginal role in stream bank stability due to the typically very high bank height, which extends beyond the rooting depth of riparian plants. F4 streams have high bank erosion potential. Even if the instability is corrected, they have very low potential for natural recovery. Based on the BLM survey results, this reach is perhaps recovering from the effects of past alterations.

#### ***Aurora Canyon Creek Reach 5-2 (AC-5-2)***

#### ***BLM Surveys***

BLM conducted a stream monitoring survey at this reach in 1988. A poor score of 2.12 was given to water characteristics that include the status of pools and riffles. The left bank received a poor score of 2.23 and the right bank received a poor score of 2. In addition, the survey indicated that both the left and right banks had extreme impact of grazing.

#### ***Tt Survey***

No monitoring conducted.

#### ***Aurora Canyon Creek Summary***

Two locations along this segment allow for some evaluation of how conditions along this stream have changed from 1988 to 2003. For segment AC-1 (AURAC-1), BLM surveys indicated severe impacts from grazing activities as well as poor geomorphologic, hydraulic, and riparian characteristics 15 years ago. It observations indicate that the stream may have stabilized or is stabilizing somewhat over the conditions observed in 1988. However, low sinuosity, high percentage of fine material on the streambed, and less protection of surface may reflect some disturbance to its natural characteristics from which the stream has not completely recovered.

For segment AC-5-1, the BLM rated the reach as severely impaired by grazing activities in 1988. However, the stream maintained good geomorphologic, hydraulic, and riparian characteristics at the time. The survey in 1994 revealed that the stream had improved substantially and at that time exhibited no impacts from grazing. It's 2003 observation indicated a stable vegetation

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presence (about 90 percent) at the site. However, observed low entrenchment and high W/D indicates that the channel may have experienced substantial bank erosion or bank expansion before reaching a stable condition.

Because the BLM and Tt studies collected some parameters in common (e.g., stream width and depth) a review of the raw data collected by both studies at like locations was conducted. The goal was to compare like parameters such as W/D ratio to evaluate whether stream changes had taken place between the period of the BLM studies and the Tt study. Data allowing for direct comparison of the same parameter from one study to the next at the same sites are limited as can be seen in Table 15 for Aurora Canyon Creek. For site AC-1 (AURAC-1) the calculated W/D ratio increased slightly. Additionally, as has already been mentioned, the comparison may be insignificant due to the different width measurements used by the two surveys. Assuming the comparison is valid, generally, decreases in W/D ratios indicate a trend toward stability. Sinuosity values between the two surveys did not change significantly. Based on the W/D ratio comparison, site AC-1 appears at least to have not deteriorated and has possibly improved. No other data allow for direct comparisons between the two studies. Similar comparisons cannot be made for site AC-5-1, the upstream site.

While Tt's site evaluations differ in methodology from those performed by the BLM, it might still be surmised that this stream has recovered somewhat from conditions during the original listing surveys. This conclusion is supported somewhat by the results of biomonitoring assuming those data are representative of current conditions. Biomonitoring in 1995 found the aquatic community at two sites on Aurora Canyon Creek to be slightly impaired and unimpaired respectively.

Table 15. Comparable Data for Aurora Canyon Creek

Site	Description	Survey Program	Date	Stream Flow (cfs)	Water Temp (C)	Sinuosity	Pool length (ft)	Run length (ft)	Riffle length (ft)	W/D Ratio	Rosgen Type
AURAC-1	Lower Site	BLM	8/16/1988	0.22	21	1.03	2.5	7.5	30	7.1	**E4
AURAC-1	Lower Site	Tt	8/4/2003	--	--	1.01	--	--	--	8.2	
Relative Change										+ 1.1	
AURAC-2	Upper Site	BLM	9/7/1988	--	--	--	--	--	--	--	F4b
AURAC-2	Upper Site	Tt	8/4/2003	--	--	1.69	--	--	--	20.2	

\*\*Sinuosity low to fit Rosgen Classification

## **Clark Canyon Creek**

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Clark Canyon Creek enters Aurora Canyon Creek approximately 2 miles upstream from the mouth. The Clark Canyon Creek watershed is approximately 15 square miles and is roughly the same size as the remainder of the land area drained by Aurora Canyon Creek (Figure 9).

### ***Clark Canyon Creek Reach 1 (CC-1)***

#### ***BLM Surveys***

BLM surveyed at one location each for a riparian inventory survey and a stream monitoring survey at this reach in 1988. BLM also conducted a stream monitoring survey at this reach in 1993.

#### ***Stream Survey***

In the stream survey of 1988, a moderate score of 2.66 was given to water characteristics that include the status of pools and riffles. The left bank received a good score of 2.8 and the right bank received a moderate score of 2.53. In addition, BLM survey of 1988 indicated that both the left and right banks had extreme impact of grazing. The stream survey of 1993 showed a similar condition. A moderate score of 2.52 was given to water characteristics that include the status of pools and riffles. The left bank received a moderate score of 2.48 and the right bank still received a moderate score of 2.56. BLM survey of 1994 indicated that both the left and right banks remained with extreme grazing impacts.

As indicated in the BLM survey, the reach had severe impacts from grazing activities in 1988. The condition remained the same in 1993 as well.

#### ***Riparian Survey***

In the riparian inventory survey, soil alteration rating received an extremely poor score (1), bank protection received a good score (3), and subsurface water status received a good score (3). Overall, the site received a poor score of 2.33. All types of soils except sand and bedrock were present at the site. The survey noted that the erosion process at this site was associated with head cutting, gullyng, sheet erosion, bank collapsing, and livestock trampling.

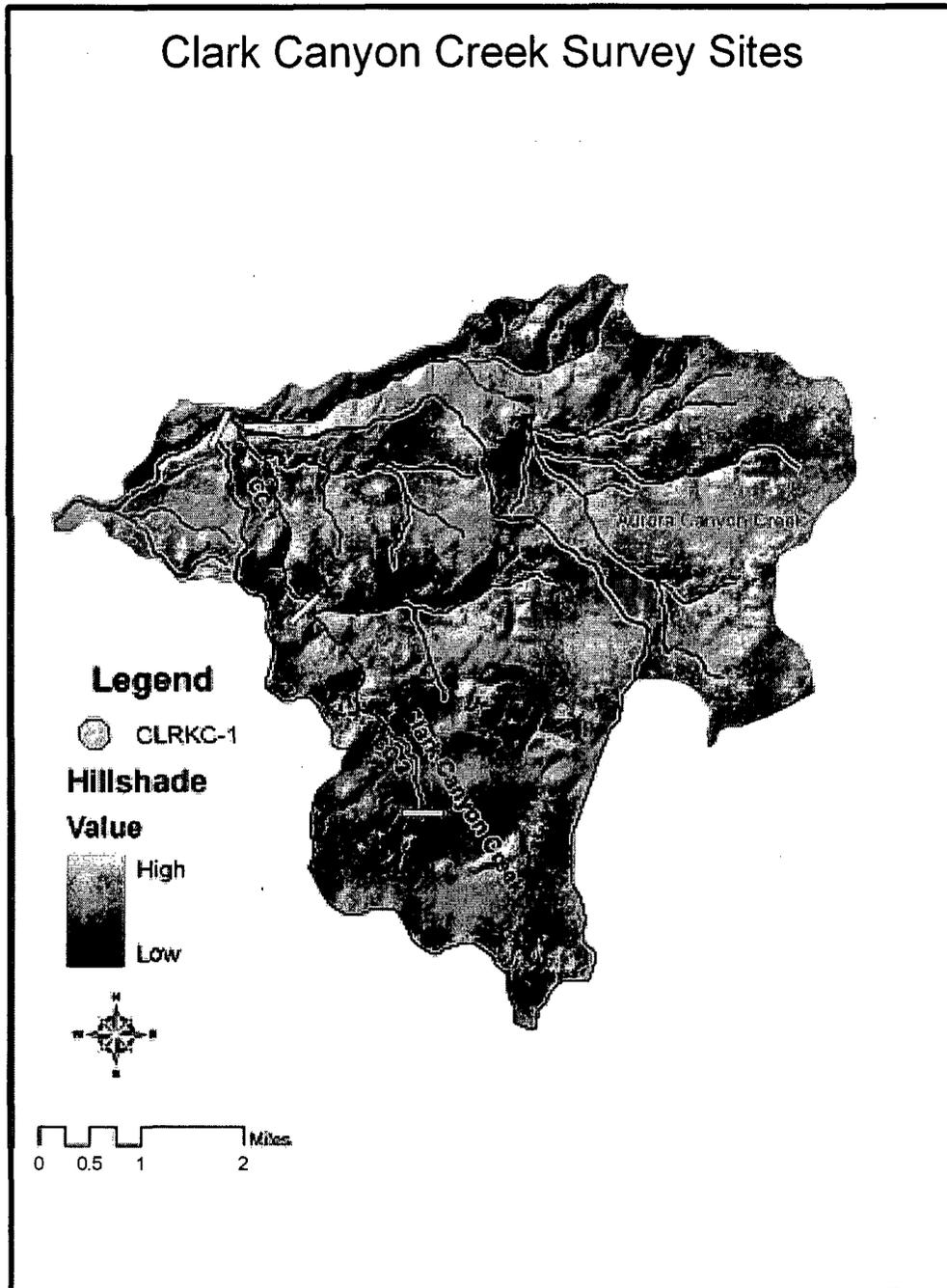


Figure 9. Survey Sites—Clark Canyon Creek

***Tt Survey***

Tt surveyed at one location (CLRKC-1) at this reach. Site CLRKC-1 represents a mainstem channel of Clark Canyon Creek just before it merges with Aurora Canyon Creek. CLRKC-1 has moderately entrenched, high W/D ratio, low sinuosity, and high slope. It also has poorly graded soil particles with the dominance of fine materials. The surface protection is about 95 percent at this site. Based on these parameters, the stream at this site fit into "B6a" Rosgen Class. This channel type is generally stable. The riparian vegetation is generally very dense in B6. This class has low sediment supply or transport capability. B6 streams are "washload" rather than "bedload" channels<sup>8</sup>. These streams are moderately sensitive to disturbances, including the changes associated with increases in stream flow and watershed sediment load. It also has low bank erosion potential. If the instability is corrected, they have excellent potential for the natural recovery.

***Clark Canyon Creek Reach 1-2 (CC-1-2)***

***BLM Surveys***

BLM surveyed at one location each for riparian inventory survey and stream monitoring survey at this reach in 1988. BLM also conducted stream monitoring surveys at this reach in 1991 and 1993. None of Tt's survey sites were located in this reach.

***Stream Survey***

In the stream survey of 1988, a poor score of 2.26 was given to water characteristics that include the status of pools and riffles. The left bank received a poor score of 2.13 and the right bank also received a poor score of 2.4. In addition, this survey indicated that both the left and right banks had moderate impacts of grazing. The stream survey of 1991 showed a slight improvement in stream condition. The stream had no impact of grazing in 1991. However, the stream scored as slightly impaired with both the left and right banks trampled in 1993.

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<sup>8</sup> "Bedload" refers to sediment in the channel that moves by skipping, rolling and sliding along the channel bed; grains remain within a few grain diameters of the bottom. "Washload" refers to particles so fine they are not found in appreciable amounts on the channel bed.

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### *Riparian Survey*

In the riparian inventory survey, soil alteration rating received an extremely poor score of 1, bank protection received a very good score of 3, and subsurface water status received a very good score of 3. Overall, the site received a poor score of 2.33. The soils at the site were sand, silt, gravel, rubble, and boulder. The survey also noted that the erosion process at this site was associated with gullying, bank collapsing, and sheet erosion.

### **Tt Survey**

No monitoring conducted.

## **Clark Canyon Creek Reach 2 (CC-2)**

### **BLM Surveys**

BLM surveyed at one location each for a riparian inventory survey and a stream monitoring survey in 1988. BLM also conducted stream monitoring surveys at this reach in 1991 and 1993. None of the Tt's survey sites were located in this reach.

### *Stream Survey*

In the stream survey of 1988, a poor score of 2.26 was given to water characteristics that include the status of pools and riffles. The left bank received a poor score of 2.13 and the right bank also received a poor score of 2.4. In addition, this survey indicated that both the left and right banks exhibited moderate impacts from grazing. The stream survey of 1991 showed a slight improvement in stream condition. The stream had no impacts from grazing in 1991. However, in 1993 the stream scored as slightly impaired with trampling of both the left and right banks.

### *Riparian Survey*

In the riparian inventory survey, soil alteration rating received an extremely poor score (1), bank protection received a very good score (3), and subsurface water status received a very good score (3). Overall, the site received a poor score of 2.33. The soils at the site were sand, silt, gravel, rubble, and boulder. The survey also noted that the erosion process at this site was associated with gullying, bank collapsing, and sheet erosion.

### **Tt Survey**

No monitoring conducted.

## **Clark Canyon Creek Summary**

Recent observations of conditions in this watershed are available at only one location, Reach 1-1 (CLRKC-1). Monitoring at this site revealed moderately impacted water characteristics in 1988 and 1993, with extreme grazing impacts to the banks. Table 16 lists data recorded during BLM and Tt monitoring. Tt monitoring showed that the segment, according to Rosgen, fits the "generally stable" class with good surface protection and generally dense riparian vegetation. This might indicate some degree of recovery has taken place since the BLM survey. A comparison of W/D ratios between 1988 and 2003 (Table 16) shows an increase in the ratio of 22.9 suggesting the channel widened during the time frame, perhaps due to bank slumping or

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grazing. Again this comparison is made with the caveat that the width measures for the two studies differ. The BLM stream width measurement was representative of stream width at the waterline as opposed to bankfull width. The Rosgen classification of B6a indicates the channel material here was predominantly silt/clay at the time of the Tt survey. Most other channel substrate in the area is comprised of gravel material.

Further upstream at segment 1-2, stream and riparian conditions were poor in 1988 (grazing impacts noted, with a slight improvement in stream conditions in 1991 (no grazing impacts noted). In 1993, stream conditions were degraded again (grazing impacts again noted).

Table 16. Comparable Data for Clark Canyon Creek

Site	Description	Survey Program	Date	Stream Flow (cfs)	Water Temp (C)	Sinuosity	Pool length (ft)	Run length (ft)	Riffle length (ft)	W/D Ratio	Rosgen Type
CLRKC-1	Clark Canyon Creek	BLM	8/19/1988	0.28	10	1.04	2	0	38	5.0	
CLRKC-1	Clark Canyon Creek	Tt	8/4/2003	--	--	1.04	--	--	--	27.9	B6a
										Relative Change	+22.9

**Clearwater Creek**

The Clearwater Creek watershed (Figure 10) covers an area of approximately 31 square miles on the southwestern slope of Bodie Mountain. Elevations in the watershed range from more than 10,000 feet NGDV at the summit of Bodie Mountain to 6,800 feet NGDV at its confluence with Virginia Creek. Clearwater Creek flows west for 12.3 miles from its headwaters to its confluence with Virginia Creek. Virginia Creek flows north into the East Walker River about 10 miles upstream of the Bridgeport Reservoir. Clearwater Creek has a total drop of 2,600 feet and an average slope of 0.040. Route 270, a paved two-lane road, runs along approximately 10 miles of the downstream portion of the stream.

**Clearwater Creek Reach 1 (CW-1)**

In 1988, BLM surveyed this reach at one location each for a riparian inventory survey and a stream monitoring survey. BLM also conducted a stream monitoring survey at this reach in 1993.

### **BLM Surveys**

#### *Stream Survey*

In the stream survey of 1988, a good score of 3 was given to water characteristics that include the status of pools and riffles. However, the stream survey of 1993 revealed that the stream was severely impaired and both the left and right banks were trampled. A poor score of 2.45 was given to water characteristics that include the status of pools and riffles.

#### *Riparian Survey*

In the riparian inventory survey, the rating for soil alteration received a poor score of 2, bank protection received a good score of 3, and subsurface water status received a good score of 3. Overall, the site received a moderate score of 2.66. All types of soils except boulder and bedrock were present at the site. The survey also noted that the erosion process at this site was associated with head cutting, gullyng, sheet erosion, bank collapsing, and livestock trampling. The left bank received a good score of 3.06 and the right bank received a good score of 2.93. In addition, the BLM survey of 1988 indicated that both the left and right banks had no grazing impacts. The left bank received a poor score of 2.2 and the right bank still received a moderate score of 2.7.

#### **Tt Survey**

Tt surveyed at one location (CLRWC-1) at this reach. Site CLRWC-1 represents the lower mainstem channel of Clear Water Canyon Creek. CLRWC-1 has moderate entrenchment, low W/D ratio, high sinuosity, and very low slope. It also has poorly graded soil particles with the dominance of fine materials suggesting some level of past disturbance. The surface protection is about 70 percent at this site. Except the W/D ratio, the rest of the parameters fit the site into "B4c" Rosgen Class. The channel materials for this type are generally comprised predominantly of gravel with little amounts of boulders and sand. B4c is relatively stable and is not a high sediment supply stream channel. It also generally well graded. These streams are moderately sensitive to disturbances, including the changes associated with increases in stream flow and watershed sediment load. B4c streams have low bank erosion potential. When instability is corrected, they have excellent potential for natural recovery. If any alterations have been removed in this area or if management measures have been installed to mitigate the impacts from external influences, this site/reach may be undergoing stabilization.

### **Clearwater Creek Reach 2 (CW-2)**

#### **Tt Survey**

Tt surveyed at one location (CLRWC-2) at this reach. Site CLRWC-2 represents the upper mainstem channel of Clear Water Canyon Creek above Cinnabar Creek. Tt observed relatively stable stream banks due to their inherent cohesive nature. Deep-rooted riparian vegetation is much more effective at maintaining stability in cohesive banks; root depths here were observed to be only 6 inches. Surface protection is about 98 percent. The site has poorly graded soil particles with the dominance of silt and clay materials.

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**Clearwater Creek Reach 3 (CW-3)**

BLM conducted a riparian inventory survey at this reach in 1988.

**BLM Surveys**

*Riparian Survey*

In this survey, soil alteration was rated very poor (1), bank protection received a poor score (2), while subsurface water status received a good score (3). Overall, the site received a poor score of 2. All types of soil materials, except muck and bedrock were present at the site. The survey also noted that the erosion process at this site was associated with gullying and sheet erosion.

**Tt Survey**

No monitoring conducted.

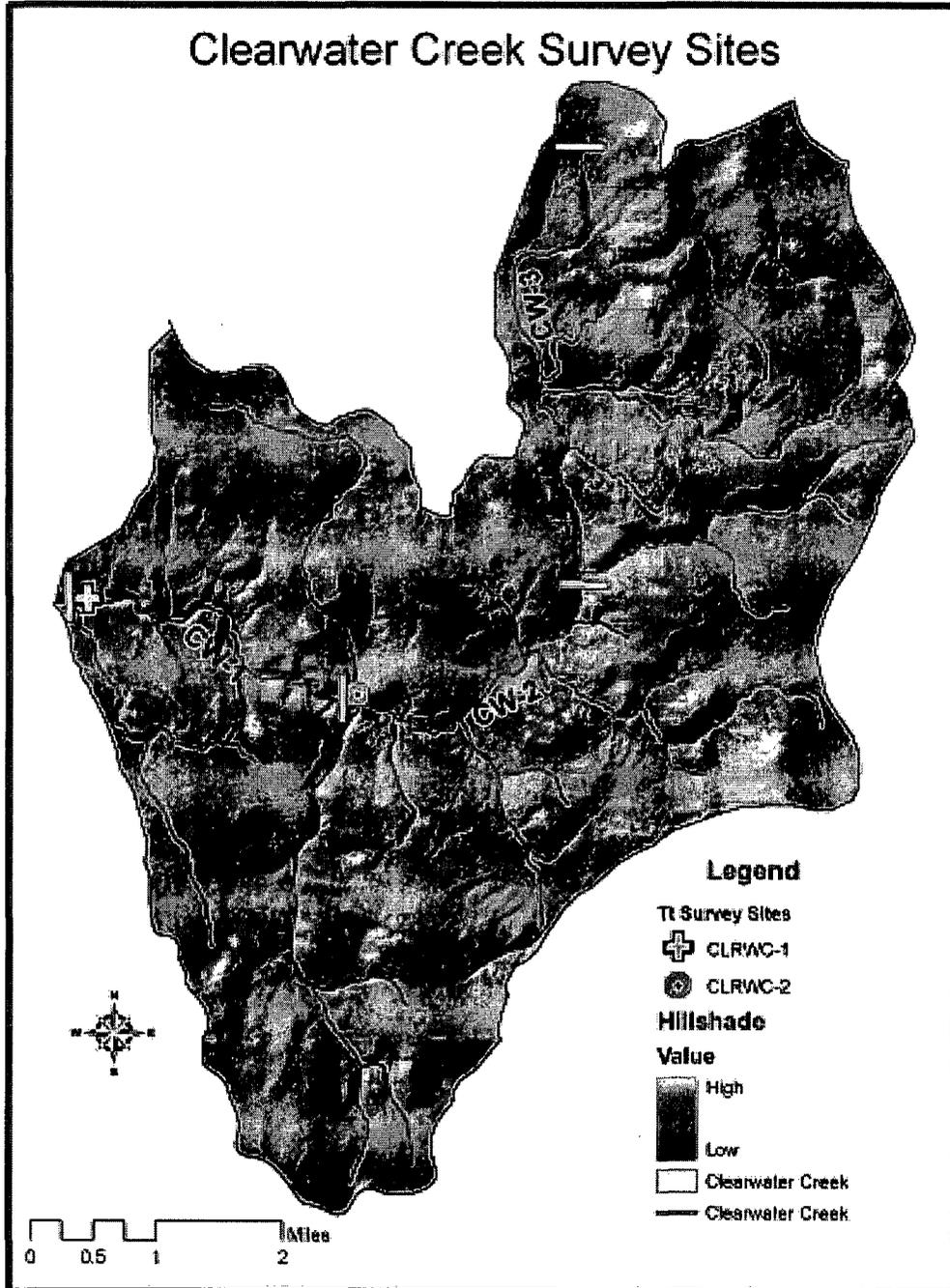


Figure 10. Survey Sites—Clearwater Creek

### Clearwater Creek Summary

Tt visited two locations in this watershed, only one of which (CLRWC-1) was earlier monitored by BLM (Table 17). At the downstream segment CW-1, the BLM survey indicated the reach was in good condition in 1988 but it was brought to severely impaired by 1993. Tt's observations in 2003 indicated a relatively stable B4c classification, but that the streambed was poorly graded with a high percent of fine materials including silt/clay (different from the general nature of B4c class that has well-graded soil materials with dominance of gravel). Tt also observed that the surface protection was 70 percent. Comparison of W/D ratios indicated an increase or widened channel from 1988 to 2003.

