



# LEVIATHAN MINE SUPERFUND SITE

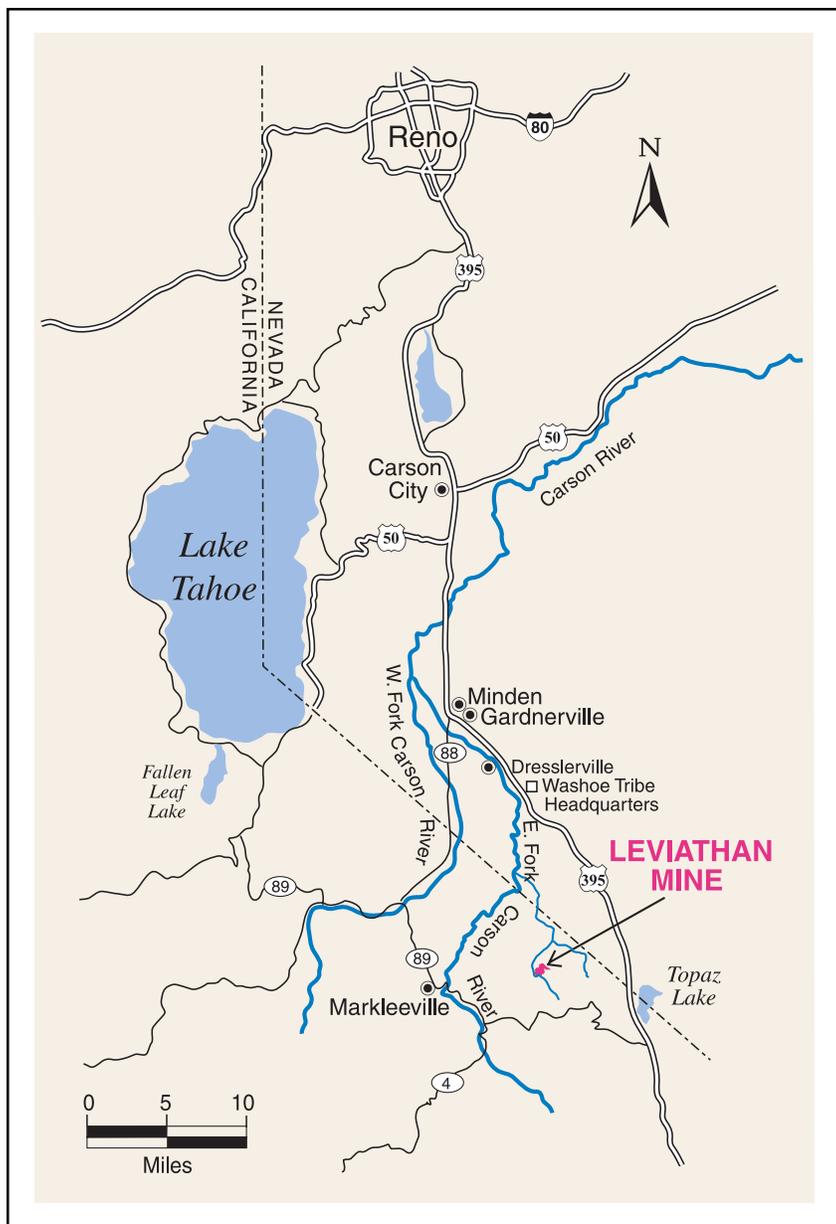
U.S. Environmental Protection Agency • Region 9 • San Francisco, CA

ALPINE COUNTY, CALIFORNIA

APRIL 2004

## PROPOSAL FOR YEAR-ROUND TREATMENT SYSTEM

This fact sheet is being sent by the U.S. Environmental Protection Agency (EPA) to present information on our proposal to treat acid mine drainage from Leviathan Mine all year long. Constructing an effective year-round system is important because it will keep metal-laden sulfuric acid from entering the Bryant Creek and Leviathan Creek watershed. We are asking for comments from the public on alternative treatment methods presented in an Engineering Evaluation/Cost Analysis (EE/CA) prepared by the Atlantic Richfield Company. In this fact sheet is a summary of the reasons a near-term solution is needed, what has been done at the mine so far, the objectives and limitations we face at this stage of the project and each option under consideration. A community meeting to discuss the EE/CA and hear from the public in person will be held on Tuesday, May 4, 2004 (see box below).



