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**APPENDIX A**

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

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UNITED STATES  
ENVIRONMENTAL PROTECTION AGENCY  
REGION IX

IN THE MATTER OF:

LEVIATHAN MINE  
ALPINE COUNTY, CALIFORNIA

ATLANTIC RICHFIELD  
COMPANY,

Respondent

ADMINISTRATIVE ORDER  
FOR REMEDIAL INVESTIGATION  
AND FEASIBILITY STUDY

U.S. EPA Region IX  
CERCLA  
Docket No. 2008-18

Proceeding under Sections  
106, 107, and 122 of the Comprehensive  
Environmental Response, Compensation,  
and Liability Act, as amended,  
42 U.S.C. §§ 9604, 9607 and 9622.

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 Remedial Investigation/ Feasibility Study (“RI/FS”) as described in the attached Statement of Work (“SOW”) (Attachment 1). Pursuant to this Order, Respondent will conduct the 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. This RI/FS should build upon earlier phases of remedial investigation at the Site, as described below.

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 No. 14-14-B and further redelegated to the Superfund Branch Chiefs by Regional Delegation R9 1290.14A, dated November 16, 2001.

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; and (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 conducting a feasibility study.

4. The activities conducted under this Order are subject to approval by EPA. Respondent shall provide all appropriate necessary information for the RI/FS, and for a record of decision (“ROD”) 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 the attached Statement of Work (“SOW”), attached hereto as Attachment 1, and with all applicable EPA guidances, policies, and procedures.

## II. 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 evince visible disturbance 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), the entire surface disturbance is on the mine site owned by the state of California.

6. 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. Vehicular access to the mine is limited by snowfall, steep grades, narrow roads with sharp turns and muddy and rough road conditions, so that the Site may be inaccessible to heavy equipment, supply delivery trucks, emergency personnel and other vehicles from as early as October to as late as July, depending on weather. The California-Nevada border lies approximately three miles northeast of the mine.

7. 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 Lahontan Regional Water Quality Control Board (“LRWQCB”). No external sources of potable water or power are available at this remote mine.

8. There are several sources of acid mine drainage (“AMD”) at the Site which may impact Leviathan Creek. When a release from the Site occurs, it may flow into the Leviathan Creek/Bryant Creek watershed, which drains into the East Fork of the Carson River. Unless treated, the releases contain elevated concentrations of metals and metalloids, most notably arsenic, as well as iron, aluminum, chromium, cobalt, copper, nickel, and zinc. The low pH and high metals content of the AMD historically limited most aquatic life in Leviathan Creek and portions of Bryant Creek downstream of the mine, until responses activities were initiated. These releases originate in California and, at times, may have flowed into Nevada and into the East Fork of the 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.

9. 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 owned and operated the mine and 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 and developed it in 1951. Mining ceased at the mine property around 1962, and the Site was sold to another party. During most of the period from 1951 to 1962, Anaconda extracted sulfur ore through open pit mining. In 1977, Atlantic Richfield purchased all of Anaconda's stock, and in 1981 it merged with Anaconda.

10. 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. State 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 C.F.R. 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 5 lined storage and evaporation ponds on-site between 1983 and 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.

13. Attempts in 1997 and 1998 at preventing overflows in the ponds were unsuccessful. In each summer since 1999, the LRWQCB has treated pond water, with oversight from EPA under a series of Administrative Abatement Actions (“AAAs”) under Section 106(a) of CERCLA, 42 U.S.C. § 9606(a). During each summer from 2001 through 2007, the LRWQCB effectively emptied the ponds of AMD in preparation for capture throughout the subsequent winter and spring. The LRWQCB has supplemented this summer treatment when necessary through additional activity in the springtime during years of higher precipitation, such as the years 2000, 2005 and 2006. The LRWQCB has successfully prevented overflow of pond water in every year since 2000, except that, for several days in mid-April 2006, an uncontrolled overflow of untreated or partially treated pond water discharged to Leviathan Creek before a temporary treatment system was able to draw down the pond water levels sufficiently. 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.

14. EPA, in consultation with the LRWQCB, issued a new AAA in 2005 directing the LRWQCB to provide for treatment of the AMD captured in the evaporation ponds each year until a final remedy is selected and implemented.

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

15. In addition to the contaminated water collected in the evaporation ponds, other sources of AMD from the Site may contribute year round to the contamination of the Leviathan Creek/Bryant Creek watershed unless they are captured and treated prior to discharge. The CUD

collects subsurface water from beneath a portion of the concrete Leviathan Creek diversion channel and usually discharges roughly 15 to 30 gallons per minute (“gpm”) into Leviathan Creek, although flows exceeded 40 gpm for several months in 2006 following a second wet winter.

16. The Delta Seep is an area where surface discharges of AMD exit 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. Prior to 2005, the Delta Seep flow had been typically measured at approximately 10 gpm. The LRWQCB’s actions to stabilize the Delta Slope in 2005 added a rudimentary system for subsurface dewatering and drainage of the face of the slope. Prior to 2007, flows from the discharge pipe of these drains and the surface seepage from the toe of the slope were not adequately collected, and flow rates can only be estimated. In 2005 and 2006, the Delta Seep flows appeared to have increased over the flows during the earlier, drier years.

17. Aspen Seep is a series of surface flows, which at times totals more than 10 gpm from low points of the waste rock in the Aspen Creek drainage. Water quality measurements taken by the LRWQCB and Atlantic Richfield indicate that these sources are somewhat less acidic and less highly concentrated in arsenic and metals than water collected in the evaporation ponds.

18. On November 22, 2000, EPA issued an administrative order requiring Atlantic Richfield to submit work plans for a phased RI/FS for developing a long-term response to releases from Leviathan Mine (“Administrative Order”). Additionally, the Administrative Order required Atlantic Richfield to plan and implement Early Response Actions (“ERAs”) to address known releases from Leviathan Mine that are not captured in the evaporation ponds.

19. Atlantic Richfield has implemented ERAs 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.

20. During 2001 through 2007, Atlantic Richfield captured and treated flows from the CUD for a portion of each year.

21. 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, Atlantic Richfield 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 was completed during the 2005 field season. Atlantic Richfield resumed partial capture and treatment of the Delta Seep in 2007 consistent with the 2007 -08 Treatability Studies and Interim Treatment Work Plan.