Table 17. Comparable Data for Clearwater Creek

Site	Description	Survey Program	Date	Stream Flow (cfs)	Water Temp (C)	Sinuosity	Pool length (ft)	Run length (ft)	Riffle length (ft)	W/D Ratio	Rosgen Type
CLRWC-1	Lower Site	BLM	8/10/1988	1.2	18	1.1	4.5	32	3.5	1.2	
CLRWC-1	Lower Site	BLM	7/30/1993	stagnant	19	--	--	--	--	--	
CLRWC-1	Lower Site	Tt	8/5/2003	--	--	1.6	--	--	--	9.3	*B4c
										Relative Change	+7.1

\*W/D ratio is low for Rosgen Class

The second site evaluated by Tt (CLRWC2, segment CW-2) produced a classification of F6—shallow rooted vegetation and poorly graded soil particles but good surface protection. Reach CW-3, was only monitored by BML in 1988 and received poor scores. Despite the poor site function ratings and Rosgen characterization, two sites (exact locations not known) along Clearwater Creek were used as reference sites for the 1995 biomonitoring assessment; indicating that the health of the aquatic community was good at that time.

Site CLRWC-1 may not have improved significantly from its condition in 1993, given Tt's observance of poorly graded materials dominated by silt/clays. Site CLRWC-2 also appeared to be altered in 2003 given its poorly graded soils and shallow rooted vegetation. It is not possible to understand from this review whether the stream is stabilizing from past disturbances or is experiencing current degradation. The presence of Route 270 and sediment impacts from it may be a significant and continuing factor for this stream.

### Hot Springs Canyon Creek

The Hot Springs Canyon Creek watershed (Figure 11) covers an area of approximately 5 square miles on the lower western slope of Bodie Mountain. Elevations in the watershed range from 8,000 feet NGDV in the southern headwaters to 6,500 feet at the mouth of the creek. Hot Springs Canyon Creek flows west for approximately 4 miles from its headwaters to its confluence with a drainage ditch. The drainage ditch flows into the East Walker River about 4

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miles upstream of the Bridgeport Reservoir. Hot Springs Canyon Creek has a total drop of 940 feet and an average slope of 0.045.

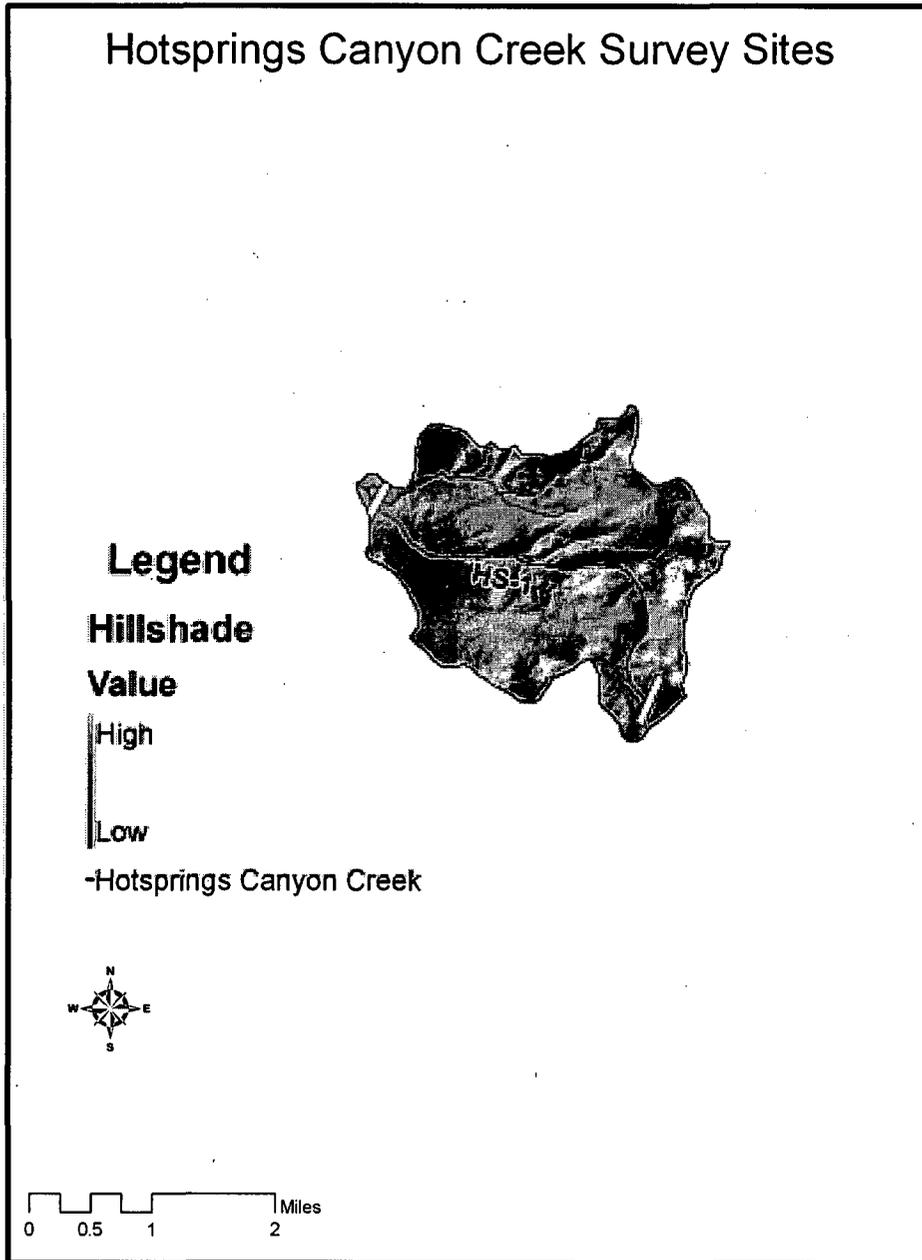


Figure 11. Survey Sites—Hot Springs Canyon Creek (no Tt sites)

### **Hot Springs Canyon Creek Reach 1 (HS-1)**

BLM surveyed one location each for riparian inventory survey and stream monitoring survey in 1988. None of the Tt's survey sites were in this reach.

#### **BLM Surveys**

##### *Stream Survey*

In the stream survey, a poor score of 1.9 was given to water characteristics that include the status of pools and riffles. The left bank received a poor score of 1.9 and the right bank also received a poor score of 1.9. In addition, this survey indicated that both the left and right bank had extreme grazing impacts.

##### *Riparian Survey*

In the riparian inventory survey, soil alteration rating received an extremely poor score of 1, bank protection received a poor score of 2, and subsurface water status received a poor score of 2. Overall, the site received a very poor score of 1.66. The soil materials at the site were sand, silt, muck, and gravel. The survey also noted that the erosion process at this site was associated with head cutting, gullyng, sheet erosion, bank collapsing, and livestock trampling.

##### **Tt Survey**

No monitoring conducted.

### **Hot Springs Canyon Creek Summary**

Based on the single set of monitoring data this stream appeared to be experiencing serious adverse affects from grazing activities. Recent data are not available to assess the current condition of this stream.

### **Rough Creek**

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The Rough Creek watershed (Figure 12) covers 270 square miles, 41 square miles in California and 229 square miles in Nevada, on the eastern slope of Bodie Mountain. Elevations in the California portion of the watershed range from more than 10,000 feet NGDV at the summits of Bodie Mountain and Potato Peak to 7,180 feet NGDV at the California/Nevada border. Rough Creek flows northeast for 8 miles in California and an additional 14 miles in Nevada to its confluence with the East Walker River about 18 miles downstream of the Bridgeport Reservoir. The portion of Rough Creek in California has a total drop of 2,600 feet and an average slope of 0.063.

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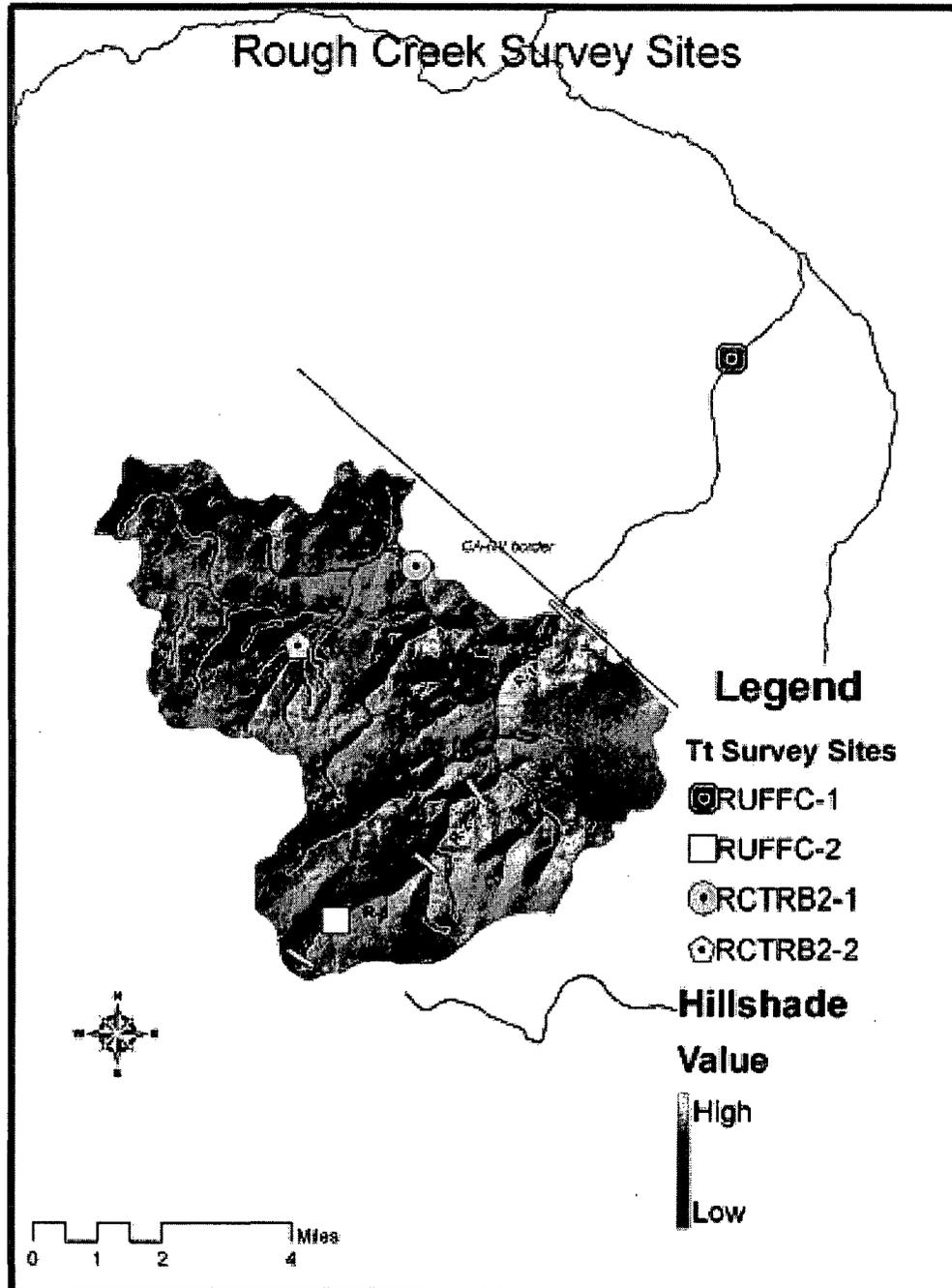


Figure 12. Survey Site—Rough Creek

### ***Rough Creek Reach 1 (RC-1)***

#### ***BLM Surveys***

BLM conducted a stream monitoring survey at this reach in 1988.

#### ***Stream Survey***

In this survey, a good score of 2.9 was given to water characteristics that include the status of pools and riffles. The left bank received a moderate score of 2.6 and the right bank received a good score of 3.2. The survey also indicated that both the left and right banks had extreme impacts from grazing.

#### ***Riparian Survey***

In the riparian survey, soil alteration was rated 1, the vegetative bank protection rating was assessed as a 2 and the subsurface water rating was also a 2 resulting in an overall site rating of 1.66. There was evidence of gullying, sheet erosion, bank collapse, and livestock trampling. Substrate included sand, silt, gravel and rubble.

#### ***Tt Survey***

Tt surveyed at one location (RUFFC-1) that was considered representative of this reach on the lower mainstem channel of Rough Canyon Creek. As the lower mainstem was not accessible during the fieldwork, the Tt field crew decided to survey at a site further down stream (approximately 4.8 miles downstream of the outlet) to represent the channel in this location. RUFFC-1 has moderate entrenchment, low W/D ratio, and low sinuosity. It has well graded soil particles with the dominance of coarse gravel. Tt's observation indicated that the surface protection is about 80 percent at this site. The observed parameters do not fit into a Rosgen class, possibly indicating impacts from past disturbances or some other reason that cannot be explained using present information. Based on entrenchment ratio, the stream should fit into Class "B." Because RUFFC-1 is more than four miles downstream of the BLM site, it may be reasonable to assume that RUFFC-1 is not representative of the BLM location.

### ***Rough Creek Reach 2 (RC-2)***

#### ***BLM Surveys***

In 1988, BLM surveyed this reach at one location each for a riparian inventory survey and a stream monitoring survey. BLM returned to survey Transect 1 of this site in 2000.

#### ***Stream Survey***

In the 1988 stream survey, a moderate score of 3.0 was given to water characteristics that include the status of pools and riffles. The left bank received a score of 3.0 and the right bank received a score of 3.0, yet the survey indicated that grazing impacts on both the left and right banks were

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extreme. Good subsurface water scores moderated the low soil alteration and bank vegetative protection ratings. In 2000, data were recorded only for Transect 1 (out of 5). Improvements were recorded for increased vegetative overhang and left and right bank vegetative protection and subsurface water status. The overall functionality rating was improved and survey notes indicated the transect was ungrazed.

### *Riparian Survey*

In the riparian inventory survey, the rating for soil alteration received a very poor score (1), bank protection received a poor score (2), and subsurface water status received a good score (3). Overall, the site received a poor score of 2. All types of soils except muck and bedrock were present in the site. The survey also noted that the erosion process at this site was associated with gully, sheet erosion, bank collapsing, and livestock trampling.

### **Tt Survey**

Tt surveyed at one location (RUFFC-2) at this reach. Site RUFFC-2 represents the upper mainstem channel of Rough Creek Canyon. RUFFC-2 has moderate entrenchment, low W/D ratio, moderate sinuosity, and low slope. It has well-graded soil particles with the dominance of coarse gravel. Tt's observation indicated that the surface protection is about 80 percent at this site. Except the W/D ratio, the rest of the parameters fit the site into the "B4c" Rosgen Class. The channel materials for this type are generally comprised predominantly of gravel with little amounts of boulders and sand. B4c streams are relatively stable. This type is not a high sediment supply stream channel. It is also generally well graded. These streams are moderately sensitive to disturbances, including the changes associated with increases in stream flow and watershed sediment load. B4c streams have low bank erosion potential. If instabilities are corrected, these streams have excellent potential for natural recovery. The presences of well-graded particles and good surface protection suggest this reach has potentially responded positively to management measures.

### **Rough Creek Summary**

Tt evaluated two sites, one in the headwaters region, RUFFC-2, and one considered representative of the watershed but located downstream, RUFFC-1. BLM surveyed segment RC-1 (represented by Tt's RUFFC-1 site) in 1988. It scored well for stream characteristics, and not so well for riparian characteristics, and there was evidence of grazing. Tt's observation indicated that the channel at the location representative of the BLM site is stable with 80 percent surface protection; the bed materials are well graded. However, noncompliance with the Rosgen Classification could be an indication of past disturbances. Regardless, because the locations were not the same, it is not reasonable to make a determination as to any changes that may have occurred.

The 1988 BLM survey indicated the upstream segment (RC-2, RUFFC-2) was impaired with stream characteristics moderately affected and with riparian conditions exhibiting extreme grazing impacts. According to Tt's recent observations, the site is stable with 80 percent surface protection. Bed materials are well-graded with coarse gravel dominance, typical characteristics of a stable channel in its class.

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In addition to RUFFC-1 and RUFFC-2, sampling was also conducted by BLM and Tt at two tributary locations. Comparison of W/D ratios at RUFF-2 (mainstem) and RCTRB-2-2 (Tributary 2 to Rough Creek) reveals a possible decrease in the value—indicative of a stabilizing trend (Table 18). These segments have perhaps stabilized since listing, or are in the process of stabilizing.

Table 18. Comparable Data for Rough Creek

Site	Description	Survey Program	Date	Stream Flow (cfs)	Water Temp (C)	Sinuosity	Pool length (ft)	Run length (ft)	Riffle length (ft)	W/D Ratio	Rosgen Type
RC-1	Rough Creek Lower Site	BLM	8/23/1988	2.6	22	1.01	0	8.5	31.5	11.7	-
RUFFC-1	Rough Creek Lower Site	Tt*	8/6/2003	--	--	1.07	--	--	--	9.1	
Relative Change										-2.6	
RC-2	Rough Creek Upper Site	BLM	8/31/1988	2.4	16	1.03	2.5	0	37.5	15.8	*B4c
RUFFC-2	Rough Creek Upper Site	Tt	8/6/2003	--	--	1.20	--	--	--	6.6	
Relative Change										-9.2	
RCTRB2-1	Tributary 2-1 of Rough Creek	BLM	8/19/1988	2.0	20	1.30	0	0	40.0	10.9	B4c
RCTRB2-1	Tributary 2-1 of Rough Creek	Tt	8/6/2003	--	--	1.31	--	--	--	13.0	
Relative Change										+2.2	
RCTRB2-2	Tributary 2-2 of Rough Creek	BLM	9/2/1988	0.03	21	1.07	0	0	40.0	31.2	B4c
RCTRB2-2	Tributary 2-2 of Rough Creek	Tt	8/6/2003	--	--	1.13	--	--	--	12.3	
Relative Change										-18.9	

\*Assumed representative of the location; actually located downstream

Overall, the comparison of recent monitoring with the BLM survey findings indicate this stream may possibly be improved in comparison to the conditions seen in 1988.

## **7. MANAGEMENT MEASURES**

The Resource Management Plan established for the Bishop Region (BLM 1993) includes a number of measures designed to address sources of impairment in the Bodie Hills waterbodies. The management plan called for stabilization and restoration of selected stream reaches in Aurora Canyon, Hot Springs Canyon, Rough Creek and all tributaries, Atastra Creek, Cottonwood Creek, Bodie Creek, Clark Canyon, Rattlesnake Gulch and Clearwater Creek. The purpose of restoration activities is to improve riparian and aquatic habitat. Specifically, improvements were targeted to achieve the following goals:

- Improve channel water storage capacity to increase base flow
- Reduce turbidity and sedimentation
- Improve the aquatic environment to increase fish and invertebrate populations
- Reduce water temperatures in summer to 60° F or less
- Provide habitat suitable for Lahontan cutthroat trout reintroduction

Additionally, grazing allocation levels were set for the Bodie Hills Management Area, calling for exclusion of livestock use from Clark Canyon, Aurora Canyon, and Hot Springs Canyon, among other areas.

Specific details regarding implementation measures were not available for this assessment. However the Natural Resource Projects Inventory Report, an online searchable database of management practices maintained by the UC Davis Information Center for the Environment, was queried for projects in the study area (<http://www.ice.ucdavis.edu/nrpi>). From the database, summary information was obtained relevant to two specific efforts in the area: the Clark Canyon Erosion Control Project and the Bodie Hills Coordinated Resource Management Group.

The Clark Canyon Erosion Control project was conducted from 1984 to 1987 to “stop the downcutting (degradation) of the active stream channel, cause sediment deposition of the stream channel to occur in the upper reach to increase the water retention capacity and to stop streambed erosion/collapse” (NRPI 2005). Project activities included installation of channel sediment retention structures and fence exclosures, prohibiting livestock entry and eliminating stream channel degradation. Expected results and performance standards for the project included channel aggradation, stream bank stabilization, and moderate improvement in water retention capacity. The project report summary indicated that these standards were partially attained as a result of implementation of the management measures.

The Bodie Hills Coordinated Resource Management Group project was initiated in 1984 led by the University of California Cooperative Extension Service to improve resource conditions and implement coordinated resource management plans for six livestock grazing allotments in the Bodie Hills. The project, a coordinated effort by multiple agencies and landowners in the area, used the Coordinated Resource Management and Planning (CRMP) process to facilitate management of public and private resources. Under the umbrella of the CRMP process,

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proposed restoration activities included implementation of a deferred grazing system, development of riparian pastures, development of water and fence facilities to improve livestock distribution, closure and rehabilitation of selected routes in the area, increase willow/aspens cover, development of off-stream water sources for livestock, development of sediment and erosion control projects, development of a public information and education plan, and development of projects to protect spring sources. Information is not provided in the summary report with respect to individual projects or post-implementation results; however the initiative is classified as “ongoing” in the database and it is reasonable to assume that a number of measures have been implemented in the area as a result of this effort and have resulted in improvements to a variety of targeted conditions especially given the apparently improved conditions seen in the watersheds relative to earlier surveys.