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**Community Meeting**  
**Tuesday, May 4, 2004**  
**7:00 p.m.**  
**Carson Valley Middle School**  
**(Library)**  
**Off Highway 395**  
**(behind Museum)**  
**Gardnerville, Nevada**

**Public Comment Period:**  
**April 27 through**  
**May 27, 2004**

Figure 1: Leviathan Mine Superfund Site - Regional location

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## Background

The Leviathan Mine Superfund project ultimately seeks the long-term cleanup of an abandoned open-pit sulfur mine that has been the source of water quality problems since the 1950s. The mine pit and waste piles cover about 250 acres at the 7,000 foot elevation near Monitor Pass on the eastern slope of the Sierra Nevada, roughly six miles east of Markleeville, CA (see Figure 1). The site is surrounded by the Toiyabe National Forest, and the drainage of Leviathan Creek, Aspen Creek and Bryant Creek flows toward the north and west into Nevada and along Washoe Tribal lands. The water quality of more than nine miles of the stream system has been severely degraded by the sulfuric acid formed by the combination of sulfur, water and oxygen in the mine waste rock. The acid also dissolves other minerals and metals present in the rocks such as arsenic, copper, nickel, zinc and others and carries these compounds into the creeks. These watersheds are tributaries to the much larger East Fork of the Carson River.

Sporadic mining has occurred at Leviathan since the 19<sup>th</sup> century. The Anaconda Mining Company conducted open pit mining from 1952 until 1962. Atlantic Richfield is the corporate successor to Anaconda. Major environmental damage to the creeks was first noticed during the open pit mining period. The State of California eventually purchased the property in 1984 in order to alleviate the contamination. The California Regional Water Quality Control Board—Lahontan Region (Regional Board) constructed several important pollution abatement projects in 1985 including regrading and compacting the waste piles and pit to reduce infiltration of rain and snow melt, constructing a concrete channel to separate Leviathan Creek from the acidic mine waste and constructing about 12 acres of lined ponds to capture and evaporate the worst acid mine drainage.

In 2000, the Leviathan Mine was formally named as a federal Superfund Site. EPA identified two immediate problems: evaporation ponds collecting the most highly contaminated acid drainage, a source known as Adit Drain, would often overflow into the Leviathan Creek during springtime; and at least three other seeps of acidic drainage would flow into Leviathan and Aspen creeks all year. These are called Aspen Seep, which flows into Aspen Creek, and Delta Seep and Channel Underdrain, which flow into Leviathan Creek (see Figure 2).