22. In 1996, 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 Atlantic Richfield 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, Atlantic Richfield 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 operates through the winter. Development and testing of improvements to the bioreactor process are important components of this early response action and treatability study. In 2007, Atlantic Richfield made additional improvements to the Aspen Seep treatment system consistent with 2007 -08 treatability studies and the Interim Treatment Work Plan.

23. 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 meteorological 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.

24. The ERAs to date have demonstrated effective technologies for seasonal treatment of the AMD 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 Atlantic Richfield, the removal actions 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 engineering evaluation/ cost analysis (“EE/CA”) to evaluate options for capturing and treating the AMD year round to specified discharge criteria.

25. Atlantic Richfield developed the Draft EE/CA with input from EPA and other stakeholders, and submitted the Draft EE/CA on April 2, 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 C.F.R. § 300.500. EPA received comments from the public, in writing and in a public meeting held on May 4, 2004.

26. EPA signed a Non-time Critical Removal Action Memorandum on July 12, 2005 (“NTCRA”), selecting a phased program for testing the effectiveness and reliability of on site year-round AMD treatment. EPA and other stakeholders identified uncertainties of winter treatment at this remote site with no existing power source and without reliable personnel access during periods of deep snow and muddy roads. At the time, active treatment of AMD at an elevation of approximately 7,000 feet, under harsh winter conditions and without day-to-day access, had not been implemented anywhere else in the nation. Consequently the new efforts during the initial years were to focus on flows from the CUD and Delta Seep, which had been allowed to discharge untreated except during the summer treatment season. Subsequent

incorporation of the Adit and PUD into a combined year-round treatment system was postponed until the winterized treatment system for the CUD and Delta Seep could be proven reliable, although the pond system did not provide sufficient storage capacity for a year of particularly high precipitation.

27. An additional objective of the NTCRA was to eliminate untreated AMD discharge to the watershed 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. The elimination of the major known discharges was expected to allow quantification of the effect of sediments and any other remaining sources without the confounding effect of replenishment of contaminated sediments for most of the year, particularly during the start of the lower flow conditions in late spring.

#### **D. Attempts to Implement the 2005 NTCRA Memorandum and Modification of the Removal Action Memorandum**

28. In 2006, a winter treatability study to test the effectiveness and reliability of High Density Sludge (“HDS”) system for year-round treatment of CUD and Delta Seep flows was not successful.

29. During the following autumn and winter, Atlantic Richfield met with EPA and technical representatives of stakeholder groups to present its analysis of the feasibility of year-round treatment at Leviathan Mine. EPA determined that the required level of construction necessary for a HDS system would be more appropriate following a thorough RI/FS and formal Record of Decision (“ROD”). As on-site winterized treatment is now envisioned, it would require capital investment and lasting effects on land use more appropriate to consider as a final remedy. Such a remedy will be analyzed in the RI/FS, where it will be compared to other potential remedies, such as increased biological treatment, off-site treatment or additional pond

storage, which were determined by EPA in the NTCRA Memorandum to be inappropriate to implement as interim remedies due to similar challenges.

30. Personnel have been able to access the Site by four-wheel drive vehicles at certain times when early spring and late autumn conditions preclude access by large delivery vehicles and other heavy equipment. Although EPA has determined that the requirements for implementing on-site winterized treatment of CUD and Delta Seep flows exceed the scope of the NTCRA, treatment during such limited access periods, to the extent practicable, may provide watershed protection from AMD and accumulation of contaminated sediment during critical low-flow stream conditions. Equally important, treatment during spring and autumn will provide information about operations during cold weather, which can negatively affect treatment chemistry, plant operations and the physical conditions for sludge handling.

31. Accordingly, EPA expects to issue a Modified Removal Action Memorandum (“MRAM”) to modify the NTCRA to provide for a lengthened, but not year-round, treatment of the CUD and Delta Seep flows. It is anticipated that the MRAM will select treatment of CUD and Delta Seep flows at times when weather and road conditions may preclude delivery of the types and quantities of supplies needed to operate a full-scale HDS system but when personnel can safely reach the Site and rely on reduced quantities of supplies and the use of a smaller scale alternative/portable treatment system. It is also anticipated that the MRAM will provide that the remaining tasks for the RI/FS shall commence concurrently, and that the MRAM will select an early response action that shall continue until the final remedy is fully implemented or as directed by EPA.

32. A separate settlement agreement will provide for implementation of portions of the NTCRA as modified by the MRAM, including those portions related to implementation of a treatability study of treatment of flows from the CUD and Delta Seep during the summer, as well as the continued year-round operation of the bio-reactor treatment of Aspen Seep. EPA is

issuing this Order for implementation of the RI/FS, which will lead to a final ROD for the entire Site.

### III. CONCLUSIONS OF LAW AND DETERMINATIONS

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

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

35. 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).

36. The substances listed in Paragraph 8 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).

37. 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).

38. 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 under Section 106(a) of CERCLA, 42 U.S.C. § 9606(a).

39. The 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.

40. The contamination and endangerment at this Site constitute an indivisible injury.

#### IV. NOTICE TO THE STATE

41. On November 8, 2007, prior to issuing this Order, EPA notified the state of California, LRWQCB, that EPA would be issuing this Order.

#### V. ORDER

42. 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

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

d. “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.

e. “Paragraph” shall mean a portion of this Order identified by an arabic numeral.

f. “Statement of Work” or “SOW” shall mean the statement of work for implementation of the 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.

g. “Section” shall mean a portion of this Order identified by a roman numeral and includes one or more Paragraphs.

h. “Site” shall mean the Leviathan Mine Superfund site, as described in the NPL listing.

I. The “State” shall mean the state of California, Lahontan Regional Water Quality Control Board.

j. “Tribe” shall mean the Washoe Tribe of Nevada and California.

k. “United States” shall mean the United States of America.

l. “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

44. Respondent shall provide, not later than 20 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.

## VIII. PARTIES BOUND

45. 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.