## 8. CONCLUSIONS AND RECOMMENDATIONS

The major task that must be accomplished prior to further regulatory activity (i.e, TMDL development, delisting, etc.) with respect to the listed waterbodies is to understand their current condition as it relates to support of beneficial uses, which include:

- Municipal and Domestic Supply
- Agricultural Supply
- Ground Water Recharge
- Freshwater Replenishment
- Water Contact Recreation
- Non-contact Water Recreation
- Commercial and Sport Fishing
- Cold Freshwater Habitat
- Wildlife Habitat
- Rare, Threatened, or Endangered Species
- Migration of Aquatic Organisms
- Spawning Reproduction and/or Early Development
- Water Quality Enhancement

An effort to do this was made by comparing the results of the BLM surveys on which the initial listings were based, to the results of the bioassessment conducted in 1995 and the results of Tt evaluations conducted in the region in 2003. Parameters measured in each study, however, were not the same. For example, no bioassessment work was conducted in 1988 or 2003, and W/D ratios, which can be calculated from data obtained by both BLM and Tt, were based on different interpretations of stream width: width at water line (BLM) and bankfull width (Tt). While the 1988 data could theoretically be used as a baseline against which recent and future data could be compared, to do so meaningfully requires that subsequent measurements be conducted using the same methodology. Because this was not the case, a certain amount of subjective interpretation of survey results is required to draw any conclusions related to changes in condition of the streams. As a result, these survey comparisons should be considered screening level and are more appropriate for highlighting streams where conditions have *potentially* changed rather than determining the attainment status of current conditions.

The original listings indicated that grazing impacts were common to all the impaired streams. Most of the above listed beneficial uses can be adversely impacted both directly and indirectly by grazing activities. While aquatic community health was generally not directly assessed, on the basis of field data and notes included in the BLM monitoring reports, it is reasonable to assume that aquatic community health in the most heavily impacted areas was to some degree impaired<sup>9</sup>. For example, excess sedimentation of fine materials over bed substrate can impair

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<sup>9</sup> Field notes sometimes noted absence or presence of fish.

## STATUS OF BODIE HILLS 303(D) LISTED WATERBODIES

spawning activities and choke aquatic habitat. Absence of riparian vegetation potentially resulted in elevated water temperatures above that which supports cold water fish health or spawning as evidenced by the limited temperature data gathered by BLM in the mid-1980s.

BLM monitoring results seemed to indicate a positive relationship between improved stream and riparian conditions with the removal of grazing activities<sup>10</sup>. Grazing management measures for the impaired waterbodies were included in the Bishop Resource Management Plan and under the Bodie Hills Coordinated Resource Management program; however, the extent to which such measures were implemented for all or some of the listed waterbodies was not clear for this analysis. It is therefore recommended that this issue be further examined to understand if and what measures have been implemented, where they have been implemented, and the extent to which they have resulted in improvements to the listed waterbodies and habitat conditions.

The findings of the 1995 Biomonitoring Assessment conducted in the area by the Sierra Nevada Aquatic Research Laboratory indicated that bank and vegetation characteristics should not be used as the sole indicators of aquatic community health. The presence or absence of grazing impacts does not necessarily predict the condition of the aquatic resources in the stream. Of the six areas studied, the aquatic community at some grazed sites was impaired and at others, aquatic communities were moderately to slightly impaired or unimpaired. This is also supported by differences between stream and riparian function ratings in the BLM inventories. Therefore, in addition to riparian assessments, bioassessments should also be considered in areas that are potential candidates for delisting to determine whether those beneficial uses related to biological communities are being supported (i.e., commercial and sport fishing, cold freshwater habitat, wildlife habitat, rare, threatened, or endangered species, migration of aquatic organisms, spawning reproduction and/or early development). Assuming the condition of the waterbodies has improved, this would help to verify the improvements, although it would not necessarily indicate other uses are being supported. If bioassessment results indicate impairment, a stressor analysis should be conducted to identify specific causes.

## **Determination of Current Status and Recommended Track**

### ***Aurora Canyon Creek***

Recent observations at two locations raise the possibility that this waterbody has stabilized relative to 1988 levels upon which the original listings were based. Recommendations for this stream include:

- Verify implementation of grazing management and/or stream restoration activities in this watershed, and evaluate success of any implementation measures.
- Consider intensive stream monitoring to make direct comparisons to results on which the listings were based and to verify appropriateness of delisting.

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<sup>10</sup> Reach 1-2 of Clark Canyon Creek, for example, showed poor conditions in 1988 with grazing noted, improved conditions in 1991 with no grazing noted, and degraded conditions again in 1993 with grazing noted. However, monitoring was not conducted frequently enough to make similar comparisons anywhere else in the Bodie Hills region.

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- Conduct biomonitoring to verify health of the aquatic community.
- Potentially appropriate to delist.

### ***Clark Canyon Creek***

Tt surveyed at one location along this waterbody, the results of which indicate possible recovery. Recommendations for this stream include:

- Verify implementation of grazing management and/or stream restoration activities in this watershed, and evaluate success of any implementation measures.
- Consider intensive stream monitoring to make direct comparisons to results on which the listings were based and to verify appropriateness of delisting.
- Conduct biomonitoring to verify health of the aquatic community.
- Potentially appropriate to delist.

### ***Clearwater Creek***

Tt surveyed at two locations along this waterbody. The downstream segment appeared to be in moderate condition and the upstream site evaluation was inconclusive. It does not appear that delisting is appropriate for this stream based on the limited evaluation conducted by Tt in 2003. However this stream was used to establish reference conditions for the 1995 bioassessment study. Recommendations for this stream include:

- Verify implementation of grazing management and/or stream restoration activities in this watershed.
- Evaluate success of any implementation measures, and work to make appropriate updates to the management plan.
- Conduct intensive stream monitoring to make direct comparisons to results on which the listings were based.
- Conduct biomonitoring to assess the health of the aquatic community.

### ***Hot Springs Canyon Creek***

Tt did not survey any sites along this waterbody; therefore no determination can be made regarding its current condition. Recommendations for this stream include:

- Verify implementation of grazing management and/or stream restoration activities in this watershed.
- Evaluate success of any implementation measures, and work to make appropriate updates to the management plan.
- Conduct intensive stream monitoring to make direct comparisons to results on which the listings were based.
- Conduct biomonitoring to assess the health of the aquatic community.

### ***Rough Creek***

It evaluated two sites along this waterbody. Findings suggest that the downstream location may be undergoing some degree of recovery from previous disturbances (although this location is a surrogate location for the segment monitored by BLM and may not be representative). The upstream location appears to be in good condition. This stream is potentially appropriate for de-listing. Recommendations for Rough Creek include:

- Verify implementation of grazing management and/or stream restoration activities in this watershed.
- Evaluate success of any implementation measures.
- Conduct intensive stream monitoring to make direct comparisons to results on which the listings were based and to verify appropriateness of de-listing.
- Conduct biomonitoring to verify that the aquatic community is healthy.
- Potentially appropriate to delist.

### **Additional Sampling**

In addition to the recommended intensive stream monitoring and bioassessment monitoring, water quality sampling in each waterbody should be conducted. Parameters such as temperature, turbidity and suspended sediment concentration, nutrients, pH, and dissolve oxygen, which can be used to evaluate whether the more restrictive designated uses in the area are being supported (e.g., spawning, reproduction of aquatic organisms) should be collected. In the absence of numeric water quality objectives, numeric criteria could be developed to describe conditions that would ensure attainment of beneficial uses (i.e., minimum summer temperatures). Monitoring locations should be at the same sites where previous monitoring was conducted to facilitate comparison of results through time.

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**Attachment 3**

U.S. EPA Region IX  
Request for Approval of Engineering Evaluation/Cost Analysis (EE/CA) and Non-Time-  
Critical Removal Action at the Leviathan Mine  
Alpine County, CA  
July 12, 2005

REQ. FOR  
APPROVAL OF  
ENGINEERING  
EVALUATION



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION IX  
75 Hawthorne Street  
San Francisco, CA 94105

MEMORANDUM

DATE: July 12, 2005

SUBJECT: Request for Approval of Engineering Evaluation/Cost Analysis (EE/CA) and Non-Time-Critical Removal Action at the Leviathan Mine, Alpine County, CA

FROM: Kevin P. Mayer, RPM, Site Cleanup Branch *KPM*

TO: Elizabeth J. Adams, Chief, Site Cleanup Branch

I. PURPOSE

The purpose of this EE/CA Approval and Non-Time Critical Removal Action Memo (NTCRAM) is to request and document approval of the proposed Non-Time Critical Removal Action (NTCRA or this Removal Action) described herein for the Leviathan Mine Site, located in Alpine County, CA. This NTCRAM is based on the Draft EE/CA submitted by Atlantic Richfield Company (Atlantic Richfield) to EPA on April 5, 2004, public comments received pursuant to 40 C.F.R. 300.415(n)(4), and the administrative record for the Site. The Draft EE/CA analyzed several approaches to year round treatment. For reasons described in Section V.A.(3) of the NTCRAM, EPA is selecting a NTCRA at Leviathan Mine that shall include on-site year round treatment of known Acid Mine Drainage (AMD) sources, to be implemented in two phases (described in more detail in Section V of this NTCRAM):

- 1) Design, construct and operate a new on-site winterized treatment system to test the effectiveness and reliability for year round treatment of the AMD from the Channel Underdrain (CUD) and the Delta Seep. Continue to treat the Aspen Seep through the Bioreactor. Continue to store the AMD from the Adit and the Pit Underdrain (PUD) for separate summer treatment. (This phase is similar to Alternative 1 in the Draft EE/CA.)
- 2) If Phase 1 proves successful, reconfigure the on-site winterized treatment system to test the effectiveness and reliability of year round treatment of combined Adit, PUD, CUD and Delta Seeps. Continue to treat the Aspen Seep through the Bioreactor. (This phase is similar to Alternative 2 in the Draft EE/CA.)

It is anticipated that this Removal Action will be conducted by Atlantic Richfield and the Lahontan Regional Water Quality Control Board (LRWQCB).

This site has been the subject of seven earlier removal action memoranda, dated September 24, 1997; July 19, 2000; July 5, 2001; July 27, 2001; July 11, 2002; July 28, 2003; and July 29, 2004. Five of these earlier removals were conducted by the LRWQCB, and two were conducted by Atlantic Richfield or by its implementing agent, ARCO Environmental Remediation L.L.C. (AERL). The July 27, 2001 removal action memorandum was issued for Early Response Action activities undertaken by Atlantic Richfield. These activities shall continue until the full implementation of this NTCRA. As with the previous removal actions, close coordination of concurrent site activities will be necessary for the proposed NTCRA.

Conditions presently exist at the site which, if not addressed by implementing the response action documented in this action memorandum, may lead to off-site migration and release of hazardous substances which may pose an imminent and substantial endangerment to the public health or welfare or the environment.

The actions described herein meet the criteria for a removal action under section 300.415 of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

## II. SITE CONDITIONS AND BACKGROUND

Site Status: NPL  
Category of Removal: Non-Time-Critical  
CERCLIS ID: CAD 980673685  
SITE ID: 1A

### A. Description of Site and Releases, National Priority List Status, and the Memorandum of Agreement with Natural Resource Trustees

#### 1. Site Description

The 656 acre Leviathan Mine property lies within a remote portion of northeastern Alpine County, California, on the eastern flank of the central Sierra Nevada, near the California-Nevada border, approximately 25 miles southeast of Lake Tahoe, and 6 miles east of Markleeville, California. Of the total property, approximately 253 acres are disturbed by mine related activities. With the exception of approximately 21 acres of disturbance on land managed by the United States Department of Agriculture, Forest Service (U.S. Forest Service), all disturbance is on the mine site owned by the state of California. As identified on the Topaz Lake and Mt. Siegel U.S. Geological Survey (USGS) quadrangle sheets, the mine property is situated principally within Sections 15 and 22, Township 10 North, Range 21 East, although small portions of the workings extend into the southeastern and northwestern corners of the adjoining Sections 14 and 23, respectively.

Vehicular access to the mine is limited by snowfall and muddy road conditions, so that the Site is inaccessible to heavy equipment from as early as October to as late as July, depending on weather. Vehicular access to the mine is provided by unpaved roads from State Highway 89 on the southeast and from U.S. Highway 395 south of Gardnerville, Nevada, on the northeast. The California-Nevada border lies approximately three miles northeast of the mine.

The disturbed areas of Leviathan Mine are sparsely vegetated. Although there is some volunteer vegetation, most existing vegetation is due to localized revegetation efforts carried out by the LRWQCB. This remote mine has no potable water or power.

2. Releases or threatened releases into the environment of a hazardous substance, pollutant, or contaminant

There are several sources of AMD at the Site which impact Leviathan Creek. When a release from the Site occurs, it flows through the Leviathan Creek/ Bryant Creek watershed, which drains into the East Fork Carson River. The AMD released contains elevated concentrations of metals and metalloids, most notably arsenic, and also includes iron, aluminum, chromium, cobalt, copper, nickel, and zinc. The low pH and high metals content of the AMD eliminated most aquatic life in Leviathan and Bryant Creeks downstream of the mine, until response activities were initiated. These releases originate in the state of California and, at times, may flow into the state of Nevada through Washoe Tribal lands into the East Fork Carson River, which serves as a major source of water supplies and a habitat for fish, including a historical habitat for the federally-listed threatened Lahontan cutthroat trout.

3. Site ownership

Mining began at the Site in the 1860's and continued on an intermittent basis for nearly 100 years. The Site was initially developed as an underground mine for gold, copper and copper sulfate from approximately 1863 to 1873. There is evidence of sporadic mining activity thereafter until 1933, when a private party acquired the site for sulfur production. Between 1933 and 1951 several companies developed a series of underground tunnels and adits and a sulfur mill on Site.

Anaconda Copper Mining Company (which later became The Anaconda Company) ("Anaconda") acquired the Site in 1951 and developed it into an open pit sulfur mine. Anaconda owned and operated the mine from 1951 until 1962. During most of this period, Anaconda extracted sulfur ore through open pit mining. Mining ceased at the mine property around 1962, and the Site was sold to another party. In 1977, Atlantic Richfield purchased all of Anaconda's stock, and in 1981 it merged with Anaconda.

In 1984, the state of California acquired approximately 495 acres of the mine property to pursue cleanup and abatement of the water quality problems associated with historic mining. Jurisdiction over the mine property rests with the State Water Resources Control Board which, in turn, has delegated authority over the mine property to the LRWQCB.

#### 4. NPL status

On May 11, 2000 (65 Fed. Reg. 30482), pursuant to section 105 of CERCLA, 42 U.S.C. § 9605, EPA listed the Site on the National Priorities List, set forth at 40 CFR Part 300, Appendix B.

#### 5. Memorandum of Agreement with Natural Resource Trustees

On April 9, 1998, EPA entered into the Leviathan Mine Site Memorandum of Agreement Among the Washoe Tribe of Nevada and California, The United States Environmental Protection Agency, The United States Department of the Interior, and the United States Department of Agriculture (MOA). The Nevada Department of Environmental Protection and the California Department of Fish and Game subsequently joined the MOA. Section VII of the MOA provides for coordination of efforts of these parties regarding collection of data, assessment of risks, evaluation of alternative possible response actions and natural resource restoration actions, and development and implementation of a strategy to seek to have liable parties perform and/or pay for the costs of response, restoration, compensation for natural resources damages, and operation and maintenance of the Site.

In addition to the parties to the MOA, other stakeholders who have participated in discussions that led to the development of the NTCRA include neighboring property owners, community members, academic researchers, and representatives of the Carson Water Subconservancy District, Alpine County, California, and Douglas County, Nevada.

#### B. Evaporation Ponds: Construction, Overflow, Treatment, and Enforcement

In an attempt to mitigate releases of AMD, the LRWQCB constructed five lined storage and evaporation ponds on-site between 1983-1985. These ponds collect AMD from an Adit and a drainage system built under the mine pit (Pit Underdrain or PUD). From the time of the construction of the ponds until the first successful season of treatment in 1999, evaporation during the dry summer season would decrease the total volume of AMD and concentrate the contaminants within these ponds. However, the combined flow of AMD and direct precipitation (rain and snow) into the ponds exceeded evaporation losses from the ponds in most years between 1985 and 1999, so that the ponds usually reached capacity (approximately 16 million gallons) and then overflowed into Leviathan Creek. Estimates of the overflow from a particularly wet winter range up

to 9 million gallons per year. Without annual preventative action, such overflow could reoccur.

In May 1998, EPA issued to AERL an Administrative Order on Consent for Removal Action (1998 AOC). Under the 1998 AOC, AERL agreed to remove liquids collected in the evaporation ponds, to collect specified information on site conditions, and to reimburse EPA, other agencies of the United States, and the Washoe Tribe of Nevada and California (the Tribe) for all costs incurred on or after March 1, 1998, not inconsistent with the NCP. AERL was not successful in removing sufficient quantities of AMD from the evaporation ponds.

EPA and AERL modified the 1998 AOC on February 18, 2000. The modification to the 1998 AOC required AERL to perform a Riparian Conservation Project, and it provided that AERL's obligations under the 1998 AOC would be terminated 30 days after receipt of payment for EPA's response costs incurred between March 1, 1998 and the effective date of the modification to the AOC, which was February 18, 2000. In November, 2001, AERL performed the required Riparian Conservation Project by spending \$720,000 to purchase 480 acres of undeveloped land in the Bald Mountain Range in Sierra County, California, donating the land to the Tribe, and donating a conservation easement to the Nature Conservancy along with funds for the costs of administering the easement in perpetuity.

In the summer of 1999, the LRWQCB conducted a treatability study to evaluate a particular process for neutralizing the AMD held in the evaporation ponds. The process tested by the LRWQCB is referred to as biphasic neutralization. The treatability study demonstrated that biphasic neutralization could be used to treat the AMD to a level acceptable for discharge to Leviathan Creek, considering all of the exigencies of the situation prior to design of further response actions. Operation of this system in the summer of 1999 reduced the level of AMD in the ponds to a significant extent. Further activity in the spring of 2000 prevented overflow that year.

On July 19, 2000, EPA issued an Administrative Abatement Action (AAA) under section 106(a) of CERCLA, 42 U.S.C. § 9606(a), to the LRWQCB, pursuant to which the LRWQCB treated the AMD in the evaporation ponds. The LRWQCB successfully treated sufficient quantities of AMD in the summer of 2000 so as to prevent pond overflows in 2001.

The AAA was modified in each of the years 2001, 2002, 2003, and 2004, to provide for the LRWQCB to perform a similar removal action each summer, each of which has succeeded in preventing pond overflows in the following year. During the past four summers, the LRWQCB effectively emptied the ponds of AMD. Each year, EPA and the LRWQCB have further developed the treatment system, so as to respond to changing chemistry in the ponds and improve AMD treatment and sludge handling techniques.

### **C. Other AMD Releases, Early Response Actions, and the Phased RI/FS**

In addition to the contaminated water collected in the evaporation ponds, other sources of untreated AMD from the Leviathan Mine currently contribute year round to the contamination of the Leviathan Creek/Bryant Creek watershed. The Channel Underdrain (CUD) collects subsurface water from beneath a portion of the concrete Leviathan Creek diversion channel and discharges roughly 15 to 30 gallons per minute (gpm) into Leviathan Creek. The Delta Seep area is a flow of approximately 10 gpm from the lowest portion of the mine waste rock in Leviathan Canyon, known as the Delta Slope, approximately 600 feet downstream from the end of the diversion channel. Aspen Seep is a series of flows totaling more than 10 gpm from low points of the waste rock in the Aspen Creek drainage. Water quality measurements taken by the LRWQCB indicate that these sources are somewhat less acidic and less highly concentrated in arsenic and metals than water collected in the evaporation ponds.

On November 22, 2000, EPA issued an Administrative Order requiring Atlantic Richfield to submit work plans for a phased Remedial Investigation/ Feasibility Study (RI/FS) for developing a long-term response to releases from Leviathan Mine (Administrative Order). Additionally, the Administrative Order requires Atlantic Richfield to plan and implement Early Response Actions (ERAs) to address releases from Leviathan Mine that are not captured in the evaporation ponds.

Pursuant to the Administrative Order, AERL has implemented ERAs on behalf of Atlantic Richfield since 2001. The ERAs have emphasized treatment of known sources of AMD, both to develop feasible methods of addressing these releases and to allow examination of whether there are other sources of contamination originating at the Site by measuring how the creeks respond to treatment of the known releases.

During the summers of 2001, 2002, 2003, and 2004, AERL captured and treated AMD from the CUD.

During 2001 and 2002, the LRWQCB conducted a geotechnical analysis of the stability of the mine wastes near the Delta Seep. In 2003 and 2004, AERL captured the Delta Seep flows and pumped this AMD uphill for treatment along with CUD flows. However, slope instability issues and mudflows from rain storms hampered Delta Seep efforts in both 2003 and 2004, and the Delta Seep effort ended early in the 2004 season. A major project sponsored by the LRWQCB to reconfigure and stabilize the Delta Slope is underway during the 2005 field season.

In 1993, University of Nevada - Reno researchers began to partially address the seep of AMD into Aspen Creek by a demonstration biological treatment project. This project was funded by the LRWQCB until June 30, 2001, when AERL assumed the project funding. The Aspen Creek treatment utilizes a biological process to reduce sulfate to sulfide and precipitate metal sulfides which are relatively insoluble. Pursuant

to the Administrative Order, AERL expanded and improved this biological treatment system, which began capturing and treating all AMD flowing into the Aspen Creek by the summer of 2003. This system works through the winter, and it is anticipated that it will continue to be operated and maintained by Atlantic Richfield for the duration of the NTCRA.

An integral part of past and future pond water treatment and other response actions includes assessment of the effectiveness of the action through water quality monitoring at the Site and in downstream waters as well as measurement of streamflow and meteorologic conditions throughout the year. The LRWQCB has monitored water quality since its first involvement, and has increased the intensity of the investigation of site characteristics since 1998.