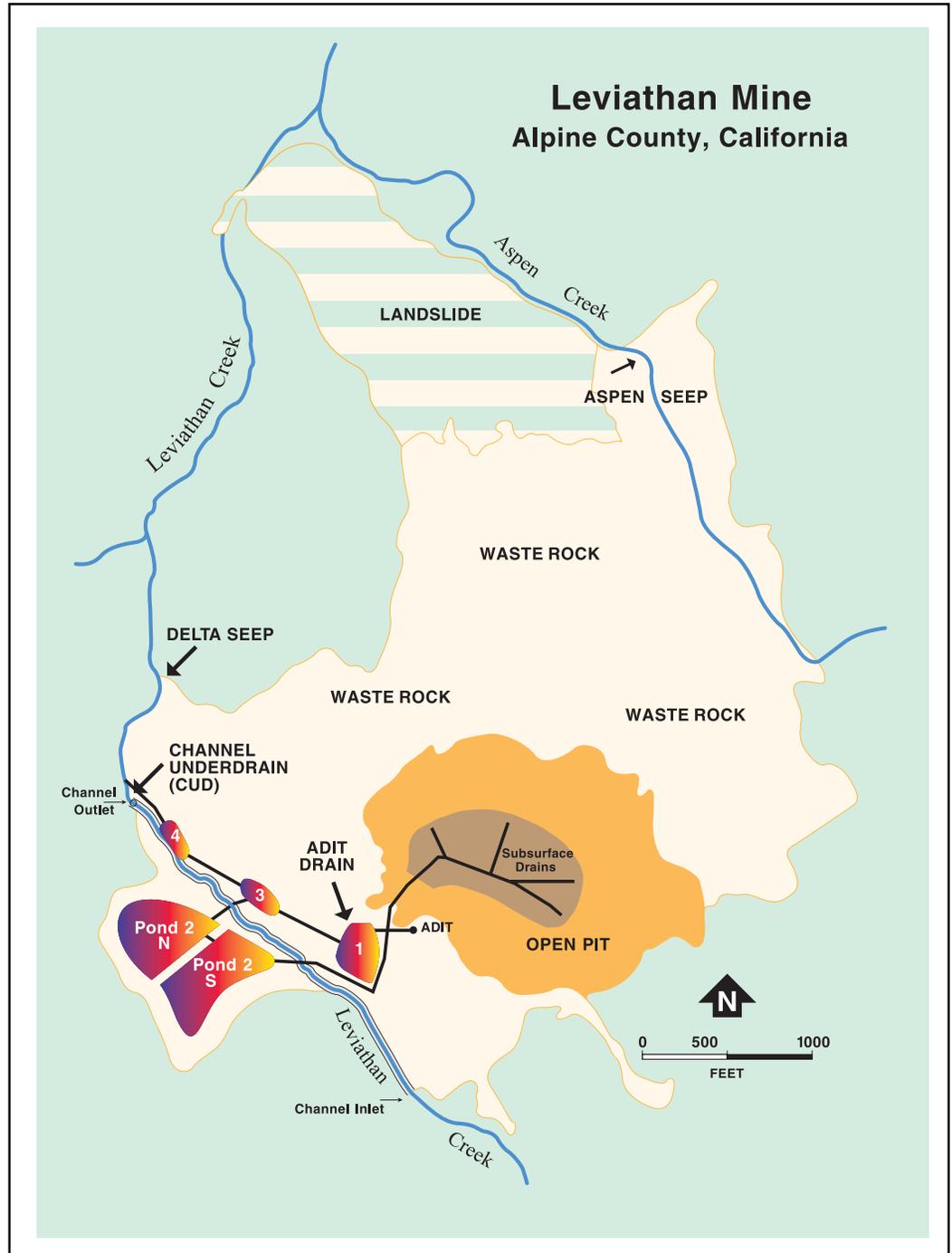
## Objectives - Need for Year-Round Capture and Treatment of Acid Mine Drainage

There are several reasons why year-round capture and treatment of the acid mine drainage is necessary. Environmental damage and possible risks to humans caused by untreated acid and dissolved metals flowing into the relatively small creeks is the main priority, making it important to stop the acid flowing from Leviathan as quickly as possible. We also need year-round treatment to further evaluate

the risks remaining once the acid and metals from the known sources no longer enter the streams. As part of a more complete investigation and risk assessment, EPA must measure the remaining metals left in the creekbeds and soil. By doing this, we will be able to establish what other cleanup measures may be necessary and set water quality standards that will be protective for the long term. In addition, we will need to assess the risks posed to the Washoe Tribe and others in the local community who may use the watershed extensively.