46. 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 5 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

47. 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.

48. 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 20 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.

49. EPA will review Respondent's selection of a project manager according to the terms of this Paragraph. 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.

50. Respondent shall conduct activities and submit deliverables as provided by the 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 Major Submittals for the Leviathan Mine Remedial Investigation/ Feasibility Study, attached hereto as Attachment 2. 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.

51. Within 90 days of the Effective Date, Respondent shall submit to EPA the Data Quality Objectives Report (“DQO Report”) as described in the SOW. Within 60 days of EPA approval of the DQO Report, Respondent shall submit the Work Plan, as described in the SOW. If EPA disapproves of or requires revisions to the DQO Report or Work Plan, in whole or in part, Respondent shall amend and submit to EPA a revised DQO Report or Work Plan which is responsive to the directions in all EPA comments, within 30 days of receiving EPA's comments.

52. 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.

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

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

55. 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.

56. 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. MODIFICATIONS

57. 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 any work plan, EPA shall modify or amend the work plan in writing accordingly. Respondent shall perform each approved work plan as modified or amended.

58. EPA may determine that in addition to tasks defined in this Order or the SOW, additional work may be necessary to protect human health and the environment. If EPA determines that additional investigation activities are necessary to protect human health and the environment or for the completion of the RI/FS, EPA may require Respondent to submit a workplan for additional investigation activities. EPA may also require Respondent to modify any plan, design, or other deliverable required by this Order. 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.

59. No later than thirty (30) days after receiving EPA's notice that additional response activities are required pursuant to this Section, Respondent shall submit a workplan for the response activities to EPA for review and approval. Upon approval by EPA, the workplan is incorporated into this Order as a requirement of this Order and shall be an enforceable part of this Order. Upon approval of the workplan by EPA, Respondent shall implement the workplan according to the standards, specifications, and schedule in the approved workplan. Respondent shall notify EPA of its intent to perform such additional response activities within 15 days after receipt of EPA's request for additional response activities.

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

60. EPA retains the responsibility for the release to the public of the report of the 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.

61. 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 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

62. 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.

63. In addition to the deliverables set forth in this Order, Respondent shall provide to EPA quarterly progress reports by the 10<sup>th</sup> day of January, April, July, and October. Upon request from Respondent, EPA may alter the due dates for these progress reports or allow their incorporation into reports submitted by Respondent pursuant to any administrative settlement agreement for implementation of removal actions at the Site. At a minimum, with respect to the period since the last report, these progress reports shall: (a) describe the actions which have been

taken to comply with this Order; (b) describe work planned for the next quarter with schedules relating such work to the overall project schedule for the Work; and (c) 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. These reports shall not be considered a substitute for notification to EPA in the event of an occurrence requiring emergency response. In addition, more frequent progress reports may be required during performance of certain Work activities.

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

64. 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, and not previously submitted to EPA or the database, shall be submitted to EPA in an annual database update, or, if the RPM so directs, in the subsequent quarterly progress report as described in Section XII of this Order.

65. 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. Nothing herein shall be construed to limit EPA's right to take any additional samples that EPA deems necessary.

66. 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 shall not assert any confidentiality claims with respect to any data related to site conditions, sampling, or monitoring.

67. Respondent shall maintain for the period during which this Order is in effect, an index of documents that the Respondent claims contain confidential business information. The index shall contain, for each document, the date, author, addressee, and subject of the document. Upon written request from EPA, Respondent shall submit a copy of the index to EPA.

68. 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

69. 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. EMERGENCY RESPONSE AND NOTIFICATION OF RELEASES

70. In the event of any action taken by Respondent or occurrence arising from Respondent's performance of the Work which causes or threatens a release of any hazardous substance from the Site that constitutes an emergency situation or may present an immediate threat to public health or welfare or the environment, Respondent shall immediately take all appropriate action. Respondent shall take these actions in accordance with all applicable provisions of this Settlement Agreement, including, but not limited to, the Health and Safety Plan, in order to prevent, abate or minimize such release or endangerment caused or threatened by the release. Respondent shall also immediately notify the RPM or, in the event of his unavailability, the Regional Duty Officer, Emergency Response Program, EPA Region IX, (800) 300-2193, of the incident or Site conditions.

71. In addition, Respondent shall submit a written report to EPA within 7 Days after each release, setting forth the events that occurred and the measures taken or to be taken to mitigate any release or endangerment caused or threatened by the release and to prevent the reoccurrence of such a release. This reporting requirement is in addition to, and not in lieu of, reporting under Section 103(c) of CERCLA, 42 U.S.C. § 9603(c), and Section 304 of the Emergency Planning and Community Right-To-Know Act of 1986, 42 U.S.C. § 11004, *et seq.*

#### XVI. EPA REVIEW OF SUBMISSIONS

72. 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.

73. 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.

74. 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, 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.

75. If any re-submission pursuant to Paragraph 72(c) is disapproved by EPA pursuant to Paragraph 72 of this Order, Respondent shall be deemed to be in violation of this Order.

## XVII. COMPLIANCE WITH APPLICABLE LAWS

76. 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.

77. 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 (i.e., within the areal extent of contamination or in very close proximity of the contamination and necessary for implementation of the Work). 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.

78. 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

79. All communications, whether written or oral, from Respondent to EPA shall be directed to EPA's 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. For purposes of the RI/FS, EPA's RPM is:

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

(415) 972-3176  
mayer.kevin@epa.gov

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

81. EPA's 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 shall have authority, consistent with the National Contingency Plan, to halt any work required by this Order, and to take any necessary response action.

#### XIX. DELAY IN PERFORMANCE

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

83. Respondents 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 within 48 hours after any 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.