The ERAs to date have demonstrated effective technologies for seasonal treatment of the discharges at the Site and confirmed that the known releases contribute the majority of contaminants affecting the streams during the dry season. Based on what has been learned over the past few years through ERAs performed by AERL, the removals performed by the LRWQCB, the initial stages of RI/FS activity, and discussions with the stakeholders, EPA, on November 13, 2003, directed Atlantic Richfield to prepare an EE/CA to evaluate options for capturing and treating the AMD year round to stringent discharge standards. It is necessary to intercept and treat these known releases year round, both to improve water quality in the affected streams on a year round basis and to provide an opportunity to determine the scope of the subsequent phases of the RI/FS, given that such interception and treatment can be expected to substantially alter the nature and extent of the threats posted by the Site. Year round treatment will greatly improve water quality in Leviathan and Bryant Creeks on a year round basis and set the stage for the long-term RI/FS, because the elimination of the major known discharges will make it possible to study the effect of sediments and any other remaining sources.

Atlantic Richfield developed the Draft EE/CA with input from EPA and other stakeholders, and submitted the Draft EE/CA on April 5, 2004. The LRWQCB had a reasonable opportunity to review and comment on the proposed EE/CA pursuant to section 106(a) of CERCLA, 42 U.S.C. §9606(a), and 40 CFR § 300.500. EPA received comments from the public, in writing and in a public meeting held on May 4, 2004.

This NTCRA is supported by an Administrative Record that includes the documents and information upon which EPA based the selection of the NTCRA.

#### **D. State and local authorities' roles**

##### **1. State and local actions to date**

The state of California obtained title to the Leviathan Mine Site in 1984 in order to facilitate access during its efforts to address the pollution problem. The LRWQCB manages the Site, and has undertaken pollution abatement projects described above. In addition to the pond water treatment project, the LRWQCB continues to take other action at the Site, researching AMD treatment methods, monitoring water quality and flow, and conducting site maintenance. There have been no substantive cleanup efforts by other state or local agencies. The state of California, the state of Nevada and the Washoe Indian Tribe of California and Nevada, as well as county and local agencies in both California and Nevada, have expressed their strong desire to see the contamination from Leviathan Mine addressed, and have participated in the cleanup process by attending meetings and submitting written comments.

##### **2. Potential for continued State/local response**

In each season since 1999, the LRWQCB has successfully treated the AMD in the evaporation ponds using the bi-phasic treatment method. Continued improvement, optimization and documentation of the treatment process remains an objective for use in long-term response decisions. This five year record of successful treatment by the LRWQCB shows a strong potential for a continued State response to the release. It is anticipated that the LRWQCB will continue to capture the Adit and PUD flows in the evaporation ponds and treat this AMD each summer through the first phase of this NTCRA, and to implement other portions of this NTCRA.

### **III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES**

The threats to public health, welfare, or the environment are those identified in Section III of the Leviathan Mine Hazard Ranking System Documentation Record Review.

### **IV. ENDANGERMENT DETERMINATION**

Actual or threatened releases of hazardous substances, if not addressed by implementing the response action selected in this Action Memorandum, may present an imminent and substantial endangerment to public health, or welfare, or the environment.

## V. PROPOSED ACTIONS AND ESTIMATED COSTS

### A. Proposed Actions

The NTCRA at Leviathan Mine shall consist of on-site year round treatment, including winter treatment, of known AMD sources to be implemented in two phases:

- 1) Design, construct and operate a new on-site winterized treatment system to test the effectiveness and reliability for year round treatment of the AMD from the CUD and the Delta Seep. Continue to treat the Aspen Seep through the Bioreactor. Continue to store the AMD from the Adit and the PUD for separate summer treatment. (This phase is similar to Alternative 1 in the Draft EE/CA.)
- 2) If Phase 1 proves successful, reconfigure the on-site winterized treatment system to test the effectiveness and reliability of year round treatment of combined Adit, PUD, CUD and Delta Seeps. Continue to treat the Aspen Seep through the Bioreactor. (This phase is similar to Alternative 2 in the Draft EE/CA.)

Development and operation of the Aspen Seep treatment system shall continue throughout the NTCRA.

The objectives of the Removal Action can be summarized as:

- Improve temporary protection of human health and environment from the known AMD discharges. EPA remains committed to selecting a protective long-term remedy based on a complete RI/FS.
- Obtain critical information for selecting a long-term remedy.
  - 1) Eliminate gross discharge to allow a more thorough Risk Assessment for long-term risks (e.g., contaminated sediment).
  - 2) Gain experience in operating systems to capture and/or treat the AMD at Leviathan through harsh winter conditions.
- Implement the Response Action in a timely manner - beginning during 2005 - both to optimize health and environmental protection and to allow the Risk Assessment and Feasibility Study data gathering to proceed to the next stage.

The primary activity of this Removal Action will be to design and implement a neutralization treatment system to treat the AMD discharged at the identified locations at Leviathan Mine by raising the pH, reducing the dissolved concentrations of metals in the AMD, and separating the resulting solids from the water. The treated effluent will be discharged to Leviathan Creek. The method of treatment and the placement of sludge generated from the treatment shall be addressed in Work Plans for site work at Leviathan Mine submitted to EPA for approval.

Other site activities such as site maintenance and continued monitoring are also elements of this NTCRA, which will be described in more detail in Statements of Work and Work Plans which will be submitted for the implementation of this NTCRA.

1. Proposed action description

The major anticipated tasks that will be involved in the proposed response actions include Phase I Actions, Phase II Actions, and Continuing Actions, as follows:

a. Phase I Actions

- i. Continue the existing summer bi-phasic treatment of the flows from the Adit and PUD, captured year round in the existing ponds, unless and until winter treatment is demonstrated to be reliable.
- ii. Continue summer treatment of flows from the CUD, unless and until winter treatment is demonstrated to be reliable.
- iii. Continue summer treatment of flows from the Delta Seep, as practicable, unless and until winter treatment is demonstrated to be reliable.
- iv. Design and construct an on-site winterized treatment system to test the effectiveness and reliability of treating the CUD and Delta year round, consistent with the ultimate objective of constructing a system to treat the combined flows of the Adit, PUD, CUD and Delta Seep year round. Test critical components of the winter treatment system (such as pumps and remote monitors and controls) on Site, beginning in the winter of 2005-2006.
- v. Design and construct winterized capture and transmission pipes for the CUD,
- vi. Operate the on-site winterized treatment system(s) to test effectiveness and reliability of treating the CUD year round,

vii. Design and construct winterized capture and transmission pipes for the Delta Seep, and

viii. Operate the on-site winterized treatment system(s) to test effectiveness and reliability of treating the CUD and Delta Seep year round.

**b. Phase II Actions**

i. Reconfigure and operate the on-site winterized treatment system(s) to test effectiveness and reliability of treating the Adit, PUD, CUD and Delta Seep year round.

**c. Continuing Actions**

The following activities will continue through both phases of the NTCRA:

i. Continue to operate and develop the existing Aspen Seep bioreactor,

ii. Evaluate on-site and off-site solids disposal options,

iii. Develop contingency plans for potential treatment system failure, and

iv. Sampling, as described in the following paragraph.

Environmental sampling of water quantity and quality for intake and discharges into Leviathan Creek from the treatment system shall be performed. In addition to monitoring water quality and system performance data collection, sampling will be performed as described in the applicable Work Plans submitted to and approved by EPA, to assure that each treatment system's effluent is in conformance with the standards set forth in Table 1, below, or other standards identified in writing by EPA.

**2. Contribution to long-term cleanup performance**

The proposed NTCRA will contribute to the phased RI/FS required by the Administrative Order. The NTCRA will address the imminent threat posed by the identified sources of AMD discharge, including the overflow of the AMD evaporation ponds. The initial phases of RI will continue as part of the NTCRA. During the implementation of the NTCRA as appropriate, EPA will direct Atlantic Richfield to submit a Work Plan for Long-term RI/FS. The information gathered pursuant to the NTCRA will be used to inform the long-term RI/FS, and year round treatment of the



identified sources of AMD discharges will enable EPA to identify remaining impacts to be addressed in the long-term RI/FS.

The immediate threats of pond overflow and other direct AMD discharges that are addressed in this NTCRAM require attention prior to, or concurrent with, the start of a long-term cleanup. To ensure that the immediate threats are adequately abated, the removal action will address only the immediate hazards of untreated AMD discharges from the identified sources, namely the Adit, PUD, CUD, Delta Seep and Aspen Seep. The information that will be gathered to assess the effectiveness and reliability of the action will be used for developing future responses, including long-term response actions.

### 3. Description of alternative technologies, response to comments, and discussion of decision

This section describes the alternative technologies considered in the Draft EE/CA for treatment of AMD and discusses EPA's decision for selecting an alternative for the NTCRA. For the past five years, EPA has issued removal action memoranda selecting continued bi-phasic treatment for the pond water each summer, based on successful implementation in the previous years. Under the Administrative Order, EPA has also approved Early Response Action Work Plans for various single phase lime neutralization and biological treatment systems. Successful experiences for properly designed and operated systems at Leviathan Mine demonstrate the effectiveness of these technologies during summer under the current exigencies at the Site.

The Draft EE/CA examined three general approaches to year round treatment with several variations: winterized on-site treatment, off-site treatment and expanded winter capture with summer treatment. The current bioreactor at the Aspen Seep would continue to operate for all alternatives. Alternatives 1 and 2 were to construct treatment systems at the mine site that would operate through the winter. Alternative 1 would retain the current pond capture/summer treatment for the Adit and PUD with a winterized treatment system for the CUD and Delta Seep. Alternative 2 would combine all four sources (Adit, PUD, CUD and Delta) in a year round treatment system. Alternative 2A would also treat the combined sources, although the AMD would be piped to a lower elevation for treatment at an off-site facility. Alternative 3 offered two variations on increasing the ability to capture all four sources in ponds on the site, with the treatment occurring during the summer.

The comments and information received during the 45 day public comment period (April 27, 2004, through June 11, 2004) were instrumental in forming EPA's selection of a phased, on-site treatment system to operate year round.

Regarding the off-site alternative (Alternative 2A), EPA agreed with several comments regarding the difficulties of implementing the off-site treatment options, at least for an Early Response Action. Such an option could be revisited for a long-term remedy, depending in part on the success of an on-site treatment action. Safe access to operating personnel is an attractive feature of an off-site treatment facility sited at elevations below the steeper sections of the access road and where winter snow accumulations are much less. The Draft EE/CA acknowledges the issues regarding potential impacts and land use constraints and states that such issues would not likely be resolved in the time-frame anticipated for the design and construction of a year round treatment facility as part of a NTCRA. Draft EE/CA, p. 53. Thus, alternative 2A has not been selected. Should the future feasibility study identify off site treatment downstream from the Leviathan Mine as a potential remedy for the site, then the impacts will be thoroughly reviewed and addressed as necessary for the treatment system location identified.

Alternative 3, Options 1 and 2 rely on increasing the pond storage capacity (Option 1) or covering the ponds (Option 2) to provide enough storage to contain AMD through the winter months. Both options for Alternative 3 would rely on summer season treatment of the accumulated AMD and precipitation. The concept behind Alternative 3 is to reduce the need for operator access during the winter with a relatively passive collection system, although a year round pumping system would still be required for CUD and Delta Seep. Worker safety issues and road maintenance concerns theoretically could be minimized. However, serious concerns have been raised over the feasibility of either of these options. Expanding the ponds in the limited area available would require considerable geotechnical assessment for stability and reliability of the berms, and the potential for containment failure or overflow in a particularly wet winter may still exist. A pond cover would reduce winter precipitation concerns, but several comments noted the unreliability of large covers in remote sites. Both options of Alternative 3 would require some active maintenance throughout the winter, particularly for Option 2 (the pond cover). Although EPA has not selected Alternative 3 for the NTCRA, such approaches may be evaluated in the feasibility study for a long-term remedy.

Several comments questioned the reliability and administrative feasibility of Alternative 2 - treating the combined flows of the Adit, PUD, CUD and Delta Seep - given the technical challenges presented by winter operations and the number of parties involved with varying responsibilities, as well as the uncertainty of the application of several regulations. In response to such comments, EPA has crafted a phased implementation which allows development of a reliable and effective winterized treatment system for the CUD and Delta Seep while evaluating solutions to technical and administrative challenges for treating all AMD sources continuously.

EPA agrees that technical and administrative hurdles face the successful implementation of a combined flow, year round system at Leviathan Mine. Any winterized treatment of AMD at Leviathan Mine presents challenges that have not previously been surmounted elsewhere, because of the remoteness of the Site. The higher concentrations of hazardous substances in the Adit flows further increase the complexity of AMD treatment and solids handling, as well as the risks inherent in the event of a system failure. The CUD and Delta Seep flows should be subjected to operational testing of year round treatment as soon as possible, since the current pond system provides no storage capacity for these releases. However, until the operational testing demonstrates the reliability of year round treatment for the CUD, it is prudent to minimize the risk of releases of untreated Adit and PUD flows by continuing to store these flows in the ponds through the winter and treat them during the summer. This is important because these flows present the most concentrated AMD, and the seasonal treatment system has proven to suffice during years with mild to moderate quantities of precipitation. Nonetheless, since the ponds still have potential for overflowing in wet years, it appears that the most reliable system would be an effective combined flow system for all the AMD flows which maximizes the potential to use the existing ponds as a back-up in case the winterized treatment system fails.

Thus, EPA has selected a response in which winterized treatment will first be tested on the CUD and Delta flows. Once winterized treatment has proven effective and reliable, tests of treatment and solids handling may be expanded to include some or all of the Adit and PUD releases.

Selection of long-term remediation technologies at Leviathan Mine is beyond the scope of the EE/CA. The NTCRA will provide for operational trials of year round treatment system for each of the known sources at Leviathan Mine. Complete assessment of alternative technologies for long-term remediation will be developed through the RI/FS, considering site-specific, risk-based cleanup goals. Initial phases of RI/FS are continuing, and EPA will direct Atlantic Richfield to submit a Work Plan for Long-term RI/FS as appropriate during the implementation of the NTCRA.

#### 4. Applicable or relevant and appropriate requirements

A removal action shall, to the extent practicable, considering the exigencies of the situation (e.g., the urgency of the situation and the scope of the removal action to be performed), attain applicable or relevant and appropriate requirements (ARARs) under federal or state environmental laws. 40 C.F.R. § 300.415 (j). Potential ARARs include the Clean Water Act (CWA), state water quality laws, RCRA requirements, the California Hazardous Waste Control Law, and state water quality laws for sludge disposal. Other federal and state advisories, criteria, or guidance may, as appropriate, be considered in formulating the removal action.

This Section of the NTCRAM explains the extent to which it is practicable to meet ARARs and establishes Discharge Criteria for the effluent which will be released pursuant to the NTCRA. These Discharge Criteria, which are listed in Table I, are based on current exigencies and information, and they may be modified, as necessary, as the situation changes and as more information becomes available. Previous removal action memoranda for the Site have included the same criteria for the same substances, and these criteria were attained for effluent from treatment systems operated at the Site in 2001, 2002, 2003 and 2004. Final long-term remediation goals will be determined during the remedy selection process as described in 40 C.F.R. § 300.340. Long-term remediation goals establish acceptable site-specific exposure levels that are protective of human health and the environment.

Water Quality in Receiving Waters. A primary adverse environmental impact from the Leviathan Mine discharges is on surface waters and the species which live in those waters. The CWA and the California Water Code contain requirements for control of discharges into surface waters. In setting the goals for any final remedy, EPA will consider whether any discharge from the mine to surface waters should comply with the water quality objectives, including those set forth in the Lahontan Regional Water Quality Control Basin Plan and the Numeric Criteria for Priority Toxic Pollutants for the State of California (Numeric Criteria), promulgated by EPA for the state of California in 40 C.F.R. § 131.38(b)(2) (May 18, 2000).

The NTCRA is intended to respond to all identified releases of AMD from the Site into Leviathan, Bryant and Aspen Creeks throughout the year, including treatability studies running through the winter months. Although implementation of this Removal Action will begin with the capture and treatment of the CUD during the summer of 2005, year round treatment will not be possible until full, successful implementation of the first phase of the NTCRA, which is projected to begin in the autumn of either 2006 or 2007. Until that milestone is met, the unmitigated releases will prevent reliable attainment of water quality standards in Leviathan and Bryant Creeks. Furthermore, during significant portions of the year, streamflow originating upstream of Leviathan Mine is minimal and the water quality of Leviathan and Bryant Creeks may be dominated by the discharge of treated water from the treatment systems. Also, during the winter, it may not be possible to safely detect or undertake timely corrective actions to address any system failures. Thus, under all of the exigencies of the situation, it is not practicable by this NTCRA to attain compliance with all ARARs for the water quality of receiving waters. However, Discharge Criteria for the effluent are either based on or in addition to the Numeric Criteria.

Effluent standards. The CWA regulates, among other matters, the discharge of pollutants from point sources into navigable waters of the United States. The discharge of effluent from a treatment system at Leviathan Mine into Leviathan Creek is a discharge of pollutants from a point source into navigable waters of the United States.

Clean Water Act controls are imposed on industries through National Pollutant Discharge Elimination System (NPDES) permits, or Waste Discharge Requirements, which are permitted on a case by case basis. No permit is required for this NTCRA since the discharges from the treatment systems will occur on-site pursuant to a removal action selected and carried out under CERCLA. 42 U.S.C. § 9621(e)(1). However, to the extent practicable under all the exigencies of the situation, a discharge must meet the substantive requirements of such a discharge permit.

In establishing discharge limits for a point source, the permitting agency considers guidelines based on both the technology available to control the pollutants for the specific industrial category of the discharger, as well as standards that are protective of the water quality. NPDES permits must include conditions necessary to achieve water quality standards established under Section 303 of the CWA, where these are more stringent than promulgated effluent limitation guidelines. 40 C.F.R. § 122.55(d). In the event there are no specific effluent limitation guidelines for the type of discharge at issue, the CWA provides that the permit shall contain "such conditions as the Administrator determines are necessary to carry out the provisions of this chapter." 33 U.S.C. § 1342(a)(1)(B). EPA uses "best professional judgment" to establish the effluent limitations if there is no effluent guideline regulation for the specific discharge category.

There are no technology-based effluent limitations specifically identified for inactive sulfur or copper mines. There are technology-based limitations for active metal mines, including copper mines (40 C.F.R. §§ 440.102 and 440.103), iron mines (40 C.F.R. §§ 440.12 and 440.13), and aluminum mines (40 C.F.R. §§ 440.22 and 440.23). Because the problems of AMD from historic mining at the Site are similar to the problems of existing active metal mines, the effluent limitation guidelines for such mines may be relevant and appropriate at the Site. However, for the relevant metals classified under the CWA as Priority Toxic Pollutants, the Numeric Criteria are more stringent than the effluent limitations guidelines for active metal mines. Consequently, the Discharge Criteria for the Priority Toxic Pollutants are based on the Numeric Criteria, while other Discharge Criteria are derived from the effluent limitations guidelines for active metal mines and EPA's best professional judgment based on the results from the last four years of operation of the treatment systems at Leviathan Mine.

EPA determines that it is practicable for all discharges to meet the Discharge Criteria set forth in Table 1 during periods when the Site is accessible, except during the initial implementation of the treatment (start-up period) or during optimization trials intended to ultimately improve treatment performance. During winter months when the Site is inaccessible, EPA recognizes that it may not be practicable to attain these Discharge Criteria, although EPA expects all parties implementing this NTCRA to make best efforts to do so, without compromising worker safety.

Table 1 presents both Maximum and four-day Average Discharge Criteria for the protection of aquatic life from acute and chronic exposure effects, respectively. The Maximum concentration equals the highest concentration of a pollutant to which aquatic life can be exposed for a short period of time without deleterious effects. The Average concentration equals the highest concentration of a pollutant to which aquatic life can be exposed for an extended period of time (4 days) without deleterious effects. Effluent meets the Discharge Criteria when no sample exceeds a Maximum criterion and the average of samples taken over a four day period does not exceed an Average criterion.

When the Site is accessible, the effluent shall be sampled and analyzed according to the methods and schedule provided in the footnotes of Table 1, unless and until EPA determines that a less intensive monitoring program provides adequate and protective process control. The relevant Work Plans shall describe sampling and analysis techniques appropriate for winter operations. Both Maximum and Average Discharge Criteria in Table 1 are to be measured at a point before the treated water is discharged.

There are eight minerals released from the Site which are Priority Toxic Pollutants for which Numeric Criteria are established in 40 C.F.R. § 131.38(b)(2): arsenic, cadmium, chromium, copper, lead, nickel, selenium and zinc. For these Priority Toxic Pollutants, the Discharge Criteria in Table 1 are derived from the Numeric Criteria, which are more stringent than any effluent limitations guidelines for discharges of these minerals from active metal mines, as provided in 40 C.F.R. Part 440.

Freshwater aquatic life Numeric Criteria for some metals are a function of the total hardness of the receiving water body. Hardness is a measure of dissolved calcium and magnesium expressed in mg/L. The presence of these minerals in water tends to decrease the toxicity of certain metals, such that a concentration of metals that are toxic to aquatic life when the hardness is 50 mg/L might not be toxic in water at 400 mg/L of hardness.

The Discharge Criteria in Table 1 are calculated for receiving water with a hardness of 200 mg/L (Ca CO<sub>3</sub>). The hardness measured in Leviathan and Bryant Creeks below the mine during July and August of 2000 during low flow conditions ranged from well above 400 mg/L (very hard) to approximately 200 mg/L (moderately hard, in Bryant Creek). Hardness values in Leviathan and Bryant Creeks also tend to decrease with dilution from snowmelt during higher flow periods. Although a specific point of compliance has not been formally established, it is EPA's goal to protect aquatic life that has been observed in Bryant and Leviathan Creeks in recent years. Given all the exigencies of the situation, it will not be practicable to fully restore the aquatic community in Bryant and Leviathan Creeks until year round treatment is successfully implemented at all known sources of AMD. Therefore EPA's best professional judgement is to use the moderate hardness value of 200 mg/L, as

measured in the upper reaches of Bryant Creek, to calculate the Discharge Criteria for this NTCRA.