## Past Actions to Control Acid Mine Drainage

EPA used its emergency response authority to direct Atlantic Richfield and the State of California to address the stream contamination in several stages. In the first step, the Regional Board successfully prevented the ponds from overflowing by actively treating and removing all or most of the acidic water in the summer so there would be sufficient storage for the water from Adit Drain throughout the winter and spring. Snowfall adds to the volume of water in the ponds. At the same time, careful measurements of water quality, streamflow, acid water production and meteorological conditions were recorded all year. These data and others are needed to design a sufficient long-term solution. A second step was conducted by Atlantic Richfield to collect and treat water from the other known acidic seeps. This gave EPA confidence that all important seeps of acid contaminating the creeks had been identified. While the early response actions were treating the acidic water, we were carefully testing and evaluating various treatment technologies for the long-term solution. These early actions proved to be quite challenging at the remote Leviathan Mine site and, to date, have been successful



**Figure 2:** Leviathan Mine Disturbed Area with major known acid mine drainage points: Adit, Channel Underdrain, Delta Seep and Aspen Seep

only during the summer months (approximately from June through September).

Freezing conditions, snowfall and limited road access hinder what can be accomplished at Leviathan Mine. When the treatment systems are turned off in October, a biological system treating acidic water along Aspen Creek and the pond collection system

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for Adit Drain continue to protect water quality. The other two known sources, Delta Seep and Channel Underdrain, flow into Leviathan Creek untreated for nearly eight months every year. Because of severe winter conditions and the two untreated sources being diverted to Leviathan Creek when winter starts, design of a system that can handle such extreme conditions and operate all year is necessary.

## **Accomplishments in 2003**

An innovative biological treatment system for Aspen Seep, designed principally by University of Nevada researchers, treated about five million gallons of acid mine drainage during 2003. The Regional Board treated all 3.5 million gallons in the ponds in three weeks during July and August. This is the third year that the ponds have been completely emptied. This winter will be the fifth straight year that the highly acidic ponds have been prevented from overflowing. Atlantic Richfield captured and treated approximately six million gallons of acidic water from Delta Seep and Channel Underdrain while testing several treatment configurations. Both the Regional Board and Atlantic Richfield treatment systems used lime to neutralize the acid and capture the metals in a sludge that could be collected for disposal. The various types of treatment produced different sludge qualities. The sludge that met stringent California hazardous material standards could be left at the mine, and the rest was trucked to approved landfills for hazardous materials. The treated water from all biological and lime treatment systems met EPA's discharge requirements based on Clean Water Act standards that are protective of freshwater organisms. The U.S. Geological Survey was instrumental in installing and maintaining extensive stream flow monitoring systems that have been operating for several years. Water flow measurements along with water quality measurements (Regional Board), biological indicator monitoring (University of California Researcher, Dr. Herbst) and stream sediment sampling by EPA have provided us with extensive information on current conditions in the creeks. Both water chemistry and insect life are

showing improvement in Bryant Creek (after dilution by Mountaineer Creek) and even in Leviathan Creek during the treatment season. Stream insects and some small fish are increasingly present during the summer.

## **The Engineering Evaluation/Cost Analysis (EE/CA)**

### **Limitations**

- \* The plan under consideration is not meant to be the final long-term remedy for Leviathan Mine. The investigation for the long-term cleanup is continuing, and the selection process will occur several years after this early cleanup action has been operating. We expect the year-round treatment to be operating by the autumn of 2005, providing protection to the creek so that the long-term remedy assessment can proceed.
- \* Some potential alternatives could not be considered for this near-term phase, such as biological treatment for the more contaminated seeps on Leviathan Creek, because they would take a long time to put in place.
- \* Worker safety is of paramount importance. Operators of a treatment system cannot be expected to be present throughout the winter in the mountains, and the site may be completely inaccessible for long periods. The project needs to be reliable without much operator attention.
- \* Even during the summer it can be difficult for heavy equipment, such as lime delivery trucks, to reach the Leviathan Mine site. Providing access for operators, materials and equipment will be challenging. Additionally, making it easier to reach the site could have drawbacks.