## XX. ASSURANCE OF ABILITY TO COMPLETE WORK

84. Within 30 days after the Effective Date of this Order, Respondent shall demonstrate the ability to complete the Work required in this Order and to pay all claims that arise from the performance of such Work. Within 30 days of EPA approval of any subsequent workplan for any response action under this Order, Respondent shall demonstrate its ability to complete the Work specified by the workplan and to pay all claims that arise from the performance of such Work. Respondent shall demonstrate the ability to complete Work by obtaining and presenting to EPA one of the following: (a) a performance bond; (b) a letter of credit; (c) a guarantee by a third party; or (d) 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 \$2,000,000, and, in the case of any future workplan, the estimate of cost for the response action described in that workplan. If Respondent seeks to demonstrate ability to complete the RI by means of internal financial information, or by guarantee of a third party, it shall re-submit such information annually, on the anniversary date of the issuance of this Order. 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. For purposes of administrative efficiency, EPA may, upon request from Respondent, alter the due dates for provision of information required in this Paragraph, or allow its incorporation into reports submitted by Respondent pursuant to another agreement.

85. At least 7 days prior to commencing any Work at the Site pursuant to this Order, Respondent shall secure, and shall maintain for as long as Respondent is required to perform Work under this Order, comprehensive general liability insurance and automobile insurance with

limits of two million dollars, combined single limit. Within the same time period, Respondent shall provide EPA with certificates of such insurance and a copy of each insurance policy. In addition, for as long as Respondent is required to perform Work under this Order, Respondent shall satisfy, or shall ensure that its contractors or subcontractors performing Work at the Site satisfy, all applicable laws and regulations regarding the provision of worker's compensation insurance for all persons performing the Work on behalf of Respondent in furtherance of this Order. If Respondent demonstrates by evidence satisfactory to EPA that any contractor or subcontractor maintains insurance equivalent to that described above, or insurance covering some or all of the same risks but in an equal or lesser amount, then Respondent need provide only that portion of the insurance described above which is not maintained by such contractor or subcontractor.

#### XXI. UNITED STATES NOT LIABLE

86. By issuance of this Order, the United States and EPA assume no liability for injuries or damages to persons or property resulting from any acts or omissions of Respondent(s). The United States or EPA shall not be deemed a party to any contract entered into by the Respondent or its directors, officers, employees, agents, successors, representatives, assigns, contractors, or consultants in carrying out actions pursuant to this Order. This Order does not constitute a pre-authorization of funds under section 111(a)(2) of CERCLA, 42 U.S.C. § 9611(a)(2). Nothing in this Order shall constitute a satisfaction of or release from any claim or cause of action against the Respondent 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).

#### XXII. ENFORCEMENT AND RESERVATIONS

87. 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,

future 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.

88. 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.

89. 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.

90. 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.

91. Violation of any provision of this Order may subject Respondent to civil penalties of up to \$32,500 per violation per day, as provided in section 106(b)(1) of CERCLA, 42 U.S.C. § 9606(b)(1). Respondent may also be subject to punitive damages in an amount up to three times the amount of any cost incurred by the United States as a result of such violation, as provided in section 107(c)(3) of CERCLA, 42 U.S.C. § 9607(c)(3). Should Respondent violate this Order or any portion hereof, EPA may carry out the required actions unilaterally, pursuant to section 104 of CERCLA, 42 U.S.C. § 9604, and/or may seek judicial enforcement of this Order pursuant to section 106 of CERCLA, 42 U.S.C. § 9606.

92. 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.

93. 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.

### XXIII. ADMINISTRATIVE RECORD

94. 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.

### XXIV. EFFECTIVE DATE AND COMPUTATION OF TIME

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

### XXV. OPPORTUNITY TO CONFER

96. 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 be held at 75 Hawthorne Street, San Francisco, California.

97. 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.

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.

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

So Ordered, this 23<sup>rd</sup> day of June, 2008.

BY: Kathleen Salyer  
Kathleen Salyer, Chief  
Site Cleanup Branch, Superfund Division  
U.S. Environmental Protection Agency

**ATTACHMENT 1**  
**Leviathan Mine, Alpine County, California**  
**Statement of Work for Remedial Investigation/ Feasibility Study**

The following outline is a Statement of Work for conducting a comprehensive Remedial Investigation and Feasibility Study (RI/FS) at Leviathan Mine, culminating in a final RI/FS report for supporting identification and selection of long-term remedial actions.

Early Response Actions have significantly altered the post-mining water and sediment chemistry in Leviathan, Aspen and Bryant Creeks while the treatment systems are in operation, particularly during the summer months. EPA anticipates that treatment of all identified discharges of contaminated water during the summer months will continue through the completion of the RI/FS. The RI/FS must evaluate reasonably foreseeable events potentially impacting water and sediment chemistry, including collection system overflows and interruptions of collection and treatment systems.

Over the past several years, a phased RI/FS has resulted in the collection of water, sediment and biological data as well as information on treatment options at Leviathan Mine. The existing information is to be used to support the RI/FS as appropriate.

**I. REMEDIAL INVESTIGATION**

Plan and conduct those investigations necessary to characterize the Leviathan Mine and actual or potential contaminant migration pathways (Environmental Setting and Pathway Characterization); define the source (Source Characterization); define the nature and extent of contamination (Contaminant Characterization); identify actual or potential receptors (Receptor Identification); and conduct an assessment of risks posed to actual or potential receptors (Risk Assessment). "Leviathan Mine", for the purposes of this Statement of Work, refers to the area within the Leviathan Mine property boundaries and adjacent areas outside the property boundary which have been disturbed by mining activities, such as mine wastes, excavations, landslides and runoff of surface water and groundwater. The Study Area for the Remedial Investigation shall include the areal extent of the Leviathan Mine, the groundwater, surface water and flood plain areas affected by contaminant migration, and all other areas necessary for an understanding of the actual or potential threats to human health or the environment from Leviathan Mine activities, including Leviathan, Aspen and Bryant Creek watersheds, East Fork Carson River, reference areas and areas directly or indirectly disturbed by Leviathan mining activities.

A Data Quality Objectives (DQOs) report shall be prepared for EPA approval. DQOs shall be prepared for each component of the RI (for example, groundwater, mine waste, botanical resources) to ensure that the data are suitable for use in decision making, for example in the risk assessments or engineering design. The investigations shall result in data consistent with an EPA-approved Quality Assurance/ Quality Control Plan and of sufficient technical quality to support the development and evaluation of the remedial action alternative or alternatives during the Feasibility Study. All sampling and analysis shall be conducted in accordance with an EPA-approved Sampling and Analysis Plan that shall be prepared before sampling begins. All planning will be based on data quality objectives. All sampling locations shall be documented in a log and identified on detailed maps of appropriate scale.