For water quality parameters that are not Priority Toxic Pollutants, the Discharge Criteria are based on the effluent limitations guidelines provided in 40 C.F.R. Part 440 or on EPA's best professional judgement based on experience at the Site. The range for pH in Table 1 is equal to the range for pH for effluent from active copper mines set forth in 40 C.F.R. §§ 440.102(a) and 440.103(a). The Discharge Criteria in Table 1 for dissolved iron are consistent with those provided for effluent from active iron mines set forth in 40 C.F.R. §§ 440.12 and 440.13, and also consistent with guidance for water quality from Quality Criteria for Water, EPA 440/5-86-001 (Washington, D.C. 1986).

The Discharge Criteria for aluminum in Table 1 are based on results from the Leviathan Mine bi-phasic system operational data over the last six years (1999-2004). These Discharge Criteria for aluminum are not as protective as the limits for effluent from active aluminum mines set forth in 40 C.F.R. §§ 440.22 and 440.23, which may be relevant and appropriate. In past trials, efforts to maintain low aluminum concentrations resulted in less efficient removal of nickel, and higher standards were necessary to ensure the promulgated aquatic life standards for nickel were achieved. Future discharge criteria for aluminum will consider treatment system effectiveness and risk-based goals in light of the expected operating improvements due to more consistent and lower concentrations of contaminants in the AMD.

**TABLE I  
DISCHARGE CRITERIA**

<b>Water Quality Parameter</b>	<b>Maximum f2</b>	<b>Average f4</b>
<b>pH</b>		<b>Between 6.0 and 9.0 SU f1</b>
<b>Arsenic (dissolved)</b>	<b>0.34 mg/l</b>	<b>0.15 mg/l f3</b>
<b>Aluminum (dissolved)</b>	<b>4.0 mg/l</b>	<b>2.0 mg/l f3</b>
<b>Cadmium (dissolved)</b>	<b>0.009 mg/l</b>	<b>0.004 mg/l f3</b>
<b>Chromium (dissolved)</b>	<b>0.97 mg/l</b>	<b>0.31 mg/l f3</b>
<b>Copper (dissolved)</b>	<b>0.026 mg/l</b>	<b>0.016 mg/l f3</b>
<b>Iron (dissolved)</b>	<b>2.0 mg/l</b>	<b>1.0 mg/l f3</b>
<b>Lead (dissolved)</b>	<b>0.136 mg/l</b>	<b>0.005 mg/l f3</b>
<b>Nickel (dissolved)</b>	<b>0.84 mg/l</b>	<b>0.094 mg/l f3</b>
<b>Selenium (total recoverable)</b>	<b>Not Promulgated</b>	<b>0.005 mg/l f3</b>
<b>Zinc (dissolved)</b>	<b>0.21 mg/l</b>	<b>0.21 mg/l f3</b>

- f1** pH measurement based on 24-hour (single day) average discharge.
- f2** Concentrations based on daily grab samples, each grab sample field-filtered and acid fixed promptly after collection.
- f3** Concentrations based on four daily grab samples, each grab sample field-filtered and acid fixed promptly after collection.
- f4** If the concentration detected by the contract laboratory is less than the detection limit, ½ the detection limit shall be used in calculating the Average concentration.

**Sludge disposal.** Sludge produced from the treatment of AMD at Leviathan is excluded from regulation under RCRA Subtitle C pursuant to the Beville Amendment. 42 U.S.C. § 6921(b)(3)(A)(ii). Additionally, any sludge produced as part of this removal is not expected to exceed any federal hazardous waste characteristics. Wastes from the extraction, beneficiation, and processing of ores and minerals that are not subject to regulation under Subtitle C are exempt from regulation as hazardous waste under California's Hazardous Waste Control Act. H&SC § 25143.1.

The sludges will be regulated under section 13172 of the California Water Code, which specifically covers mining waste, and the Code's implementing regulations found at 27 CCR 22470 et seq.

Should any sludge that exhibits hazardous waste characteristics be disposed of off-site, the disposal will comply with CERCLA's Off-Site Rule found in section 300.440 of the NCP.

**Other Potential ARARs.** It is not anticipated that this Removal Action will negatively implicate other potential ARARs, such as the Endangered Species Act, the Archeological and Historic Preservation Act of 1974, the National Historical Preservation Act, or the Hazardous Materials Transportation Act.

#### 5. Project schedule

The first phase of the NTCRA, including winter treatability studies, will begin in 2005, with construction of a winterized treatment system commencing in 2006. Certain adjustments for system optimization may be expected in subsequent years of operation. The schedule for proceeding to the second phase is dependent on an analysis of the first phase operation results. Construction schedules at Leviathan Mine are limited by weather-related site access conditions, with mobilization typically expected by June or July and demobilization in October. Construction during 2005 is further complicated by other activities at the site, including the Delta slope stabilization project by the LRWQCB.

The operation of the NTCRA shall continue until selection and implementation of relevant aspects of the long-term Remedial Action. For the purpose of cost estimation, a five year operation period is assumed.

## B. Estimated Costs

### Cost Projection Summary

Removal Action Implementation Costs (Extramural to EPA, based on recalculated EE/CA estimates for five year total of phased Alternatives 1 and 2)	<u>\$ 5,740,000</u>
EPA Total (EPA contractor oversight, five year estimate)	<u>\$ 200,000</u>
Project Total	<u>\$ 5,940,000</u>

## VI. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

Current and past removal actions at the Leviathan Mine have not addressed releases of AMD from CUD and Delta Seep that occur annually during the months of October through June and degrade water quality in the Carson River watershed. If this NTCRA is delayed or not taken, these releases will continue, even if the past removal actions were extended. Furthermore, if no action is taken, the AMD evaporation ponds will continue to collect and concentrate AMD. If the ponds reach their holding capacity, the AMD may overflow and cause an uncontrolled release of AMD to the Carson River watershed. Any such uncontrolled release would adversely impact water quality, potentially threatening biota and humans. Removal of pond water and control of the other identified AMD releases provides flexibility to conduct any engineering studies or field trials of long-term treatment alternatives, which may not be implemented effectively if the action is delayed or not taken. Minimization of the release of AMD or sediment to Leviathan, Bryant and Aspen Creeks allows the final stages of the Remedial Investigation to proceed to assess the remaining risks at the Site, without the confounding effects of the untreated AMD discharges.

## VII. OUTSTANDING POLICY ISSUES

The Draft EE/CA has highlighted several outstanding issues which should be addressed during the long-term RI/FS. Among these is the question of whether more of the treatment solids can and should be placed on-site in a properly designed repository in the future. Resolution of this issue requires complete physical and chemical characterization of the solids, analysis of several federal and state requirements, and consideration of questions of land management policy. For purposes of the NTCRA, EPA has concluded that it is appropriate to bring certain wastes to an approved off-site repository. Whether this is the best solution for a long-term remediation is an issue that will require careful consideration during the RI/FS.

Similarly, the Draft EE/CA identified several potential advantages of off-site treatment. While EPA has concluded that such a system could not be implemented as a removal action, EPA should work with the U.S. Forest Service in the development of the RI/FS to address challenging technical, administrative, legal, and policy issues presented by this option. The U.S. Forest Service would be a key player in off-site treatment, because it would be necessary to build a pipeline across U.S. Forest Service land to bring the AMD to a low elevation off-site treatment plant. Siting that plant would also be an issue of concern to the U.S. Forest Service.

This issue can also be viewed as an example of a larger phenomenon: as EPA reaches the long-term issues of remediation of releases from Leviathan Mine, close coordination with natural resource trustees and the community will become ever more essential.

#### VIII. ENFORCEMENT

A confidential Enforcement Addendum is attached.

#### IX. RECOMMENDATION

This decision document represents a selected removal action for Leviathan Mine Site, in Alpine County, California, and was developed in accordance with CERCLA, and is not inconsistent with the NCP. This decision is based on the administrative record file for the Site.

Conditions at the Site meet the NCP section 300.415(b)(2) criteria for a removal and I recommend your approval of the proposed removal action. The total project ceiling, most of which will be incurred by Atlantic Richfield and/or the LRWQCB, will be \$5,940,000. Of this, an estimated \$ 200,000, mostly for oversight, comes from the Regional budget. EPA's costs will be sought through negotiations with potentially responsible parties.

  
Approval Signature

7/12/2005  
Date

\_\_\_\_\_  
Disapproval Signature

\_\_\_\_\_  
Date

**Appendix A**  
**Response to Public Comments on the**  
**Leviathan Mine Site Engineering Evaluation/Cost Analysis**

The United States Environmental Protection Agency (EPA) formally solicited and received public comments from April 27, 2004, through June 11, 2004 (extended at the formal request of the US Forest Service) on its proposal for the Non-Time Critical Removal Action (NCTRA) for a year round treatment system at Leviathan Mine Superfund site. In addition, EPA accepted comments during the public comment period on the "Draft Leviathan Mine Site Engineering Evaluation/Cost Analysis [EE/CA]" (March 31, 2004) prepared by Atlantic Richfield and used to develop and support EPA's decision on a removal action capable of year round treatment of acid sources. EPA received written comments from the Washoe Tribe of Nevada and California, U. S. Forest Service, U. S. Fish and Wildlife Service, California Regional Water Quality Control Board—Lahontan Region, and Brooke-Shaw-Zumpft (representing W. B. Parkland LLC). Verbal comments were received at the May 4, 2004 Community Meeting held in Minden, Nevada. This Response to Public Comments presents the comments and EPA's responses and is an integral part of EPA's decision document .

EPA is grateful for the thoughtful insights provided by all the commenters. The comments and information were instrumental in forming the decision to select a phased, on-site treatment system to operate year round.

From the input we received, EPA distinguished 59 written comments and 46 oral comments. The comments covered a wide-range of issues from access, to feasibility, to clarifications of statements in the draft EE/CA document. A number of comments reoccurred. Each comment will be addressed in this Section.

There were many comments regarding inaccurate, incomplete or unclear statements made in the EE/CA. Corrections and clarifications in the background and description of the Leviathan Mine site - including past and current cleanup efforts and effects - will be noted for the record in this response document and incorporated into the Remedial Investigation Report as appropriate. The Remedial Investigation and Feasibility Study for a Long-term Remedy is expected to continue for several years and will include information gathered during the Early Response Actions. There will be a formal review of the draft Remedial Investigation Report and corrections made before that document is finalized. EPA believes the basic technical information in the EE/CA was sufficient to support a decision for the Removal Action, and has not required a formal rewritten EE/CA document.

Several commenters questioned the administrative feasibility of treating the combined flows of the Adit, Pit Underdrain (PUD), Channel Underdrain (CUD) and Delta-Seep, given the number of parties involved with varying responsibilities and the

uncertainty of the application of several regulations. EPA agrees that administrative and technical hurdles face the successful implementation of a combined flow, year round system at Leviathan Mine. However, an effective combined flow system which uses the existing ponds as back-up appears to provide long-term reliability both for the Adit and PUD - which have the potential for overflowing the ponds during wet years - and for the CUD and Delta Seep flows - for which the current pond system provides no storage capacity. In response to the comments about the administrative and technical uncertainties, EPA has crafted a phased implementation which allows progress to be made while evaluating solutions to technical and administrative challenges. EPA has discussed this approach with the stakeholders and it appears that this is the most acceptable resolution in the near term.

## Detailed Responses

### **Comments from U.S. Forest Service (Gary Schiff, District Ranger, Carson Ranger District)**

#### General Comments

*Alternatives 1 and 2 would entail year round access to the site via the Leviathan Canyon Road (Forest Road 052) from Highway 395. The description of the nature and frequency of access to the site that would be required under these alternatives is very general, even so we provide the following comments:*

#### **Comment 1**

*This road currently provides public recreation access to backcountry surrounding the Leviathan area during the summer and early fall months. The road is typically inaccessible to the public during the late fall, winter and early spring due to snow accumulations and snowmelt runoff. Winter management of the road would effectively extend the period of time the road is accessible by the public. The public may wish to utilize the road during the winter to access the backcountry for winter sports pursuits (snowmobiling, skiing and snow shoeing). During the late fall and spring I'm concerned about resource damage that could occur from all-terrain vehicles (ATV's) traveling off the mine access road, and the increased possibility of wood theft. Our ability to patrol the area during this time is limited.*

*Public use of the road during the winter months may interfere with mine traffic posing a safety hazard. The risk from public and mine traffic using the road during adverse conditions should be mitigated. Public access could be seasonally restricted utilizing a gate or gates.*

*Presently this portion of the forest provides a relatively secure area for wintering wildlife. In the event that winter access is improved and human use increases, wildlife security would be compromised and use patterns altered. The extent of this impact would need to be anticipated and documented through a Biological Evaluation process. Limiting access with gates would provide an effective mitigation to this potential impact.*

*A road use permit/agreement should be in place to quantify the type and frequency of use for winter access. The permit/agreement will need to specify the type of vehicles that will need access, and how often they will access the site. The permit/agreements would also need to specify the method of plowing and how much residual snow will be left to prevent damage to the road surface during winter use by mine vehicles. Annual maintenance and repair of road surface would need to be identified each year to assure mixed traffic safety. Only administrative use should occur in typical non-public use periods (Nov.-May).*

#### **Response 1**

Year round treatment will be implemented in a manner that minimizes the need to use the Leviathan Canyon Road during the winter months. It is our expectation that larger loads of

construction equipment and bulk material will be restricted to summer and autumn deliveries. However, EPA anticipates that any year round treatment at the Leviathan Mine will require some access to the site during the winter months by operation and maintenance personnel. EPA appreciates the suggestion for minimizing the safety, wildlife, and environmental impacts by installing a gate or gates at strategic locations along the road, and we agree to work with the USFS to incorporate such features in this action.

EPA also appreciated and agrees with USFS's suggestion to collaboratively develop anticipated road use patterns and procedures (types of vehicles, frequency of travel, and associated road maintenance activity) for this removal action. The parties performing the work will be asked to collaborate with USFS on this issue.

#### **Comment 2**

*Alternative 2A proposes year round treatment at an offsite location on National Forest System land. Site specific information is sketchy, however it appears that the proposed location is on a very steep slope that would require significant cut and fill to develop. Issues associated with use of the site include a high probability of cultural resources, visual resource impacts from placing a treatment plant in a scenic area, stability concerns where the pipeline would cross a landslide and the potential for acid mine drainage releases in sensitive areas in the event of a process upset. As an offsite action Alternative 2A would be subject to the National Environmental Protection Act. It is considered unlikely that the alternative would be approved within the timeframes specified in the EE/CA.*

*Alternative 3, Options 1 and 2 do not appear to involve significant uses of National Forest System Land, however a road use agreement/permit may be appropriate as described above if construction would involve significant increases in use of the Leviathan Mine Road. The Forest Service would prefer that EPA select Alternative 3, option 1 due to the minimal impact on the Forest. However, given the EE/CA criteria of cost, implementability and effectiveness, the Forest Service understands that EPA may select an option that requires year round treatment and year round access to the site. If geotechnical constraints limit the implementability of Alternative 3, option 1 it is recommended that a somewhat larger covered pond storage system be considered.*

#### **Response 2**

EPA agrees with this comment regarding the difficulties of implementing the off-site treatment options, at least for an Early Response Action. We may want to revisit such an option for a long-term remedy depending on the success of an on-site treatment action. Also, safe access to the treatment facility for operating personnel is an attractive feature of an off-site treatment facility sited at elevations below the steeper sections of the access road where winter snow accumulations are much less. The EE/CA text acknowledges the issues regarding potential impacts and land use constraints raised in the comment and states that such issues would not likely be resolved in the time-frame anticipated for the design and construction of a year round treatment facility as part of a removal action (page 53, first complete paragraph). Thus,

alternative 2A has not been selected. Should the future feasibility study identify off site treatment downstream from the Leviathan Mine as a potential remedy for the site, then the impacts identified in the comment will be reviewed and addressed as necessary for the treatment system location identified at that time.

Road use issues were discussed in the previous comment response.

Alternative 3, Options 1 and 2 rely on increasing pond capacity (Option 1) or covering the ponds (Option 2) to provide enough storage to contain acid mine drainage (AMD) through the winter months. Both options for Alternative 3 would rely on summer season treatment of the accumulated AMD and precipitation, but we have serious concerns over the feasibility of either of these options. In addition, we received comments regarding the need for active maintenance throughout the winter, particularly for Option 2 (the pond cover). EPA appreciates the Forest Service's preference for a remedy that requires minimal winter month access, and Alternative 3 will be evaluated in the remedial design/feasibility study for a long-term remedy. Given the criteria for selection of the removal action and the information available, EPA believes that a modified version of Alternative 2, that initially includes year round treatment of CUD and Delta Seep, followed by addition of Adit and PUD flows to the treatment system after successful year round treatment is demonstrated, will best meet removal action objectives. As discussed above, EPA will take precautions to minimize the impact on the Forest during the winter season.

### Specific Comments

#### *Comment 3*

*Table 4-1 identifies the Water Quality Objectives in Chapter 3 of the Basin Plan as an Applicable or Relevant and Appropriate Requirement (ARARs). Data summaries on pages 22 and 23 and the figures in appendix B show exceedances of Basin Plan water quality objectives during periods when known sources of acid mine drainage are being treated. The statement on page 40 of the EECA that conventional lime treatment is expected to be in compliance with ARARs is not supported by data and would be better termed as a goal to achieve ARARs.*

#### **Response 3**

EPA agrees that the statement in the Draft EE/CA document is imprecise, and we provide a more explicit analysis of ARARs for this Removal Action in Section V. 4. Based on results of the early response actions completed at the Leviathan Mine to date, conventional lime treatment is expected to result in compliance with water quality objectives for aluminum, arsenic, copper, iron, nickel, lead, and zinc, the metals of concern at Leviathan Mine. However, conventional lime treatment performed during the Early Response Actions (ERAs) has not met the numerical values for sulfate and total dissolved solids (TDS) in the Basin Plan. Implementation of conventional lime treatment year round will provide the opportunity to assess impacts in light of Basin Plan objectives. During this Early Response Action, EPA will continue to evaluate the treatment systems and potential enhancements that may achieve compliance with ARARs related to Basin Plan objectives.

**Comments from California Regional Water Quality Control Board, Lahontan Region  
(Harold J. Singer, Executive Officer)**

**General Comments**

***Comment 1***

*The EECA is intended to identify early response actions to address known sources of acid mine drainage (AMD) discharging to Leviathan Creek until a final remedy can be developed and implemented through the Remedial Investigation/Feasibility Study (RI/FS) process. Proposals to construct and operate a permanent onsite hazardous waste repository, as put forth in the EECA, seem to deviate from the temporary nature of previous early response actions at the site. It appears inappropriate to consider a permanent onsite hazardous waste repository as an early response action. We believe proposals to construct a permanent onsite hazardous waste repository would be more appropriately considered through the RI/FS process. Furthermore, we believe the information needed to design a permanent hazardous waste repository (e.g. geotechnical, hydrogeologic, and seismic data) would be more appropriately acquired through the RI/FS process. We recommend removing consideration of a permanent onsite hazardous waste repository from the EECA and moving such considerations into the RI/FS arena. The same types of data will be pertinent in determining whether the evaporation ponds should be part of the long-term remedy at Leviathan Mine. In addition, we believe it would be extremely difficult to obtain the needed information and to design the facility to enable completion of work in 2005.*

**Response 1**

EPA concurs with this comment and has determined that sludge from the year round treatment of CUD and Delta Seep flows should be disposed of off site initially. Should year round treatment prove to be reliable, the year round system may also be expanded to include year round treatment of Adit and PUD discharge as well. Data about the quality of the sludge will be collected during these operations. If it is determined that on site storage is implementable and cost effective, then EPA intends to evaluate the technical, administrative and regulatory concerns over construction of an on site facility in conjunction with this removal action.

***Comment 2***

*Eliminating the permanent on-site hazardous waste repository from consideration means that the cost of storing and disposing hazardous waste must be carefully considered. Minimizing the generation of hazardous wastes should be of primary consideration. The State's biphasic process was designed with just that consideration. Under Alternative 2, the EECA seems to propose a single combined flow monophasic treatment facility that would continuously process AMD from the Adit, Pit Underdrain, Channel Underdrain, and Delta Seep. Such a facility would produce significant quantities of hazardous sludge, potentially off-setting the lower operational costs for this alternative. Without an on-site repository for*

*the hazardous sludge produced from such a system (see Comment 1, above), the viability of Alternative 2 should be seriously questioned.*

**Response 2**

EPA plans to phase in alternative 2 to allow time to address the issues raised in this comment and to gather information about sludge characteristics, disposal costs and on site repository analysis. Initially, the year round treatment will be for CUD and Delta seep AMD and the sludge will be disposed off site. If successful, year round treatment may be expanded to include AMD from the Adit and PUD. The sludge will be hauled off site for this phase of the removal action unless it can be determined at this point that an on site disposal repository is administratively and technically feasible and cost effective. Given this approach, the viability of Alternative 2 will be demonstrated in steps. The EE/CA estimates a cost of \$90,000 per year for off site disposal.

**Comment 3**

*With regard to Alternative 1 (two treatment systems), what is the assumed configuration of seasonal pond water treatment – biphasic or monophasic? It is important to make this distinction given the differences in operational costs and sludge production rates. The operational costs for biphasic treatment of pond water are expected to run much higher than those for monophasic treatment of pond water; however, the biphasic configuration eliminates the need to handle cost to dispose a large volume of hazardous waste. With the monophasic configuration, operational costs would be reduced; however, this arrangement would require more storage capability for hazardous waste and would require great expenditures for offsite disposal. The RWQCB can provide current costs, based on 2003 competitive bids, for assembly, operation and maintenance, and disassembly of the biphasic treatment system.*

**Response 3**

Under Alternative 1, biphasic treatment of pond water would continue to be performed by RWQCB using the current bi-phasic treatment system.