### **Alternatives**

For a near-term response such as the one now considered for Leviathan, the three selection factors are:

- \* Effectiveness (will it reliably meet the water quality criteria for fresh water organisms throughout the harsh winter?);

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- \* Implementability (are we confident that the system can be built safely at Leviathan Mine during the time period we want?); and
  - \* Cost (are we selecting the least expensive system that meets the above requirements since we may choose an entirely different approach for the long-term cleanup a few years from now?). Costs fall into two general categories - capital costs (what the building costs are, usually a one-time expense) and operating and maintenance costs (which are recurring every year). These often are combined for purposes of comparison to provide an estimate of a project lasting either 10 or 30 years. Some projects that may be inexpensive to build but more expensive to operate may not be the lowest cost over many years of operation.

## **The Options**

**No Action** - this is a standard alternative for every Superfund decision, providing a description of what might happen if nothing further was done.

## **Details of Remaining Alternatives**

The EE/CA document focuses on five alternatives for addressing contamination from Leviathan Mine. Each alternative includes costs for disposal of sludge from water treatment in an on-site lined containment area. The current treatment of Aspen Seep at the existing bioreactor is also retained for all alternatives. Several approaches to providing power to the site will be considered for all treatment alternatives including a wind turbine, solar power, a diesel generator and a combination of sources. Selection of a power source will be more fully developed once the basic treatment approach is determined. Cost estimates are provided for both 10 and 30-year timeframes.

## **Alternative 1: Separate Treatment Systems**

This alternative involves water treatment similar to current Early Response Actions during the sum-

mer. Under this alternative, Adit discharges would be captured in the evaporation ponds for seasonal treatment using a system similar to the existing treatment facility for pond water. Discharges from Delta Seep and Channel Underdrain would be treated in a year-round lime neutralization treatment system located near Pond 4. The previous year's treatment has shown that these technologies can effectively treat contaminated waters at Leviathan Mine.

## **Alternative 2: Year-round Combined Flow Treatment Using Conventional Lime Treatment at Pond 4**

Under this alternative, a lime neutralization treatment system would be constructed near Pond 4 and would be used to treat combined discharges from Adit Drain, Delta Seep and Channel Underdrain.

## **Alternative 2a: Conventional Lime Treatment at an Off-site Location Downstream of Leviathan Mine**

Under this alternative, a lime neutralization treatment system would be constructed downstream of Leviathan Mine and would be used to treat combined discharges from Adit Drain, Delta Seep and Channel Underdrain. This alternative requires piping water off site, constructing an off-site treatment facility and transporting sludge back to the site for disposal in a repository. The proposed treatment facility would be located approximately three miles downstream from Leviathan Mine. This alternative promotes better winter access by moving the treatment system to a lower elevation (about 6,000 feet). Costs evaluated for this alternative did not account for land acquisition, permitting or coordination of right-of-way issues with landowners.

## Alternative 3, Option 1: Enlarge Ponds and Perform Seasonal Treatment

The ponds would be increased to contain all the acid drainage from Leviathan Creek seeps through a winter of heavy snowfall. They currently can hold approximately 16 million gallons. For this alternative, the ponds would be expanded to about 37 million gallons by raising the height of the containment berms. New liners would be placed over the existing pond liners. A thorough evaluation of the ponds area will be needed to ensure such enlargement is both technically feasible and seismically stable.

## Alternative 3, Option 2: Cover Ponds and Perform Seasonal Treatment

Impermeable fabric covers would be used to prevent accumulation of direct precipitation in the ponds. Snowmelt will be collected and piped off the covers. The total capacity of the ponds would not be expanded under this alternative. The addition of discharge from Delta Seep and Channel Underdrain to the existing ponds might provide a relatively small margin of safety and few options if the ponds were

not fully emptied before winter. This alternative may require two seasonal treatment periods: one in the spring, and a second to fully evacuate the ponds before each winter begins.