Natural systems entail variability, and uncertainty analysis is necessary to establish the confidence with which we use the data. DQOs have an additional use in defining the limits of uncertainty and the impacts of uncertainty on the decisions made in the RI/FS. The degree to which the natural variability of the systems to be investigated (for example sediment, groundwaer and biota systems) affects the decisions to be made shall be assessed through an uncertainty analysis for each system.

Data shall be provided to EPA in an electronic format compatible with EPA data management systems, including Geographical Positioning System (GPS) information. Semi-annual written progress reports with periodic submission of data shall be submitted to EPA, and shall be augmented by more frequent communication (such as field visits, conferences, and/or teleconferences) during periods of increased field activity, sampling and construction.

Previous investigation work shall be incorporated into the Remedial Investigation as appropriate. The Remedial Investigation shall augment and coordinate with past and ongoing information gathering efforts to provide consistent and comparable long-term information. For example, stream sampling locations shall be consistent with previous water quality and flow measurement locations.

This outline presents a general list of scope items; modifications may be required as the program proceeds.

**A. Environmental Setting and Pathway Characterization**

Collect information to supplement and verify existing information on the environmental setting and potential contaminant migration pathways in the Study Area. The investigation shall characterize the following:

1. Hydrogeology

The goals of the hydrogeoloy component of the RI are to (1) investigate if it is possible to prevent or reduce the amount of acid generated as water flows through the site, (2) define the water balance sufficiently to show whether significant discharges remain unaddressed at the site, and (3) investigate the potential for groundwater contamination downgradient of the Mine site..

The current understanding of groundwater flow at Leviathan Mine is inadequate to relate potential acid generating sources to each of the known acid discharge locations. An improved understanding of the hydrogeology may support actions to reduce or prevent acid generation, thereby decreasing the efforts necessary to treat acid mine drainage at the site.

In addition, a well documented water balance can provide confidence that all significant contaminant discharge locations and potential exposure routes are being addressed.

The hydrogeology program must provide for regular periodic monitoring of groundwater elevations, and sufficient sampling and analysis of groundwater for constituents of

concern and other chemicals within the study area to provide an understanding of the site hydrogeology. Based on the water balance and consideration of the existing geologic and hydrogeologic information, implement an investigation program to provide the following information, as appropriate to support selection of a remedy for the site.

- a . Analysis of available data to construct a water balance. Consider the uncertainties in the water balance.
- b. A description of the regional and local geologic and hydrogeologic characteristics affecting ground water flow beneath and downgradient of the Leviathan Mine, including:
  - i) Regional and local aquifer stratigraphy;
  - ii) Structural geology with particular emphasis on geologic structures that may affect groundwater flow and/or slope stability;
  - iv) Identification and characterization of areas and amounts of recharge and discharge to be incorporated into a water balance for the site;
  - v) Regional and local groundwater flow patterns;
  - vi) Characterization of seasonal variations in the groundwater flow regime including an evaluation of “100-year” wet year conditions;
  - vii) Ongoing collection of general meteorological data including, as applicable: daily precipitation and temperature records, annual and monthly precipitation averages, monthly temperature averages, wind speed and direction, evaporation rates, and climatic extremes (including frequency of occurrence);
  - viii) Specific watershed characteristics.
- c. Based on field data, field mapping, tests, and cores, a representative and accurate classification and description of the hydrogeologic properties of units which may be part of the migration pathways (including saturated and unsaturated units), including, as appropriate:
  - i) Hydraulic conductivity, porosity, effective porosity, pore water velocity, and Darcy velocity;
  - ii) Lithology, grain size, sorting, degree of cementation;
  - iii) An interpretation of the degree of interconnections between recharge areas, water bearing zones, different saturated zones, fractures, and groundwater discharge areas including adits, pits,

ponds and springs;

- d. Based on field studies and cores, and understanding of structural geology prepare hydrogeological cross sections and fence diagrams showing the extent (depth, thickness, lateral extent) of hydrogeological units which may be part of the migration pathways identifying, as appropriate:
  - i) Sand and gravel layers in unconsolidated deposits;
  - ii) Zones of fracturing or channeling in consolidated or unconsolidated deposits;
  - iii) Zones of higher permeability or lower permeability that might direct and restrict the flow of contaminants;
  - iv) Geologic formation or group of formations that are capable of yielding a significant amount of groundwater to wells, springs and surface water;
  - v) Water bearing zones that may serve as a pathway for contaminant migration including perched zones of saturation.
  - vi) Mine features such as tunnels, pits, ponds and waste piles that may serve as sources or pathways for contaminant migration.
- e. An analysis of any topographic features that might influence the groundwater flow system (for example topographic relief, ponds or seasonal pools above mine, and ponds and seeps in the landslide area on the northwestern portion of the mine property);
- f. Based on data obtained from regular periodic monitoring of groundwater elevation in groundwater monitoring wells and/or piezometers installed upgradient and downgradient from the potential contaminant sources, a representative description of water level or fluid pressure monitoring including, as appropriate:
  - i) Water level contour and/or potentiometric maps (displayed legibly, superimposed on site maps of appropriate scale);
  - ii) Hydrologic cross sections showing vertical gradients;
  - iii) The flow system including the vertical and horizontal components of flow;
  - iv) Any seasonal or temporal changes in hydraulic gradients.
  - v) Relationships between groundwater and surface water.

- g. Based on analytical data from monitoring of groundwater chemistry from groundwater monitoring wells and/or piezometers installed upgradient and downgradient from the potential contaminant sources:
  - i. Contours of constituents of concern in groundwater plotted on site maps of suitable scale;
  - ii) Hydrologic cross sections showing chemical concentrations
  - iii) Relationship between contaminant sources such as waste rock and contaminant discharge such as at the channel underdrain
- h. A description of manmade influences that may affect the hydrogeology in the vicinity of the Leviathan Mine including the open pit and high walls, mine shafts and adits, tunnels and galleries, mine wastes, pipelines, drains, ditches and altered channels, seals, and compacted fill . A particular emphasis should be made toward evaluation of the sources of water draining from the adit, the channel underdrain, the Delta Seep, and Aspen Seep. In addition, the relationship between surface and groundwater flow shall be evaluated.