**Comment 4**

*Finally, USEPA should consider the potential problems with implementing each of the alternatives. The State's biphasic treatment system has operated successfully for the last five years. Confidence in the continued operation of the State's system (with some improvements) is high. The most significant unknown in Alternative 1 is the viability of a second system to treat AMD from the Channel Underdrain and Delta Seep year round. Short-term failures of a separate Channel Underdrain/Delta Seep treatment system would result in limited water quality effects. Alternatively, under Alternative 2, it appears that the entire AMD flow would be routed to a new monophasic system (see Comment 2, above), never operated during winter conditions. Additionally, requesting Atlantic Richfield Company, the State, or both parties to independently or jointly implement such a system*

*raises potential liability issues. While USEPA may not be concerned about such matters, implementation of Alternative 1 addresses the goals of the EECA and does not immediately raise the issue.*

*In summary, we strongly urge USEPA to select Alternative 1 as the early response action with the elimination of the permanent on-site hazardous waste repository. The State is prepared to discuss with USEPA the appropriate vehicle for implementing early response actions under the EECA. We also request that the EECA be modified to address the comments listed in this letter and enclosure.*

#### **Response 4**

EPA agrees with the comment regarding the uncertain reliability of a continuous flow treatment system during the winter and the undesirable consequences of inadvertent discharge of the highly contaminated Adit AMD. EPA also acknowledges that RWQCB and Atlantic Richfield have not resolved significant issues regarding liability at Leviathan Mine. In consideration of these comments, EPA's recommended alternative is to conduct initial year round treatment of CUD and Delta Seep flows, with a design that provides the capacity to expand the system to treat the combined flows from the Adit, PUD, CUD, and Delta Seep when and if the system proves reliable. Under this approach, Adit and PUD discharges would be treated in the pond water treatment facility during the summer season by RWQCB until the reliability of the year round treatment system is demonstrated. This initial operation phase allows the removal action and RI/FS to progress while Atlantic Richfield and RWQCB continue negotiations for a long-term resolution.

Regarding sludge management, EPA agrees that in the short term, sludge from the year round treatment system should be disposed of at an off site permitted facility. Again, this avoids the need to resolve administrative issues prior to implementing year round treatment. Nevertheless, EPA anticipates that an on site repository may become desirable to all parties as the treatment system is expanded to include treatment of Adit and PUD discharges.

#### **Specific Comments**

##### ***Comment 1***

*Section 7.2.1 Effectiveness – Conventional Lime Treatment, Compliance with ARARs, page 40. The Water Quality Control Plan for the Lahontan Region (Basin Plan) contains numerical water quality objectives (WQOs) for Leviathan and Bryant creeks. The WQOs include numerical standards for sulfate and Total Dissolved Solids (TDS). Table 4-1 of the EECA identifies Basin Plan WQOs as ARARs. According to EECA, it is expected that conventional lime treatment will be in compliance with ARARs for the site; however, we know that conventional lime treatment will not reduce sulfate and TDS enough to meet WQOs. This paragraph should be revised to indicate that conventional lime treatment would not be in compliance with WQOs for sulfate and TDS. Also, as a general comment regarding the effluent limits that will be applied to conventional lime treatment and the bioreactor system, it would be helpful if the EECA included a discussion on the expected effluent limits*

*for conventional lime treatment, the basis of those limits, and how those numbers compare to ARARs (including WQOs).*

**Response 1**

EPA has observed that effluent from each of the existing seasonal treatment systems (Bi-Phasic, Lime Lagoon and Aspen Seep Bioreactor) do not achieve numerical water quality objectives for sulfate and TDS. An alternative for meeting Basin Plan objectives for sulfate and total dissolved solids has not been identified during the Early Response Actions. EPA recognizes that the benefit of treating the AMD at Leviathan Mine to reduce metals loading is greater than leaving the AMD untreated. Thus, the current early response actions (ERA) have focused on effectively mitigating the acidity and reducing metals loading from AMD. Further, the alternatives identified in the EE/CA for AMD treatment are not likely to meet the numerical water quality objectives for sulfate and TDS. EPA believes that performance of year round treatment will provide the opportunity to assess the effectiveness of the treatment systems and explore enhancements that may result in meeting Basin Plan objectives.

The basis for effluent limits applied to the year round treatment system are provided in the Section V. 4.

**Comment 2**

*Executive Summary, page i, Site Location, first paragraph. Please clarify that the State of California owns approximately 475.5 acres of the mine site. Private parties and the USFS own the balance of the 656 acres.*

**Response 2**

EPA appreciates this clarification and correction.

**Comment 3**

*Executive Summary, page iii, Effect of Previous Treatment Trials on Leviathan Creek Water Quality and Aquatic Life, first paragraph, second sentence. We recommend changing the word "background" to "upstream."*

**Response 3**

EPA agrees that "upstream" would be a more accurate description. Since the geology of the Leviathan Mine area appears to be different from the upstream watershed, the water chemistry of the upstream portion of the creek may not provide an appropriate background value.

**Comment 4**

*Executive Summary, page iii, Effect of Previous Treatment Trials on Leviathan Creek Water Quality and Aquatic Life, second paragraph, fourth sentence. The number "200" needs to be revised to the appropriate year.*

**Response 4**

EPA appreciates this correction.

**Comment 5**

*Section 2, page 5, Physiography, first sentence. Replace "250 acre" with "656 acre"*

**Response 5**

EPA notes this comment for the record and for appropriate correction in future documents.

**Comment 6**

*Section 2.1.1, page 5, Physiography, sixth sentence. Please clarify whether the numbers for mean annual precipitation and pan evaporation are for the Leviathan/Bryant Creek watershed (both numbers seem high).*

**Response 6**

These values will be checked and corrected as appropriate in future documents.

**Comment 7**

*Section 2.1.4, page 7, Surface Water, second paragraph, second sentence states, "The confluence of these creeks is located less than ½ mile north of the Site, just north of the landslide on the mine property (Brown and Caldwell, 1983)". Please clarify that only a portion of the landslide is on State property, and that the confluence of Leviathan and Aspen creeks is on USFS property.*

**Response 7**

EPA notes this comment for the record and for appropriate correction in future documents.

**Comment 8**

*Section 2.1.6, Land Use. Please clarify that the State of California owns approximately 475.5 acres of the mine site. Private parties and the USFS own the balance of the 656 acres.*

**Response 8**

EPA notes this comment for the record and for appropriate correction in future documents..

**Comment 9**

*Section 2.2, Mining District History, seventh paragraph, last sentence. We recommend revising the sentence as follows: "Though LRWQCB conducted successful work on the evaporation ponds (meaning that the LRWQCB treated a sufficient volume of AMD during the 1999 field season to preclude pond overflow in 2000), in July 2000, USEPA issued an Administrative Abatement Action which provided for the performance by the LRWQCB of a removal action (including treatment of AMD contained in the evaporation ponds) during the 2000 field season.*

**Response 9**

EPA agrees that a clarification is warranted and this statement will be corrected as appropriate in future documents.

**Comment 10**

*Section 3.1.4, page 13, Actions by LRWQCB, fourth paragraph. The first sentence states that, "The effectiveness of the project was limited primarily by the three factors listed below" and cites a 1991 LRWQCB document as the source of this statement. Upon review of the 1991 LRWQCB document, it appears that the three bulleted items following the above-quoted statement misrepresent findings in the 1991 LRWQCB document. The 1991 LRWQCB document states, "Ongoing water problems are from three sources: 1) uncontrolled springs and seeps; 2) evaporation pond overflows; and 3) erosion of tailings into the creek channel." The EECA must be modified to eliminate the discrepancy between what the 1991 LRWQCB document states and what is stated in the EECA. The three bulleted items in the EECA should be replaced with the above quote from the 1991 LRWQCB document, so as not to mislead the reader. With regard to the third bullet, it would be more accurate to state that pond overflow occurred NOT because the pond sizes were reduced, but because the usable area at the site was limited.*

**Response 10**

EPA agrees that a clarification is warranted and this statement will be corrected as appropriate in future documents.

**Comment 11**

*Section 3.1.4 – the EECA fails to mention several important projects conducted by the LRWQCB since completion of the 1985 pollution abatement work, including the following:*

- a) *Installation and operation/maintenance of a lime treatment system to treat AMD contained in evaporation ponds to prevent pond overflow (installed July 1999, operation/maintenance is on-going);*
- b) *Installation, maintenance, and operation of continuous flow recording devices throughout the site and vicinity (commencing October 1998, monitoring is on-going);*
- c) *Monthly surface water quality monitoring (on-going);*
- d) *Construction and operation/maintenance of a semi-passive treatment system (bioreactor) sized to treat AMD emanating from the Aspen Seep (constructed 1996, renovated 1998, operation/maintenance through June 30, 2001);*
- e) *Site maintenance activities, including fence/gate repair, road re-surfacing, ditch cleaning, removal of sediment from Leviathan Creek Channel;*
- f) *Geotechnical assessment of the Delta Slope, and design of slope stabilization project (scheduled for construction during the 2004 construction season);*
- g) *Structural assessment of Leviathan Creek Channel for purposes of detecting the need for corrective actions (on going).*

*We recommend adding the above-listed items to provide a more accurate summary of LRWQCB work at the site.*

**Response 11**

EPA agrees that the LRWQCB work at the site has been extensive and should be reflected in future documents.

**Comment 12**

*Section 3.2.3, page 14, Aspen Seep Bioreactor System, second sentence. Please clarify that the "LRWQCB" constructed the original Aspen Seep bioreactor in 1996, and that the "LRWQCB" renovated the bioreactor system in 1998. UN worked under contract for the LRWQCB on both these projects.*

**Response 12**

EPA agrees that a clarification is warranted and this statement will be corrected as appropriate in future documents.

**Comment 13**

*Section 3.4.3, page 17, Combined Flow Treatment Study, second paragraph. The six different scenarios used during the combined treatment tests are listed. This comment addresses the last two scenarios. Under the first Combined Flow Treatment, Phase 2 – Part C test, the EECA states that the 1-point lime addition was used to treat combined flows through September 23, 2003. In the second Combined Flow Treatment, Phase 2 – Part C test, the Draft EECA states that 2-point lime addition was used to treat combined flows through September 29, 2003. After reviewing operator daily logs, sample CCS and daily notes recorded by LRWQCB staff, a discrepancy is apparent for the last two combined flow tests. The sources reviewed indicate the actual tests run were 2-point lime addition through September 23, 2003 and then 1-point lime addition through September 29, 2003.*

**Response 13**

This information will be checked and corrected as appropriate in future documents.

**Comment 14**

*Section 3.6.3, page 21, Summary of Effects of Previous Treatment Trials on Leviathan Creek Water Quality and Aquatic Life, first paragraph, second sentence. We recommend changing the word "background" to "upstream."*

**Response 14**

EPA agrees, as discussed in the response to an earlier comment.

**Comment 15**

*Section 6.4, Basis for Development of Removal Action Alternatives, page 36, last bullet, last sentence. Please change the word "approved" to "accepted."*

**Response 15**

EPA notes this comment for the record and for appropriate correction in future documents.

**Comment 16**

*On-site Disposal, page 44. The seventh bullet states, "...the sludge decreases to 50% water by weight after 2 to 4 weeks of drying time/denaturing in the existing pit charier." Review of Site operational data show that the sludge began denaturing at the end of treatment in mid-August and was sampled in early November. Analysis of sludge samples indicated the average moisture content of three samples being approximately 50% by weight. However, total drying time at the time of sample collection was approximately 12 weeks. It should also be noted that the drying/denaturing took place during optimum summer weather conditions.*

**Response 16**

EPA agrees that a clarification is warranted and this statement will be corrected as appropriate in future documents.

**Comment 17**

*Section 7.2.9, page 46, Cost-On-Site Disposal. In the distributed paper copy of the EECA, the paragraph titled Off-Site Disposal appears to have been cut off and does not continue into the text on page 47.*

**Response 17**

We apologize for the copy error. We understand that the document distributed electronically avoided this error.

**Comment 18**

*Section 7.5.2, page 57, Implementability-Enlarged Ponds. The first paragraph states that the existing pond water treatment facility has been in operation since 2000. The existing pond water treatment facility has been in operation since 1999.*

**Response 18**

EPA notes this comment for the record and for appropriate correction in future documents..

**Comment 19**

*Figure 1-1. No sampling stations are shown on the figure. The first sections of the EECA discuss surface water sample results by station number without any reference to a site diagram showing station locations. The figure with station locations found in the Additional Backup Materials section of the EECA, in the 2004 Herbist report, page 12, Figure 1, which has hand notations for station locations, could be very misleading when discussing Station 1 results.*

**Response 19**

Thank you for the suggestion for an improved and more useful graphic.

**Comments from William Jack Shaw, Brooke-Shaw-Zumpft for W.B. Parkland LLC**

**General Comments**

*Comment 1*

*At this time, W.B. Parkland neither favors nor opposes any particular remediation treatment proposal. Rather, it reminds the EPA, as well as all other interested parties, including ARCO and the State of California Water Resources Control Board, that water allocated to the River Ranch property, pursuant to the Alpine Decree, cannot be used by ARCO in its remediation efforts without our client's consent and permission.*

*My client has raised this issue on several occasions and has received no response or resolution. Neither ARCO nor the State of California Water Resources Control Board has contacted my client with a proposal or request for use of its water.*

**Response 1**

The year round treatment system will not result in consumptive use of the water. This treatment system will intercept the CUD and Delta Seep (total maximum flows up to approximately 0.1 cubic feet per second) and treat the intercepted water to remove metals and raise the pH. The treated water will then be returned to Leviathan Creek for use by downstream users with appropriate water rights under the Alpine Decree.

**Comments from Washoe Tribe of Nevada and California (Rob Greenbaum, Resources Policy Advisor)**

**Specific Comments**

**Decision-making Time-Frame and Process**

**EE/CA reference for Comment 1**

*p1. The alternative recommended in this EE/CA is considered an interim removal action of AMD scheduled to take place in 2005. However, during the summer of 2004 additional data will be collected to fill informational gaps associated with AMD treatment alternatives. Based on the data, the alternative that proves to be the most effective, reliable and implementable will be chosen.*

**Comment 1**

*Is the EE/CA decision going to be made after the submission of additional information collected in 2004? Will stakeholders have an opportunity to review the additional information first?*

**Response 1**

The EE/CA and decision to take a removal action are based on information available at the time the EE/CA was prepared (March 31, 2004). Information gathered after March of 2004 will be summarized in 2004 year end reports. The stakeholders will have the opportunity to review each of these documents. While this additional information may be incorporated into the removal action design, this information will not affect the decision to implement a removal action, and is not anticipated to significantly impact the removal action.

**EE/CA reference for Comment 2**

*p.35 In an on-going evaluation, sludge analyses for different treatment regimes (e.g., CUD/Delta Seep flow, Adit/PUD flow, and combined CUD/Delta Seep and Adit/PUD flow) will be conducted in 2004 to evaluate whether the treatment plant byproducts meet California nonhazardous waste criteria and to provide a comprehensive data set for the decision-making process for on- or offsite disposal. [See also p.47.]*

**Comment 2**

*When is sludge analysis expected to be completed? When will decisions be made? Will there be another EE/CA review period once the data is back, prior to the final decision being made?*

**Response 2**

The sludge analysis is expected to be completed by the end of 2004 and included in the year end reports. The objectives of the removal action will not be changed by information gathered in 2004. Currently available information shows that the sludge is likely to contain

metals at concentrations requiring sludge management as a California hazardous waste. The current decision of a phased alternative 2 anticipates that on site disposal will occur assuming the data collected during the initial phases demonstrate reliability and cost effectiveness. Off site disposal will occur in the initial phase of the action and will require temporary storage of sludge on site through winter months, similar to current practices. The removal action will be designed to provide for safe storage of sludge prior to performing off site disposal.

Although EPA has demonstrated its commitment to an open deliberative process throughout the Leviathan Mine project, there will not be another formal review of this EE/CA. The decision to address this action as a Non-time-Critical Removal Action rather than an interim Record of Decision was made in consultation with and at the urging of the Washoe Tribe, and one of the factors considered was the relatively limited formal review opportunities for the EE/CA process. EPA's determination is addressed in this action memorandum based on information contained in the draft EE/CA document, the comments received and the administrative record for the site.

### **EE/CA reference for Comment 3**

*p.36 The process of developing media-specific alternatives for the Site entailed a series of open meetings at which input was solicited from agency representatives and members of other interested groups.*

*The initial meeting in this process was held on December 4, 2003 at which technology options for capture and treatment of known AMD sources were developed and assembled into seven preliminary alternatives.*

- 1 The next alternative development meeting was held on January 14, 2004, at which no changes to the initial seven preliminary alternatives were made.*
- 2 The next alternative development meeting was held on February 5, 2004, at which four of the initial seven preliminary alternatives were removed based on 2003 ERA monitoring data and, the lack of technical feasibility to carry these alternatives forward. The remaining three alternatives were refined by including sub-options within the alternatives to reflect different conceptual descriptions for disposal and power.*
- 3 The alternatives developed from the previous meetings were reviewed at a working meeting on March 17, 2004. EPA and other project stakeholders approved the three conceptual alternatives as the final list of alternatives to be carried forward in the EEICA detailed analysis.*

### **Comment 3**

*These first three meetings were not open meetings. The Tribe was not invited, nor even made aware of them. As to the March 17 meeting, to which the Tribe and other natural resource trustees were invited, we were neither asked to, nor did we, approve anything.*

### **Response 3**

EPA agrees that the statement is imprecise as written. The meetings referred to were a

combination of two telephone discussions and one technical working meeting at which approaches to preparing the EE/CA were discussed. All stakeholders were informed that such preliminary discussions and meetings would occur, specifically at the TAC meeting in November, 2003, as noted in the minutes. EPA distributed the minutes of the one actual meeting in Reno (January 14, 2004) which included a discussion of the December 4, 2003, teleconference. A second teleconference was held on February 5, 2004.

The meetings did not involve approval of decisions. EPA does not make decisions regarding selection of removal action alternatives without input from the community and stakeholders. This response to comments provides documentation of input from stakeholders and the community received by EPA prior to making a decision.

### **Tribal Beneficial Uses**

#### **EE/CA reference for Comment 4**

*p.2 The following list summarizes the key characteristics in determining beneficial uses for the Leviathan Mine Site.*

- 1 No one lives at the mine site. The nearest residence is located about 16 miles of the Site.*
- 2 The mine is abandoned and inactive, but receives seasonally moderate recreational use by hikers, mineral collectors and deer hunters.*
- 3 There are no groundwater users in the Leviathan Mine Site area.*
- 4 The mine is located in a remote, mountainous scenic area approximately 16 miles from US Highway 395.*
- 5 Threatened species listed in the California Natural Diversity Database (CNDDDB, 2001) for the Topaz Lake quadrangle are bald eagles (*Haliaeetus leucocephalus*). Threatened, endangered, or sensitive plant species listed in the CNDDDB are valley sedge (*Carex vallicola*). Valley sedge was list listed as a rare plant, threatened, or endangered in California, but more common elsewhere.*
- 6 This mine is within the Bryant Creek watershed. Impacts to Leviathan and Aspen Creeks may affect downstream areas.*

#### **Comment 4**

*The Leviathan-Bryant Creek watershed is an important area for traditional and customary Tribal uses, including, but not limited to, gathering and hunting. Within this watershed, located along Bryant Creek from the Von Schmidt line down almost to the East Fork Carson River, are a number of Washoe Indian Pine Nut Allotments, which are held in trust by the United States for the benefit and use of various Tribal members. Some of these allotments potentially may be used as home sites by the allotment owners.*

#### **Response 4**

The EE/CA is intended to evaluate alternatives that when implemented as a removal action will quickly abate current releases of hazardous chemicals that threaten human health and the environment, as we can reliably identify such releases. The year round treatment system will attempt to capture and treat the AMD discharges from the channel underdrain (CUD) and

Delta Seep, removing the metal loading from these sources to Leviathan Creek. Implementing this treatment system will result in short term abatement of threats to human health and the environment, while the long term remedial investigation and feasibility study (RI/FS) continues to identify a long term remedy.

EPA recognizes that Washoe Tribe members historically used resources in the Leviathan and Bryant Creek watersheds. Further, EPA recognizes that future land use by members of the Washoe Tribe may occur. EPA will address issues related to future land and resource use in the long term RI/FS for the site.

**EE/CA reference for Comment 5**

pp.3, 26 *The EE/CA summarizes the beneficial uses for Leviathan Creek and Bryant Creek as defined by the Water Quality Control Plan for the Lahontan Region ("Basin Plan").*

**Comment 5**

*The Basin Plan's list, however, is deficient in that it does not include traditional and customary Tribal uses. For the purpose of evaluating the EE/CA, such Tribal uses must be considered as well.*

**Response 5**

The comment is correct in that traditional and customary Tribal uses are not specifically identified in the Basin Plan or EE/CA. The Basin Plan is not the only source of information that will be considered in development of the long-term Risk Assessment.

**ARARs**

*Note that the Tribe's comments regarding ARARs only relate to the non-time-critical removal action under consideration in this EE/CA. They are not intended to reflect Tribal input on ARARs for other removal actions or for the RI/FS.*

**EE/CA reference for Comment 6**

*Table 4-1 p. 1 Safe Drinking Water Act/40 USC § 300 National Primary Drinking Water Regulations/40 CFR Part 141/Establishes health based standards, maximum contaminant levels (MCLs), for public water systems. MCL's: The basin plan designates surface water in Leviathan and Aspen Creeks as a drinking water source for domestic and municipal use. While that is not a very realistic or likely use at this Site, we do plan to discharge treated water to the creek, and downstream users may draw the water into a public water system. Further investigation is needed to determine whether this is a relevant and appropriate requirement.*

**Comment 6**

*The Safe Drinking Water Act is in Title 42 of the United States Code, not Title 40, and it begins at section 300f, not section 300. The Basin Plan also designates Bryant Creek as a drinking water source. The Tribe believes the SDWA MCLs are ARARs. It's not clear what*

*further investigation is needed or will be conducted.*

**Response 6**

The comment is correct regarding the location of the Safe Drinking Water Act at Section 300f of Title 42 of the U. S. Code. Please refer to Section V.4. of this Memorandum regarding ARARs.