## How to Comment on the Alternatives

EPA places a high value on public input and will be accepting comments on this EE/CA from **April 27 through May 27, 2004**. During that period, you may submit written comments by mail (postmarked or e-mailed no later than May 27, 2004) or give oral comments at the EE/CA public meeting scheduled for May 4, 2004 (for details, see front page). Written comments should be sent to: Kevin Mayer, Remedial Project Manager, U.S. Environmental Protection Agency, 75 Hawthorne St. (SFD-7-2), San Francisco, CA 94105. E-mail: [mayer.kevin@epa.gov](mailto:mayer.kevin@epa.gov) After EPA reviews and responds to public comments, the selected near-term remedy will be announced.

The public is encouraged to comment on any of the alternatives presented in the EE/CA. The full EE/CA documents and supporting data is available for review at the Information Repositories listed on the next page.

## Costs

The table below summarizes the capital and operations and maintenance costs for each of the alternatives. Costs are estimated for 10 and 30-year operating lives and include periodic replacement. The Aspen Seep bioreactor was assumed to continue to operate as it currently does.

Alternative	Capital Cost	Annual Operations and Maintenance Cost	Net Present Value 10 years	Net Present Value 30 years
1	\$2,767,000	\$601,000	\$7,192,000	\$10,887,000
2	\$3,087,000	\$485,000	\$6,437,000	\$9,313,000
2a	\$4,246,000	\$497,000	\$7,879,000	\$10,924,000
3, Option 1	\$3,694,000	\$357,000	\$6,532,000	\$8,967,000
3, Option 2	\$3,905,000	\$424,000	\$7,209,000	\$10,299,000

# Information Repositories

Documents related to the Leviathan Mine Superfund Site, including the Engineering Evaluation/Cost Analysis (EE/CA), can be found at the following locations:

Alpine County Library  
270 Laramie St.  
Markleeville, CA 96120  
(530) 694-2121

Hours: Tues, Wed, Thurs, 10:00 a.m. to 6:00 p.m.  
Fri and Sat, 10:00 a.m. to 5:00 p.m.

Nevada State Library and Archives  
100 N. Stewart St.  
Carson City, NV 89701  
(775) 684-3360

Hours: Monday through Friday,  
8:00 a.m. to 5 p.m.



Douglas County Public Library  
1625 Library Lane  
Minden, NV 89423  
(775) 782-9841

Hours: Mon, Tues, Wed, 9:00 a.m. to 8:00 p.m.  
Thurs, Fri, Sat, 9:00 a.m. to 6:00 p.m.

Superfund Records Center  
95 Hawthorne St., Suite 403S  
San Francisco, CA 94105  
(415) 536-2000

Hours: Monday through Friday,  
8:00 a.m. to 5:00 p.m.



## MAILING COUPON

If you are not already on the Leviathan Mine site mailing list and would like to be, please return this coupon to: Vicki Rosen, Community Involvement Coordinator, U.S. EPA, 75 Hawthorne St. (SFD-3), San Francisco, CA 94105.

NAME: \_\_\_\_\_

MAILING ADDRESS: \_\_\_\_\_  
\_\_\_\_\_

CITY, STATE, ZIP: \_\_\_\_\_

# FOR MORE INFORMATION

If you have questions or concerns about the Leviathan Mine Superfund Site, please do not hesitate to contact any of the people listed below:

Kevin Mayer  
Remedial Project Manager  
(SFD-7-2)  
(415) 972-3176  
[mayer.kevin@epa.gov](mailto:mayer.kevin@epa.gov)

Vicki Rosen  
Community Involvement Coordinator  
(SFD-3)  
(415) 972-3244  
[rosen.vicki@epa.gov](mailto:rosen.vicki@epa.gov)

U.S. Environmental Protection Agency  
75 Hawthorne St.  
San Francisco, CA 94105

Washoe Tribal Contact:  
Rob Greenbaum  
Resources Policy Advisor  
Washoe Tribe of Nevada and California  
919 U.S. 395 South  
Gardnerville, NV 89410  
(775) 883-1446 ext. 1155 or  
(530) 694-2339 ext. 1155  
[robert@washoetribe.us](mailto:robert@washoetribe.us)

You may contact either Kevin or Vicki **toll-free at (800) 231-3075.**

Please leave a message and your call will be returned.

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