The information generated by the above activities will be used to reevaluate the sources of acidity expressed in the known discharges to determine if acid generation can be prevented and/or minimized. The new information will be used to refine the water balance and determine whether potential infiltration areas, groundwater contamination or additional discharges of contaminants should be addressed in the FS.

## 2. Surface Water and Sediment

Review existing programs to characterize the surface water bodies in the Study Area and design additional work to fill data gaps. Considerable data have been gathered to date for characterization of Leviathan Mine surface water quality and sediment chemistry. These data shall be more thoroughly analyzed and information gaps and uncertainties shall be identified and resolved. Furthermore stormwater has not been characterized. Appropriate streams and rivers to be characterized include Mountaineer Creek and Leviathan Creek upstream of the Leviathan Mine, the drainage immediately downstream of the Leviathan Mine, and the affected stream/river system (Leviathan Creek, Bryant Creek, East Fork Carson River). In addition, reference streams in the vicinity of the Study Area with comparable flow patterns, altitude, and watershed characteristics (such as geologic parent materials) should be identified and monitored for comparison. The surface water and sediment characterization program shall include, as appropriate, but not be limited to the following activities and information:

- a. Description of the water bodies including:
  - i) For streams and rivers: location, elevation, flow, velocity, depth, width, seasonal fluctuations, and flooding tendencies (i.e. 10, 50, 100 and 500 year flood events, as appropriate);
  - ii) Drainage patterns;
  - iii) Production of a hydrograph sufficient for relating streamflow to precipitation and snowmelt patterns.
- b. Installation, calibration and maintenance of stream gages at locations in the watershed sufficient for monitoring flow rates for use in stream hydrology and contaminant mass transport assessment;
- c. Description of the chemistry of the natural surface water and sediments within appropriate reference streams. This includes determining, as appropriate, the pH, total dissolved solids, total suspended solids, BOD, COD, alkalinity, conductivity, dissolved oxygen profiles, nutrients, total organic carbon, concentrations of all identified Contaminants of Concern (COC), including federal priority pollutants.
- d. Stormwater monitoring is necessary to evaluate the interaction of stormwater runoff and seasonal melt water runoff with mine waste at the site. Storm water monitoring should be conducted to allow assessment of the impact of summer thunderstorms, seasonal rainfall, and snowpack runoff on surface water. The information from stormwater monitoring can be used to assess appropriate surface water and erosion controls to minimize future impacts of stormwater on water quality downstream of Leviathan Mine. Stormwater monitoring should include:
  - i) Inspections to identify suitable erosion control measures;

- ii) Continued implementation of best management practices to control erosion of mine wastes;
  - iii) Regular monitoring of storm water runoff (summer thunderstorms, seasonal rainfall, and snow melt);
  - iv) Chemical analysis of stormwater samples for constituents of concern.
  - v) Annual reporting of inspection findings, sampling and analytical results, and erosion control measures taken.
- e. Eroded sediment from mine wastes and chemical precipitates from acid mine drainage, may impact water quality and biota in the watersheds of Leviathan Creek, Bryant Creek, and East Fork Carson River (EFCR). Sediment may be affected in both the short and long term. Short term effects include seasonal precipitation from acid sources, and erosion by stormwater and melt water. Longer term effects may be caused by accumulation of metal enriched sediments in depositional areas along the streams downgradient of Leviathan Mine. Characterization of the sediment and depositional areas should include:
- i) Deposition area (including distance downstream and flood plain/bank deposition);
  - ii) Thickness profile;
  - iii) Physical and chemical parameters including grain size, density, organic carbon content, pH, contaminant concentration such as metals and arsenic.
  - iv) Contaminant mobility, bioavailability, transport potential and acid generation potential for in-stream sediment and flood plain deposits.
- f. Evaluation of sediments at the Ruhestroth Dam Site. From its construction in the early part of the twentieth century until its partial removal in 1997, this dam accumulated sediment (sand and silt). This sediment is visible as terraces along the EFCR immediately upstream from the former dam site. Coring, age dating and chemical analyses of these sediments would allow evaluation of sediment chemistry through time from the pre-open pit mining to post open pit mining periods at Leviathan Mine. This information shall be used to evaluate impacts of Leviathan Mine on the EFCR sediments and the potential for Leviathan Mine pollutants in other depositional areas in the watershed below Leviathan Mine. This work may result in identification of geochemical indicators of impacts from Leviathan Mine on sediment in the EFCR. It

may be necessary to identify and evaluate other depositional areas in the ECFR for pollutants from the mine site. Characterization of these sediments shall include:

- i) Measurement of stratigraphic sections;
- ii) Age dating of sediments;
- iii) Chemical analysis of sediments;
- iv) Visual description of the sediments

## **B. Source Characterization**

Mine wastes at Leviathan Mine are partially characterized. For example it is known that these mine wastes generate acid and contain elevated metals. However the volume, extent, and regulatory classification of the mine wastes is not well documented. Analytical data should be collected to completely characterize and designate the wastes and areas where wastes have been placed, collected or removed including: type; quantity; physical form; disposition; and other characteristics affecting release. This shall include quantification of the following specific characteristics at each source area:

1. Disposal or release area characteristics including: location and distribution of waste types, design features, operating practices, period of operation, age of area, and general physical conditions. At a minimum, it is expected that a differentiation will be made between waste deposited on the Aspen Creek drainage and that in the Leviathan Creek area.
2. Waste characteristics
  - a. Type, quantity and chemical composition of wastes placed in the area, including degradation and reaction byproducts;
  - b. Physical and chemical characteristics of the waste including mine waste classification in accordance with federal and State regulations;
  - c. Migration and dispersal characteristics of the waste including: erosion, sorption, biodegradability, acid generating potential, hydrolysis rates and chemical transformations;
  - d. Biological effects of the waste on revegetation efforts and contaminant uptake potential.