**EE/CA reference for Comment 7**

*p.28 The California "Antidegradation Policy" (Resolution 68-16), states that any discharge of waste into an existing high quality water must employ "best practicable treatment or control" necessary to assure that a pollution or nuisance will not occur, and the highest water quality consistent with maximum benefit to the people of the State will be maintained. The substantive portions of this policy may be applicable if there is a discharge to surface water or groundwater. The baseline groundwater data may determine that the groundwater below this site does not meet the definition of "high quality water" due to the acidic nature of the Leviathan Mine Site area. If this is the case, then the policy will not be considered an ARAR for groundwater on-site.*

**Comment 7**

*When will it be determined if groundwater does not meet the definition of "high quality water"? What about baseline surface water data? Again, this gets to aspects of when will decisions concerning the EE/CA be made and what further involvement by stakeholders will there be in such decisions? Will groundwater quality data be available prior to the EE/CA decision and would it be premature to make this decision prior to securing such data?*

**Response 7**

EPA agrees that the EE/CA misstated the issue of groundwater. Groundwater issues at Leviathan Mine will be addressed in the long term RI. Stakeholders will have numerous opportunities to comment on plans for any future groundwater investigations, reports containing groundwater data, and any subsequent decisions regarding how to address groundwater issues at Leviathan Mine.

The purpose of the EE/CA is to document site characteristics at the CUD, Adit, PUD and Delta Seep requiring a removal action, and to evaluate engineered alternatives intended to mitigate identified releases threatening human health and the environment. This EE/CA provides the information necessary to support a decision on year round capture and treatment of AMD at the site. Performance of year round treatment of AMD is the decision being made at this time.

**EE/CA reference for Comment 8**

*p.28 Water Code 1243 is also cited by the Department of Fish and Game. It provides that "recreation and preservation and enhancement of fish and wildlife resources is a beneficial use of water."*

**Comment 8**

*California Water Code 1243 should be an ARAR, as seems to have been suggested by the California Department of Fish and Game. However, it is not clear from the text cited above whether or not Atlantic Richfield is considering Water Code 1243 to be an ARAR; it does not appear to have been evaluated in Table 4-1.*

**Response 8**

EPA agrees that a clarification is warranted and this statement will be corrected as appropriate in future documents.

**EE/CA reference for Comment 9**

*pp.29, 32 The EE/CA mentions that Atlantic Richfield prepared a report entitled "Preliminary Human Health and Ecological Risk Evaluations: East Fork Carson River Near Bryant Creek, Douglas County, NV" (Mancini et al., 2002).*

**Comment 9**

*During the Leviathan Mine Council meeting on November 18, 2002, in Sacramento, EPA made it clear that this East Fork Carson River preliminary risk evaluation ("EFCR PRE") is a draft document, even though the word "draft" does not appear anywhere on the document. The EFCR PRE has not been critically reviewed by EPA, nor has it been approved by EPA. Therefore, it should not be used to support the EE/CA or any other work plans, proposals, decisions, and so forth.*

**Response 9**

The comment is correct in that the draft East Fork Carson River preliminary risk evaluation is draft and has not been formally reviewed by EPA. EPA agrees that a clarification is warranted and this statement will be corrected as appropriate in future documents. However, the results of this risk assessment were not used in the EE/CA to determine the need for a removal action or to identify cleanup levels.

**EE/CA reference for Comment 10**

*p.30 Protection of Cultural Resources*

**Comment 10**

*Among other things, the National Historic Preservation Act requires consultation with the Washoe Tribe and consideration of mitigation measures.*

**Response 10**

As with all federal agencies, EPA is bound by the applicable provisions of the National Historic Preservation Act. EPA's practice is to consult with the Tribe whenever there is a potential that Native American cultural artifacts or areas containing Native American artifacts will be disturbed. The non-Time Critical Removal Action will involve construction in a severely disturbed area of waste rock disposal that has been subject to construction activity since the 1980s. Native American artifacts have not been observed during the construction activity, and the Washoe Tribe has not previously identified any concerns regarding historic preservation where active mining disturbance currently exists. EPA will seek consultation with the Tribe regarding preservation of historic resources prior to any activities in previously undisturbed or minimally disturbed areas of the site.

**EE/CA reference for Comment 11**

*p.43 Compliance with ARARs. It is expected that the proposed bioreactor will be in compliance with ARARs for the Site. Activities conducted under CERCLA authority typically can provide for some exemptions if necessary for certain constituents.*

**Comment 11**

*The second sentence of the above paragraph does not appear under sections on compliance with ARARs for other treatment technologies. Is there some constituent in the bioreactor treatment that may need to be exempted from any ARARs?*

**Response 11**

EPA has observed that effluent from each of the existing seasonal treatment systems (Bi-Phasic, Lime Lagoon and Aspen Seep Bioreactor) do not achieve numerical water quality objectives for sulfate and TDS. An alternative for meeting Basin Plan objectives for sulfate and total dissolved solids has not been identified during the Early Response Actions. EPA recognizes that the benefit of treating the AMD at Leviathan Mine to reduce metals loading is greater than leaving the AMD untreated. Thus, the current early response actions (ERA) have focused on effectively mitigating the acidity and reducing metals loading from AMD. Further, the alternatives identified in the EE/CA for AMD treatment are not likely to meet the numerical water quality objectives for sulfate and TDS. EPA believes that performance of year round treatment will provide the opportunity to assess the effectiveness of the treatment systems and explore enhancements that may result in meeting Basin Plan

objectives.

The basis for effluent limits applied to the year round treatment system are provided in the Section V. 4.

**EE/CA reference for Comment 12**

p.46 Compliance with ARARs

*On-site disposal would comply with ARARs and also achieve removal action objectives.*

**Comment 12**

*Similar statements about compliance with ARARs are included throughout the discussion of alternatives in the EE/CA. Such statements do not explain how the particular treatment technology (in this case, on-site disposal) would comply with various ARARs. In comparison, the statement on compliance with ARARs for Diesel Generator Power (p.48), provides at least minimal explanation.*

**Response 12**

EPA agrees with this comment that the ARARs statements in the EE/CA are minimal and warrant at least some additional discussion. Section V. 4. provides EPA's analysis of ARARs and the RI Report will include a more thorough analysis.

**Alternatives**

**Comment 13**

*Throughout the alternatives discussion, conventional lime treatment is discussed. However, it is unclear whether this refers to the current biphasic lime neutralization treatment plant or a new monophasic treatment plant. This needs to be clarified.*

**Response 13**

Conventional lime treatment refers to either biphasic or monophasic treatment, both of which raise the pH of AMD by addition of lime. In either instance, the discharge requirements should be attained. Sludge volumes and disposal issues have been discussed previously. Detailed design issues will be addressed in the future.

**EE/CA reference for Comment 14**

*p.34 No action was included as a baseline for evaluation purposes.*

**Comment 14**

*What does "No action" mean? Since the purpose of this EE/CA was to develop alternatives to add winter capture and treatment of all identified AMD sources, presumably "No action" should mean simply that this component would not be added to the already established seasonal capture and treatment that has operated over the past few years (and which will be in place again in 2004). EPA has made it clear that, at a minimum, the current early response action regime would be continued. That alternative has not been evaluated in this EE/CA, a substantial deficiency in the document as it precludes a realistic comparison of alternatives with the status quo. This point was raised by the Tribe at the March meeting of the Leviathan Mine Technical Advisory Committee.*

**Response 14**

The commenter is correct that 'no action' refers to no action from this evaluation, but that the current early response action program would continue.

**EE/CA reference for Comment 15**

*p.41 All necessary equipment and personnel are available or easily obtainable for installation, operation and monitoring of a water treatment system including an outside laboratory testing facility to verify discharge effluent is meeting water quality objectives identified in EPA's RAM (EPA, 2001).*

**Comment 15**

*Is Alternative 1 capable of being made operational in 2004 instead of waiting until 2005? If so, the value of achieving year round capture and treatment a year early should be considered when comparing alternatives. For instance, if Alternative 1 could be operable in 2004, the currently identified AMD sources would be out of the creeks a year earlier. Alternative 2 would provide more regular water flows, which may be better for habitat recovery, though Alternative 2 could not be implemented for another year.*

**Response 15**

Alternative 1 could not be made operational in 2004; design and construction could not be completed during the remaining 2004 field season.

**EE/CA reference for Comment 16**

*p.46 Administratively feasible, however the ease of attainability of a participation agreement between LRWQCB and Atlantic Richfield for technologies that combine all four AMD sources may pose a potential problem.*

**Comment 16**

*This statement applies to the On-Site Disposal option for sludge management. Similar statements appear throughout the EE/CA when discussing other removal action components. However, nowhere is there any explanation of what the potential problems are in reaching an agreement between Atlantic Richfield and the LRWQCB, how likely or unlikely it is that an agreement will be reached, and by when an agreement must be reached. The EE/CA provides no information with which to evaluate this issue.*

**Response 16**

Comment Noted. If the initial phase of year round on-site treatment of the CUD and Delta Seep proves reliable, EPA intends that a combined flow, year round system will be implemented. This phased approach has been discussed in response to the issues raised by LRWQCB. EPA believes that in responding to the LRWQCB concerns after actual operational experience will facilitate agreement in a timely manner.

**EE/CA reference for Comment 17**

*p.46 costs for on-site disposal assume the sludge material has been characterized as hazardous and therefore the bottom liner system assumes a double line/leachate collection/leak detection system for complete containment.*

**Comment 17**

*In the past, LRWQCB has taken hazardous sludge off-site for disposal and has only disposed of non-hazardous sludge on-site. What is the reason for potentially allowing on-site disposal of hazardous sludge? Are the design elements discussed in this statement sufficient for meeting all ARARs? What are the potential ramifications of siting a hazardous waste disposal facility at Leviathan Mine? Might a hazardous waste disposal facility built in the pit preclude potential long-term remedies (which have not been identified since the RI/FS has not been completed)? If a long-term remedy were selected which would require the on-site hazardous waste disposal facility to be removed, what problems might be encountered in doing so and how difficult and costly would it be to remove the on-site disposal facility?*

**Response 17**

If issues regarding on-site disposal of sludges could be resolved, there would be a reduction in the risks and costs involving bulk handling and transport of the material. The on site repository for sludge would be designed to comply with ARARs. At this early stage, it is not anticipated that a disposal area within the pit would interfere with current or future activities. A repository design would need to consider potential future plans for reducing infiltration, highwall stabilization and increasing revegetation efforts. If a repository were to be built and if it were later determined to remove the facility, there would be additional costs to handle and transport both the waste material and waste generated by the repository construction material. However there might be offsets to the costs due to economy of scale for removing material accumulated over multiple years.

EPA has determined that sludge that does not meet California's threshold quality will be disposed off site in the initial phase of the removal action. However, it is anticipated that sludge may be disposed of on site in an appropriately designed repository in the future.

**EE/CA reference for Comment 18**

*p.47 The short-term effectiveness is high once the wastes are loaded and transported off-site to a RCRA C hazardous waste landfill.*

**Comment 18**

*It is unclear whether under the off-site disposal option it is assumed that all sludge would be hazardous and would therefore be shipped to a hazardous waste landfill. This again raises the question of whether the lime treatment will be biphasic or monophasic.*

**Response 18**

Initially, the sludge from year round treatment of CUD and Delta Seep will be disposed of off site, and the biphasic treatment sludges from the Adit and PUD AMD will continue to be handled as they have been in the past. When and if the CUD, Delta, Adit and PUD are combined in one treatment system, the sludge would likely need to be disposed off site, depending on the sludge chemistry. However, if administrative, regulatory and technical issues can be resolved, on site storage of sludge may be considered. For the purposes of this EE/CA, the year round lime treatment system is anticipated to be a monophasic system.

**EE/CA reference for Comment 19**

*p.50 Typical lead time to design and fabricate this type of power system can be anywhere between 12 to 18 months not including installation. This is much longer than the time it would take to design and order a diesel generator power system.*

**Comment 19**

*If the wind power evaluation will still be ongoing through 2004 (p.18), and if it takes this long to design, fabricate, and install a wind turbine system, is it even feasible to use wind power during the first year of operation? If not, is it still being looked at as a possibility for subsequent years?*

**Response 19**

Wind power is being evaluated as a possibility for powering the year round treatment system.

**EE/CA reference for Comment 20**

*p.51 Administrative feasibility for one treatment system will require an operating agreement between Atlantic Richfield and LRWQCB. Executing this agreement in the timeframe associated with this interim removal action may pose a potential problem.*

**Comment 20**

*This statement - under the discussion of conventional lime treatment under Alternative 2 - mentions that there may be a problem getting the agreement done in time. However, it doesn't give any idea of when the agreement needs to be in place by or how difficult this is expected to be and why.*

**Response 20**

The year round treatment system will be designed to allow expansion to treat the combined flows from the Adit, PUD, CUD, and Delta Seep. However, the initial operations will treat the CUD and Delta Seep flows year round. Adit and PUD discharges will be treated in the pond water treatment facility during the summer season. Once the reliability of the year round treatment system is demonstrated, addition of the PUD and Adit flows to the year round treatment system will be evaluated. This initial operation phase removes the need for Atlantic Richfield and RWQCB to negotiate an agreement prior to performing year round treatment. Once Atlantic Richfield and the RWQCB reach an agreement and winter season operations are proven feasible, combined year round treatment can occur.

**EE/CA reference for Comment 21**

*p.52 For simplicity of this EE/CA evaluation it was assumed that one on-site disposal repository was sufficient for analysis. However, it may be necessary to construct two on-site disposal facilities (one for byproducts generated by Adit/PUD flow and one for CUD/Delta Seep flow) if LRWQCB and Atlantic Richfield may not reach a participation agreement.*

**Comment 21**

*Are two sludge repositories potentially needed for both Alternatives 1 and 2, or just for Alternative 2? (Alternative 1 also requires an agreement with LRWQCB if on-site sludge storage is used.) Has the possible need for 2 sludge repositories been evaluated under the cost for Alternative 2? This also raises questions again about whether either alternative relies upon biphasic treatment. If so, will some of the sludge be non-hazardous?*

**Response 21**

A single sludge repository is envisioned in the EE/CA. Initially, sludge from year round treatment will be disposed of off site. However, sludge generated during the winter months will likely require temporary on site storage until road conditions permit off site transport each spring. Based on combined flow treatment trials conducted in 2003, monophasic sludge from treatment of combined flows may be suitable for on site disposal in a designed repository.

**EE/CA reference for Comment 22**

*p.57 The existing pond water treatment system has operated since 2000 having demonstrated the technical feasibility in past ERAs conducted at the Site ....*

**Comment 22**

*Here, when discussing the technical feasibility of Alternative 3 - Option 1, the EE/CA relies on the performance of the existing pond water treatment system, which is the biphasic lime neutralization plant. This implies that the conventional lime treatment for Alternative 3 - Option 1 will use the biphasic plant. Is the same true for the conventional lime treatment components of the other alternatives?*

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**Response 22**

Both monophasic and biphasic lime treatment can be performed using the existing treatment plant at Pond 1. Monophasic lime treatment in a yet to be constructed treatment plant near Pond 4 is envisioned during year round treatment.

**EE/CA reference for Comment 23**

*p.57 Administrative Feasibility*

*Pond water treatment is currently approved for AMD capture and treatment at the site, suggesting an enlarged system should be administratively feasible. However distinct disadvantages are apparent at this time. For instance, the storage of precipitation (rain and snow) during winter months and the evaporation of AMD sources collected in the Ponds during summer months, changes the flow pattern of the creek with respect to downstream residents. This alternative presents water rights and beneficial use issues that may not be easily rectified among the various project stakeholders in the future.*

**Comment 23**

*This issue is not discussed under Alternative 1, even though Alternative 1 involves some seasonal storage of water, though less than Alternative 3 - Option 1. A comparison of this issue between all the alternatives (including the "no action" alternative of continuing the 2001-2004 early response actions) would be helpful in evaluating the alternatives.*

**Response 23**

EPA agrees that a clarification is warranted and this discussion will be expanded as appropriate in future documents.

**EE/CA reference for Comment 24**

*p.61 Alternative 2 was deemed the foremost effective, reliable, implementable, and cost-effective alternative. However, the ease of attainability of a participation agreement between LRWQCB and Atlantic Richfield for a technology that combines all four AMD sources may pose potential issues in implementing this alternative. Therefore, Alternative 1*

would be the next recommended alternative ....

**Comment 24**

*However, Alternative 1 also apparently requires an agreement with LRWQCB if on-site sludge storage is used (see p.46). The other alternatives also require an agreement. The only alternative that apparently would not require an agreement would be Alternative 1 with Off-Site Disposal of sludge. The ability to reach an agreement between LRWQCB and Atlantic Richfield seems to be a significant issue, yet it is not explained in the EE/CA. If LRWQCB and Atlantic Richfield cannot come to terms in time, does EPA have the authority to modify its orders to each party to require each party to abide by certain terms (e.g., requiring the parties to cooperate with each other or allocating costs and responsibilities among the parties or whatever the issue is.) to effectuate an efficient cleanup?*

**Response 24**

EPA has authority to modify its orders to the potentially responsible parties should this be necessary.

**Miscellaneous**

**EE/CA reference for Comment 25**

*P.9 In 1997, EPA became involved in the Site, at the request of the Washoe Tribe, concerned about the potential for acidic water to flow out of evaporation ponds that LRWQCB constructed on-site.*

**Comment 25**

*It was not the potential for pond overflows that concerned the Tribe, but rather actual overflows taking place over a number of years. Actual overflows continued through 1999. The Tribe's concern also stemmed from other sources of acid mine drainage, such as Aspen Seep, Delta Seep, and the channel underdrain, and the build-up of contaminated sediment, as well as potential impacts to resources from other pathways, such as air.*

**Response 25**

EPA notes this comment for the record and for appropriate correction in future documents.

**EE/CA reference for Comment 26**

*p.33 The environmental pathways by which contaminants in the mine water mobilizes are: discharge of acid water from the Adit, PUD, CUD and Delta Seep into Leviathan Creek and discharge of Aspen Seep AMD into Aspen Creek.*

**Comment 26**

*This statement should begin, "The known environmental pathways . . . ."*

**Response 26**

EPA agrees that a clarification is warranted. EPA notes this comment for the record and for appropriate correction in future documents.

**EE/CA reference for Comment 27**

*p.39 Chemical precipitation (conventional lime treatment system) can be an effective technology for removing dissolved metals from AMD. Effectiveness and reliability for similar water treatment systems operated by the State and Atlantic Richfield were proven in the 2002 and 2003 ERAs at the Site. The laboratory analytical results indicated that treated discharge concentrations of dissolved metals were below effluent discharge objectives, throughout the project, identified in EPA's RAM (EPA, 2001). While no metal met all standards at all stations in the Pre-Pond, NonERA water treatment (1998-1999), all metals met all standards at all stations in the 2002 and 2003 ERAs with the exception of Station 15 for aluminum. (Background concentrations at Station 1 for aluminum consistently exceeded lowest applicable standards, indicating aluminum occurs naturally at elevated concentrations.) The average dissolved aluminum, arsenic, iron, and nickel concentrations were 58% (arsenic) to 96% (aluminum) lower than the EPA's RAM discharge objectives at Station 15 during the 2002 ERA compared to Pre-Pond, Non-ERA water treatment (1998-1999). Concentrations at Station 1 were consistent over the four time periods (see Section 3.6.3 and Appendix B), and concentrations at Stations 15 and 23 showed slight progressions downward (Station 23 more of a progression than Station 15) indicating the positive effect of treatment on the water quality in Leviathan and Aspen Creeks.*

**Comment 27**

*The paragraph quoted above is somewhat hard to follow. In addition, it appears to be inconsistent with a similarly confusing discussion of previous sampling results on page 22. On page 39, as quoted above, the EE/CA states that "all metals met all standards at all stations in the 2002 and 2003 ERAs." (The only exception given is for aluminum at Station 15.) However, on page 22, the EE/CA says that iron "gets close to meeting Standards" in 2002 (i.e., iron did not meet the 2001 Removal Action Memorandum Standards in that year). Clearly, one of these statements is inaccurate.*

*In addition, this paragraph does not address pH, which should be taken into account when evaluating human health and ecological risk.*

**Response 27**

The comment is correct in that the text is confusing and possibly contradictory. However, analytical results from the treatment system effluent for 2002 and 2003 ERAs show that the treatment system effluent met the discharge objectives identified in the removal action memorandums. Treatment system effluent discharged during the 2002 and 2003 ERAs also

met Basin Plan requirements for pH (the pH was between 6 and 8.5).

EPA notes this comment for the record and for appropriate correction in future documents.

**EE/CA reference for Comment 28**

*p.40 This treatment would provide moderate to high protection of human health and the environment by reducing exposure of untreated AMD.*

**Comment 28**

*This statement regarding Alternative 1 is unsupported, misleading, and inaccurate. Moreover, similar statements are repeated throughout the EE/CA's discussions (in both the text and tables) on the "Overall Protection of Human Health and the Environment" afforded by the various technology options. Undoubtedly, treatment will provide better protection of human health and the environment than doing nothing, and it's entirely possible that it could afford a "moderate to high" level of protection. Yet the EE/CA's statement makes a determination on an unspecified absolute scale, without providing any basis to support, or describe the use of, such rankings. What do "moderate" and "high" mean, and on what risk-based research are these labels based? The meager discussion of treatment standards on page 39 hardly qualifies as support for such a bold statement. Moreover, the treatment standards are only aquatic life criteria - they are not risk based standards relevant to human health. As noted above, the treatment standards discussed contain a discrepancy and do not include pH standards, which Station 15 met only once (p.22). Such broad pronouncements are also premature because they do not consider risks from other sources, such as contaminated sediments. Additionally, statements about how much a particular treatment technology will protect human health and the environment are premature prior to consideration of the Washoe exposure scenario (expected January 2005).*

**Response 28**

EPA notes this comment for the record and for appropriate correction in future documents.