## **C. Contamination Characterization**

Consistent with an approved DQO, QAPP, SAP and/or FSP, collect analytical data in the

study area as appropriate to quantify potential contaminants of concern (COC) in groundwater, surface water, sediment, soils including flood plain soils, mine waste at the mine site, and mine waste used on or along the roads in the Study Area. Background or ambient concentrations in the various media need to be quantified to allow identification and quantification of potential COCs. Methodologies and sample locations shall be identified, and samples collected to quantify potential COC concentrations in background and/or reference materials. These data shall be sufficient to define the extent, origin, direction, and rate of movement of contaminants. Data shall include time and location of sampling, media sampled, concentrations found, conditions during sampling, and the identity of the individuals performing the sampling and analysis.

The potential COCs to be considered shall include:

pH

Ferric and ferrous sulfate, total sulfate, and sulfuric acid

Metals and compounds: aluminum, arsenic, beryllium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, selenium, thallium, vanadium, and zinc.

Additionally other COCs may be identified during the Remedial Investigation.

Address the following types of contamination in the Study Area:

1. Groundwater contamination including: the horizontal and vertical extent of groundwater contamination, direction of hazardous substance (contaminant) movement, velocity of contaminant movement, horizontal and vertical concentration of the indicator parameters of all possible hazardous and dangerous waste constituents, identification and characterization of discharge pathways from groundwater to surface water, evaluation of factors affecting contaminant movement, and extrapolation of future contaminant movement.
2. Soil (including mine wastes) contamination including: vertical and horizontal extent of contamination, contaminant concentrations, velocity and direction of contaminant movement, contaminant dispersal and deposition on receptors through dust (e.g. accumulation on pine nuts) from mine materials in riparian corridors and along roadways, and a description of the contaminant and soil chemical properties and interaction.
3. Surface water and sediment contamination including: the horizontal and vertical extent of contamination, direction of contaminant movement, velocity of contaminant movement, horizontal and vertical concentration of contaminants, effect of erosion on contaminant distribution, evaluation of factors affecting contaminant movement, description of the chemistry of the contaminant and surface water or sediment properties and interaction, and extrapolation of future contaminant movement and fate. Included shall be an evaluation of the contamination resulting from treatment system leaks or failures.
4. Seasonal and annual mass transport of contaminants of concern, including: total flux (dissolved and suspended/resuspended materials) from the Leviathan Mine, mass flux from identifiable source areas still contributing to the stream

contamination, hydrological and other factors contributing to patterns of streambed precipitation and resuspension..

## **D. Receptor Identification and Risk Assessments**

### **1. Human Health Risk Assessment**

Perform a human health baseline risk assessment in accordance with EPA's Risk Assessment Guidance for Superfund, Human Health Evaluation Manual (Interim Final, December, 1989, EPA 540-1-89-002) and with EPA's Risk Assessment Guidance for Superfund Part D: Standard Planning, Reporting, and Review of Superfund Risk Assessments (currently without an EPA document number, but available on the EPA homepage at <http://www.epa.gov>).

The risk assessment should also make use of an EPA document now in public review, Community Participation in Superfund Risk Assessments Supplement to RAGS (available by faxing Dr. Sophia Serda at 415-972-1916).

The work plans, Study Area conceptual models, list of contaminants of concern, list of potential receptors and sensitive populations, and all other components of the risk assessment shall be submitted for EPA approval in a phased approach. It is particularly critical that all field sampling plans for data to be used for human health risk assessment be approved by EPA prior to any mobilization in the field.

The risk assessment shall identify the potential exposure pathways in the surface waters, groundwater, sediment, and soils and biota in terrestrial areas potentially impacted by run-off or sediment transport from the Leviathan Mine. Specific Washoe Tribal cultural uses of the resources affected by the mine as described in the Washoe Tribe Human Health Risk Assessment Exposure Scenario for the Leviathan Mine Superfund Site (Harper, 2005) ("Washoe Exposure Scenario") and the Washoe Tribe Provisional Reasonable Maximum Exposure Factors (RME) for the Leviathan Mine Superfund Site (Harper, 2005) ("RME") memorandum shall be incorporated into the risk assessment. The Study Area conceptual models and human health baseline risk assessment shall be developed to apply to receptors located entirely within each study segment (Mine site, Leviathan Creek, Bryant Creek, EFCR), as well as to any receptors that divide time among the segments.

The contaminants of concern, identified in the RI, should be carried through exposure pathways determined to be complete, COCs will be based on comparison to applicable risk based benchmarks available in the literature and appropriate federal state and tribal screening limits. to background or ambient values, and provided that these chemicals are present beyond the appropriate screening limits

All COCs that are detected in any medium over background levels shall be carried through all pathways of the risk assessment in each medium. Seasonal high concentrations shall be used as upper bound exposure point concentrations.

The Baseline Human Health Risk Assessment shall include:

- a. Development of a DQO document specific to the risk assessment that describes statistical sampling requirements and that follows EPA Guidance on data useability;
- b. Collection and analysis of relevant data and data quality from the Study Area;
  - i. Identify potential chemicals of concern in water, groundwater, sediment, soil and biota;
  - ii. Identify bioavailable chemical species of the COCs;
  - iii. Collect qualitative and quantitative toxicity information for the chemicals of concern and specific species of the chemicals, particularly bioavailable forms;
  - iv. Determine appropriate toxicity values;
- c. Develop a detailed Risk Assessment Work Plan;
- d. Identify potential exposure pathways and exposed populations. Exposure pathway identification shall incorporate the Washoe Exposure Scenario and RME documents;
- e. Prioritize exposure pathways via consumption of plants and animals through consideration of the Washoe Exposure Scenario, and abundance in the study area;
- f. Estimate exposure concentrations and contaminant intakes for pathways based on field measurements;
- g. Characterize potential for adverse health effects (cancer risks and non-cancer hazard quotients) due to each COC and each exposure pathway. With respect to the Washoe Tribal members, the Washoe Exposure Scenario and the RME shall be utilized;
- h. Characterize cumulative potential and associated uncertainties for adverse health effects (cancer risks and non-cancer hazard quotients), summing across contaminants and pathways. With respect to the Washoe Tribal members, the Washoe Exposure Scenario and the RME shall be utilized;

## 2. Ecological Risk Assessment

Perform an ecological risk assessment according to the Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments (Interim Final, June 1997, EPA 540-R-97-006). To the extent practicable the Ecological Risk Assessment data gathering shall be coordinated with Human Health Risk Assessment activities. The work plans, Study Area conceptual model, list of contaminants of ecological concern and bioavailable forms of the chemicals, list of ecological receptors, and all other components of the ecological risk assessment shall be approved by EPA in a phased approach. It is particularly critical that all field sampling plans be approved by EPA prior to any mobilization in the field. The ecological study shall identify the potential biological receptors (including benthic and aquatic fauna and plants) in the surface waters characterized above (upstream of the Leviathan Mine, in the affected stream, in tributary streams and in appropriate reference streams) and in terrestrial areas potentially impacted by run-off from the Leviathan Mine. Species and habitats of importance to the Washoe Tribe and species potentially sensitive to the COCs shall also be identified. The program shall include:

- a. Identification of the species present, including species identified as threatened or endangered by Federal or State agencies, and of critical habitats such as wetlands;
- b. Estimate of population of all threatened and endangered species;
- c. Selection of ecological receptors and foodwebs;
- d. Selection of assessment and measurement endpoints, including a mix of measured and modeled endpoints.

**E. Geotechnical Engineering Evaluation**

Conduct a geotechnical engineering assessment to evaluate the stability of existing impoundment berms and mine waste pile slopes, and high walls particularly during potential seismic events. The assessment will include the following tasks:

1. Review of groundwater level data collected from groundwater monitoring wells in the vicinity of the Leviathan Mine.
2. Completion of geophysical surveys across the Leviathan Mine and adjacent areas in an attempt to determine the stratigraphy and relative density of subsurface materials, and identify subsurface geologic features that may affect stability.
3. Visual inspection and assessment of the existing structures to evaluate whether additional investigations are necessary.
4. Completion of subsurface explorations to characterize the native materials beneath the mine waste piles and other areas of interest.
5. Assessment of mine shafts, adits, tunnels and galleries to determine their interaction and connection with other structures.
6. Geotechnical assessment of the existing evaporation pond berms for structural integrity as well as an assessment of the potential for increasing pond capacity through raising the berms and/or level of the outflow pipes. Consideration should be made of the seismicity of the surrounding area, height and competency of the impermeable liners and the effect of potential wave action.
7. Geotechnical assessment of mine waste slopes and high walls for stability and safety. Conduct an evaluation of the stability of high walls at the pit, stability of slopes on mine waste piles and associated areas. This evaluation should focus on identifying any areas where cut and/or fill or other engineering methods will be necessary to prevent the failure of slopes and associated hazards to human health and the environment. Evaluation of the optimal slopes for minimizing erosion and facilitating revegetation efforts shall also be made.
8. Landslide Area Evaluation. The landslide extending from the overburden waste pile to the vicinity of the confluence of Leviathan and Aspen Creeks is known to be active. Water quality of ponds and seeps indicates that acidic conditions are present within the landslide. The proximity of mine wastes at the head of the landslide begs the question as to whether continued movement of the slide could enhance the migration of mine wastes to the environment. A geotechnical assessment of the landslide area is necessary to determine the potential for mine wastes to be mobilized by continued landslide activity. In addition, investigations are necessary to determine if water flow through the landslide mobilizes mine waste constituents and/or contributes to continued instability of the landslide.

## II. FEASIBILITY STUDY

Conduct a Feasibility Study and prepare a Feasibility Study Report.

The Feasibility Study will serve to evaluate the feasibility and effectiveness of implementing alternative remedial actions. Early response actions and treatability studies shall be considered within the context of the entire remedial response. The Feasibility Study shall include:

- A. Detailed identification of contamination to be remediated and physical hazards to be removed. Contamination will be identified as to hazardous substances present, types of waste including location and volume. Preliminary remedial action goals will be developed for each waste medium, associated affected media, location and completed exposure pathway.
- B. Identification of remedial action alternatives that will protect human health and the environment by eliminating, reducing, or otherwise controlling risks posed through each exposure pathway and migration route. The number and types of alternatives to be evaluated shall take into account the characteristics and complexity of the wastes present and the facility. A phased approach for evaluation of alternatives may be required for certain facilities, including an initial screening of alternatives to reduce the number of potential remedies for the final detailed evaluation. The final evaluation of remedial action alternatives that pass the initial screening shall be evaluated for compliance with the requirements in (40 CFR 300.430[e][9]). The Feasibility Study should specifically evaluate the potential damage to the ecological receptors of each remedial alternative for contaminants in water, sediment and surface soils as the final task of the ecological risk assessment.

Specifically each alternative must be assessed for:

- 1. Overall protection of human health and the environment;
- 2. Compliance with all applicable or relevant and appropriate federal, state and tribal laws and regulations;
- 3. Long term effectiveness and permanence;
- 4. Reduction of the toxicity, mobility, or volume through treatment;
- 5. Short-term effectiveness;
- 6. Implementability;
- 7. Cost;
- 8. State acceptance;

9. Community acceptance.

- C. An evaluation of alternatives based on the nine criteria specified above;
- D. Recommendation of a preferred remedial action plan for EPA approval;
- E. Schedule for implementation of a preferred remedial action plan.

## **Attachment 2**

### **List of Major Submittals for the Leviathan Mine Remedial Investigation/Feasibility Study**

Draft Data Quality Objectives (DQO) Report  
Final DQO Report

Draft RI/FS Work Plan  
Final RI/FS Work Plan  
    Health and Safety Plan  
    Draft Sampling and Analysis Plan (SAP)  
    Final SAP  
    Draft Quality Assurance Project Plan (QAPP)  
    Final QAPP  
    Draft Field Sampling Plan (FSP)  
    Final FSP

Draft Remedial Investigation Report  
Final RI Report  
    Draft Human Health Risk Assessment  
    Final Human Health Risk Assessment  
    Draft Ecological Risk Assessment  
    Final Ecological Risk Assessment

Draft Feasibility Study Report  
Final Feasibility Study Report