**Comments from U. S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office  
(David L. Harlow, Acting Field Supervisor)**

**General Comments**

***Comment 1***

*Although the removal action alternatives presented in the Engineering Evaluation/Cost Analysis (EE/CA) report are conceptual, the Service believes that some basic information should have been included to ensure complete understanding of the possible alternatives. Examples of information omitted in the report that would have led to a more comprehensive understanding of the possible alternative removal actions are as follows:*

- 1 A more comprehensive description of the lime treatment system*
- 2 A figure of the sample/station locations on the site*
- 3 A more comprehensive description of the existing storage capacity of the ponds*
- 4 A brief description of contingency plans*

**Response 1**

Thank you for your suggestions to improve the communication of important information. EPA intends on developing contingency plans, sampling plans, including locations, and detailed description of the treatment system in the design phase of this process. An analysis of the existing ponds, analysis of future pond expansion, and a pond expansion geotechnical study is expected to be performed during the RI/FS. EPA believes that the EE/CA provided sufficient information to allow a determination on year round treatment options.

***Comment 2***

*The Service would also like to provide the following information regarding federally listed species on the site. Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*) are listed as threatened under the Endangered Species Act and historically were in all accessible cold waters of the Lahontan basin, in a wide variety of water temperatures and conditions. Currently there is no conclusive information of the presence or absence of the Lahontan cutthroat trout (LCT) at the site. However, the Leviathan and Bryant watersheds would be suitable habitat for LCT were it not for the Leviathan mine and other anthropogenic activities.*

**Response 2**

EPA notes this comment for the record and for appropriate inclusion in future documents.

***Comment 3***

*The Service recommends the selection of alternative 2 as the next early response removal action. It is the only alternative with year round treatment, discharging treated water in a somewhat flow-through system. Thus, this alternative has the most potential of improving*



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*and stabilizing the hydrology at Leviathan Creek and adjacent watersheds. With this remediation, a more constant year round discharge of treated water would help improve year round water chemistry and flow, thereby increasing the natural attenuation of sediment contamination. Improvement of the riparian corridor will be more supportive to attaining a more viable habitat for aquatic and terrestrial fauna and flora.*

**Response 3**

EPA agrees with the analysis of some of the advantages of alternative 2.

**Comments during Leviathan Mine Community Meeting presenting the Proposal for Year Round Treatment System Engineering Evaluation/Cost Analysis. May 4, 2004, in Gardnerville, Nevada.**

A community meeting was held in Gardnerville at the Carson Valley Middle School Library on May 4, 2004. The purpose for the meeting was to obtain input on an Engineering Evaluation and Cost Analysis of alternatives for conducting year round treatment of acid mine drainage from the Leviathan Mine Superfund Site. The meeting was opened by Mr. Kevin Mayer of the USEPA, and included a presentation of the EE/CA by Atlantic Richfield. The following text summarizes the discussion. Individuals who asked or responded to questions are identified in parentheses.

***Comment 1 (David Griffith, Community Member)***

*Will proposed Alternative 3, Option 1, only rely on evaporation? This has not been a very successful alternative in the past.*

**Response 1 (Dan Ferriter, Atlantic Richfield Company [Atlantic Richfield])**

The option of increasing pond size or covering the ponds during the winter would be used with seasonal treatment - operating during the summer months.

***Comment 2 (Kevin Mayer, U. S. Environmental Protection Agency [EPA])***

*What is the feasibility of operating a treatment plant during the winter weather? What is the potential for freezing, would the pipes be constructed underground, and would the system be located in a heated building?*

**Response 2 (Mr. Ferriter, Atlantic Richfield, and Monika Johnson, EMC<sup>2</sup>)**

It would be necessary for an operator to periodically check system operations. Operation of a treatment system requires maintaining lines during both the summer and winter months. It would be necessary to store adequate materials on-site at Leviathan Mine so that replacement materials are available as needed during the winter months. The use of a satellite system would be evaluated, which could provide contact with the site and notification in the event of failure, where emergency shut down could occur. The design of the system has not been completed, although fail-safe measures would be included.

***Comment 3 (David Griffith, Community Member)***

*What would happen if a pump fails?*

**Response 3 (Mr. Ferriter, Atlantic Richfield and Ms. Johnson, EMC<sup>2</sup>)**

Due to the topography of the site, it would be necessary to use fail-safe measures, such as back-up pumps. In regards to power sources, adequate generators would be used in order to meet supply and demand.

**Comment 4 (Mr. Mayer, EPA)**

*Was using the larger pond evaluated as an alternative?*

**Response 4 (Ms. Johnson, EMC<sup>2</sup>)**

Due to the short time frame for completing the EE/CA and evaluating the alternatives, it will be best to use Pond 4.

**Comment 5 (Mr. Griffith, Community Member)**

*Were the costs for the alternatives both discounted and inflated?*

**Response 5 (Mr. Ferriter, Atlantic Richfield and Ms. Johnson, EMC<sup>2</sup>)**

Yes, the costs were prepared according to EPA guidance. All developed alternatives could be implemented. An evaluation of the time constraint for implementing the alternatives was also considered. All alternatives have either been tested before or are proven technology throughout the states. Operator health and safety has also been thoroughly considered.

**Comment 6 (Community Member)**

*Is Atlantic Richfield going to carry through with their financial responsibility for remediating the site?*

**Response 6 (Mr. Ferriter, Atlantic Richfield)**

Atlantic Richfield and the State of California are negotiating allocation of responsibilities and costs.

**Comment 7 (Mr. Mayer and Vicki Rosen, EPA)**

*EPA would like to see Atlantic Richfield and the State come to an agreement prior to beginning the project, so that the implementation of a remedy is not affected by determining financial responsibility. EPA understands there is a process to settle matters, such as determining financial responsibility. The chosen short-term alternative would certainly help with the long-term treatment. All alternatives being discussed are large investments. Although EPA cannot commit to a long-term remedy at this time, there is a possibility that the short-term alternative could be worked into the long-term solution.*

**Response 7**

The comment was noted. A response to this comment was not warranted or provided.

**Comment 8 (Ms. Rosen, EPA)**

*If a short-term treatment system is installed at the site, including a satellite notification system, what are the scenarios in the event an operator could not reach the site for some time?*

**Response 8 (Mr. Ferriter, Atlantic Richfield)**

One option would be the use of an overflow pond. This project is at the conceptual planning level, and that during the actual design stage these types of scenarios would be reviewed to determine the best fail-safe procedures, such as the use of backup pumps and surge pumps.

The use of a combined treatment system, such as Alternative 2 and 2a, would lower operations and maintenance (O&M) costs, although the initial capital outlay would be higher. Using two treatment systems, such as Alternative 1, would have lower capital outlay, although O&M costs would be higher. If Atlantic Richfield and the State cannot come to terms, it might be necessary to use two treatment systems.

*Comment 9 (Mr. Mayer, EPA)*

*What about the additional lime storage and how to handle clogged lines?*

**Response 9 (Mr. Ferriter, Atlantic Richfield)**

The first year of operation will provide valuable input. It might take a period of time to get things right, and there will be a continual learning curve due to site conditions. Even though lime treatment has been around for decades, the current work being completed at Leviathan Mine has offered many learning opportunities.

*Comment 10 (Mr. Mayer, EPA)*

*In reference to Dr. Herbst's biological work, even though treatment has occurred during only the summer months, improvement has occurred to aquatic insects in Bryant Creek.*

**Response 10**

The comment was noted. A response to this comment was not warranted or provided.

*Comment 11 (Rob Greenbaum, Washoe Tribe of Nevada and California)*

*The biological work and improvement to Bryant Creek is a positive trend.*

**Response 11**

The comment was noted. A response to this comment was not warranted or provided.

*Comment 12 (Mr. Mayer, EPA)*

*Taking the first steps, such as the bioreactor system, is helping. Even if there were a failure within the short-term treatment for a couple of months, improvement would still occur during the time the system is in operation.*

**Response 12 (Mr. Ferriter, Atlantic Richfield)**

Due to site conditions for O&M, it is important to use more automation than manpower when designing the system.

**Comment 13 (David Park, W. B. Park Land Company)**

*What is the feasibility of transporting supplies or contractors to the site during the winter months?*

**Response 13 (Mr. Mayer, EPA, and Mr. Ferriter, Atlantic Richfield)**

The capacity of the ponds was discussed. Even during high precipitation periods, the ponds would have capacity to hold the drainage and precipitation in the event of system failure. There are avenues for engineering fail-safe procedures. The bioreactor system operator travels to the site almost every month during the year. The bioreactor system is very low tech and proving to be an innovative concept.

**Comment 14 (Steve Brooks, U. S. Forest Service [USFS])**

*The EE/CA is vague regarding the winter access to the site. It would be quite helpful to determine the types of vehicles necessary to get to and from the site.*

**Response 14 (Ms. Johnson, EMC<sup>3</sup>)**

There are many transportation alternatives to get to and from the site including snowplows, snow cats, or snowmobiles. Adequate supplies would be stored at the site. In addition, the EE/CA estimated the winter season as being seven months long versus the typical five or six.

**Comment 15 (Mr. Brooks, USFS)**

*In the event roadway improvements were needed, the Forest Service would not take on responsibility for these changes or improvements.*

**Response 15 (Mr. Mayer, EPA, and Mr. Ferriter, Atlantic Richfield)**

In the event changes were necessary to the roadway, this would need to be discussed and determined by all parties. It is important to remember that there are many ways to engineer the design, such as using evaporation ponds.

**Comment 16 (Mr. Mayer, EPA)**

*Is it anticipated that large vehicles would be used during the winter?*

**Response 16 (Mr. Ferriter, Atlantic Richfield)**

It is anticipated that large vehicles would not be necessary during the winter, and would not pose a roadway problem.

**Comment 17 (Mr. Mayer, EPA)**

*How does the current road maintenance work regarding the vehicles to and from the mine at this point?*

**Response 17 (Mr. Brooks, USFS, and Mr. Ferriter, Atlantic Richfield)**

The Forest Service maintains the roads under a current summertime access road agreement. There is a lot of flexibility in treating the combined flow or using pond water storage, and it is Mr. Ferriter's opinion that there are more risks to increasing pond sizes or using a cover as an option.

**Comment 18 (Mr. Mayer, EPA, and Chris Stetler, RWQCB)**

*Mr. Mayer and Chris Stetler discussed their observations of the pond surface elevation increase during the winter months as well as the evaporation. Mr. Mayer requested a copy of the predictions regarding precipitation, drainage, and evaporation.*

**Response 18 (Mr. Ferriter, Atlantic Richfield)**

The request was noted.

**Comment 19 (Mr. Mayer, EPA)**

*What are the details on the pond cover?*

**Response 19 (Mr. Ferriter, Atlantic Richfield)**

The pond cover is innovative and offers a good concept to keep out precipitation. It is difficult to engineer the pond cover to protect it from winds and large snowfall, which could result in failure. The issue of operators having limited access to the site during the winter months raises an issue regarding O&M of the cover. If precipitation causes stress on the cover, the issue of getting people to the site would be important. Direct precipitation would not cause a sludge issue or a need to treat the precipitated water, it only adds to volume.

**Comment 20 (Mr. Mayer, EPA)**

*One factor to consider is how much operator time would be necessary at the site if a pond cover was used to collect and store all the acid mine drainage, followed by running the treatment plant once the access roads are clear. Dealing with snowdrifts would not be an issue during the dry months. Please provide clarification on the necessary manpower and access issues.*

**Response 20 (Mr. Ferriter, Atlantic Richfield and Ms. Johnson, EMC<sup>2</sup>)**

Operational risk scenarios are increased with the use of pond storage. With the need to store drainage from the Channel Underdrain and Delta Seep, O&M would increase due to the volume of water that would require treatment in order to maintain sufficient storage capacity. Just keeping the covers up is very labor intensive. It is necessary to take into consideration ice, snow,

wind, and animals, which present operator health and safety concerns.

**Comment 21 (Mr. Park, W. B. Park Land Company)**

*Many agricultural areas use pond covers to conserve water, although it is necessary to cut vents in the covers, which defeats the purpose of water conservation since water is lost to evaporation.*

**Response 21**

The comment was noted. A response to this comment was not warranted or provided.

**Comment 22 (Mr. Stetler, RWQCB)**

*If liner use were chosen, a removable liner is recommended.*

**Response 22**

The comment was noted. A response to this comment was not provided.

**Comment 23 (Mr. Griffith, Community Member)**

*What would be the structural capability of expanding the ponds?*

**Response 23 (Mr. Ferriter, Atlantic Richfield)**

This would need to be determined during the design phase of the project.

**Comment 24 (Mr. Park, W. B. Park Land Company)**

*The W. B. Park Land Company is concerned with using an evaporation method because this water belongs to downstream users. Water use is governed by the Alpine Decree. W. B. Park Land Company is not sure why this has not been addressed as part of this remediation.*

**Response 24 (Mr. Mayer, EPA)**

It is important to remember that alternatives being discussed include treating the water all year as it comes out of the mine. The water would then be drained back into the creek at the same rate it comes out of the mountain. Another option would be to store the drainage and treat it during the summer followed by releasing it into the creek.

**Comment 25 (Mr. Brooks, USFS)**

*USFS is concerned regarding contingencies in the event of a system failure.*

**Response 25**

The comment was noted. A response to this comment was not provided.

**Comment 26 (Mr. Park, W. B. Park Land Company)**

*The W. B. Park Land Company cannot irrigate during the winter months, and they are concerned with storing the drainage water or possible evaporation during the summer months. Please provide details regarding water flow for the winter and summer months. This is important because water is valuable.*

**Response 26 (Mr. Stetler, RWQCB)**

Taking water out of the ponds and releasing to the creeks during the summer months would present a value for irrigation or other downstream use.

**Comment 27 (Mr. Park, W. B. Park Land Company)**

*River Ranch [operated by the W. B. Park Land Company] is only entitled to use the water during the irrigation season; winter water is valuable for other uses, such as Lahontan Lake.*

**Response 27 (Mr. Mayer, EPA)**

It seems as if there are tradeoffs by holding back a portion of the flow and then treating and discharging during the summer. Even if some water were lost to evaporation, more water would be available during July, August, and September.

**Comment 28 (Mr. Park, W. B. Park Land Company)**

*Evaporation does not typically occur during the winter months. There is a lot of evaporation during the summer months. He described a swimming pool scenario.*

**Response 28**

The comment was noted. A response to this comment was not provided.

**Comment 29 (Mr. Griffith, Community Member)**

*It would be beneficial to evaluate potential evaporative losses.*

**Response 29**

The comment was noted. A response to this comment was not provided.

**Comment 30 (Mr. Park, W. B. Park Land Company)**

*It has been difficult to keep the River Ranch irrigated over the years. Water is a valuable resource.*

**Response 30 (Mr. Mayer, EPA)**

It is important to hear these community concerns.

***Comment 31 (Daniel Christensen, Jr., Woodfords Washoe Tribe)***

*It would be helpful to evaluate evaporative loss of the stored water during the winter and the evaporative loss during the summer.*

**Response 31**

The comment was noted. A response to this comment was not provided.

***Comment 32 (Mr. Griffith, Community Member)***

*Downstream users own the water. Users of the Carson River System from Fallon to the headwaters would all be affected by the treatment system.*

**Response 32**

The comment was noted. A response to this comment was not provided.

***Comment 33 (Mr. Christensen, Jr., Woodfords Washoe Tribe)***

*Treating the water and storing it during the winter months present concerns of overflow. How long does it take to treat the water?*

**Response 33 (Mr. Mayer, EPA)**

Combined discharge from the CUD and Delta Seep into Leviathan Creek is on the order of 25 to 60 gallons per minute. Discharge from Aspen Seep is approximately 20 gallons per minute. Aspen Seep discharge is treated through the bioreactor. When creek flow is really high (spring runoff), there is a lot of dilution. When creek flow decreases, the relative impact of sulfuric acid discharged to Leviathan Creek increases if it is not treated. There is a large difference to the creek's water quality if the water is high or low.

***Comment 34 (Mr. Christensen, Jr., Woodfords Washoe Tribe)***

*Does the sulfuric acid cause a problem with mercury?*

**Response 34 (Mr. Mayer, EPA)**

Mercury has not been a problem at Leviathan Mine. At Leviathan Mine, sulfuric acid dissolves metals in the rocks, for example iron is what changes the creek's color. Nickel, zinc, copper, arsenic, chromium and other metals have been detected in the creek. If enough of these metals are present, it could be toxic. In addition, metals have been detected in the creek sediment.

***Comment 35 (Mr. Mayer, EPA)***

*How much time does the Woodfords Washoe Tribe spend at the property?*

**Response 35 (Mr. Christensen, Jr., Woodfords Washoe Tribe)**

The Woodfords Washoe Tribe spends a fair amount of time at the Pine Nut allotment. They have seen where the ponds at Leviathan Mine have reached near capacity while checking around the property.

***Comment 36 (Mr. Christensen, Jr., Woodfords Washoe Tribe)***

*What is the effectiveness of the water treatment system?*

**Response 36 (Mr. Ferriter, Atlantic Richfield)**

The treatment technologies treat on the order of 99 percent of the metals in the water.

***Comment 37 (Mr. Mayer, EPA)***

*The start up period for activating the bioreactor system during the summer months could take up to two months to ensure everything is operating properly. It would be most effective to perform treatment all year long, which alleviates the yearly start up and shut down period.*

**Response 37**

The comment was noted. A response to this comment was not provided.

***Comment 38 (Mr. Mayer, EPA)***

*How do Washoe tribal members conduct sample collection and perform research?*

**Response 38 (Mr. Greenbaum, Washoe Tribe of Nevada and California)**

The tribe has conducted some research regarding the types of uses for the water. They have talked with people who have used the water and collected information on those who have used the area in the past. There is not much current use of the water, although this is related to the water conditions. The fact that there is no fishing affects the use.

***Comment 39 (Mr. Griffith, Community Member)***

*Mr. Griffith stated it is a good sign that fish have been sighted.*

**Response 39**

The comment was noted. A response to this comment was not provided.

***Comment 40 (Mr. Greenbaum, Washoe Tribe of Nevada and California)***

*The resources are reduced for people's current use. If cleanup is really successful and or if the cleanup starts to become successful, there is potential danger if the water looks clean but remains contaminated. The Washoe Tribe of Nevada and California's main concern is to make sure cleanup is completed so that traditional use of the water could occur, such as drinking water, bathing, plant gathering, and the use of soils. It is most important to limit the risk.*

**Response 40 (Mr. Mayer, EPA)**

Risk is a complicated issue and it is important to effectively obtain and compile the information and needs of the Washoe Tribe.

***Comment 41 (Mr. Greenbaum, Washoe Tribe of Nevada and California)***

*The Washoe Tribe is available to provide additional information or participate in discussion.*

**Response 41**

The comment was noted. A response to this comment was not provided.

***Comment 42 (Mr. Greenbaum, Washoe Tribe of Nevada and California, and Mr. Mayer, EPA)***

*In regards to the cost options presented in the EE/CA, all costs are fairly close. At the last Technical Advisory Meeting, the Washoe Tribe requested a comparison of what is being done now and over the past couple of summers versus what is planned for the next phases. When will this information be available?*

**Response 42 (Ms. Johnson, EMC<sup>2</sup>)**

For evaluation purposes for Alternative 1, it would be comparable to look at what has been done in the past. Alternative 2 would be difficult to determine because there would be an additional cost for the new system.

***Comment 43 (Mr. Greenbaum, Washoe Tribe of Nevada and California)***

*Has it been decided whether or not to use year round treatment? It would be necessary to evaluate the dollar figures for future years of operating the system.*

**Response 43 (Mr. Ferriter, Atlantic Richfield, and Ms. Johnson, EMC<sup>2</sup>)**

Operation and maintenance would be similar to the bioreactor system. The building holding the system would be larger than anything that has been done in the past. It would be difficult to compare to past treatment systems. Capital costs have been evaluated, although treatment system upgrades have not been determined to date. Operation and maintenance costs, including labor, equipment, diesel, overhauls, fuel, lime, and reagents for treatment, have been assessed. Amounts could be determined yearly versus seasonally. Operation of the bioreactor system has

included demobilization and mobilization, which is costly; therefore, the operation and maintenance costs would be about the same.

***Comment 44 (Mr. Greenbaum, Washoe Tribe of Nevada and California)***

*Has there been any thought as to how long the treatment system would need to perform?*

**Response 44 (Mr. Ferriter, Atlantic Richfield, and Mr. Mayer, EPA)**

There is a possibility that the treatment system could run for 5 to 10 years. In addition, there would be the necessity of preparing a remedial investigation (RI)/feasibility study (FS), with an anticipated preparation date of mid-2005. The ultimate remedy is not known at this time.

Design and construction of the short-term treatment system would take approximately two years. EPA believes the final remedy would be determined within the 5-year range. The 30-year evaluation is used to determine costs because 30 years is a standard time period used as a rule of thumb. The conditions at the site might be difficult on the system, therefore, the treatment time period could be extended.

***Comment 45 (Mr. Mayer, EPA)***

*EPA thanked everyone for participating in the community meeting and for all of the efforts put into their work and research in the past.*

**Response 45**

The comment was noted. A response to this comment was not provided.

***Comment 46 (Mr. Christensen, Jr., Woodfords Washoe Tribe)***

*Will there be additional community meetings regarding Leviathan?*

**Response 46 (Mr. Mayer, EPA)**

Yes, additional community meetings would be necessary. It is not anticipated that another community meeting would be held regarding the EE/CA, and a decision for a short-term alternative needs to be made soon.