



Washoe Tribe of Nevada and California
2023 Leviathan Mine Superfund Site Tour



**State Water
Resources
Control Board**



History

Underground mining for copper began at the site in the mid-1800s followed by underground sulfur mining in the mid-1900s. Then, in 1952 the Anaconda Company began an open pit sulfur mine operation and by the mid 1950s fish kills were reported. Mining stopped in 1962 and in 1977 the Atlantic Richfield Company purchased the site. Two years after USGS began monitoring groundwater in 1982, the California Regional Water Quality Board (RWQCB) acquired the site to address water quality issues. In 1997 the Washoe Tribe of Nevada and California pushed the EPA to investigate ongoing concerns about the site. In 2000, the EPA added the site to the National Priorities List (Superfund). The Tribe received funding in 2016 to reengage with the project which is currently managed by the EPA and the RWQCB.

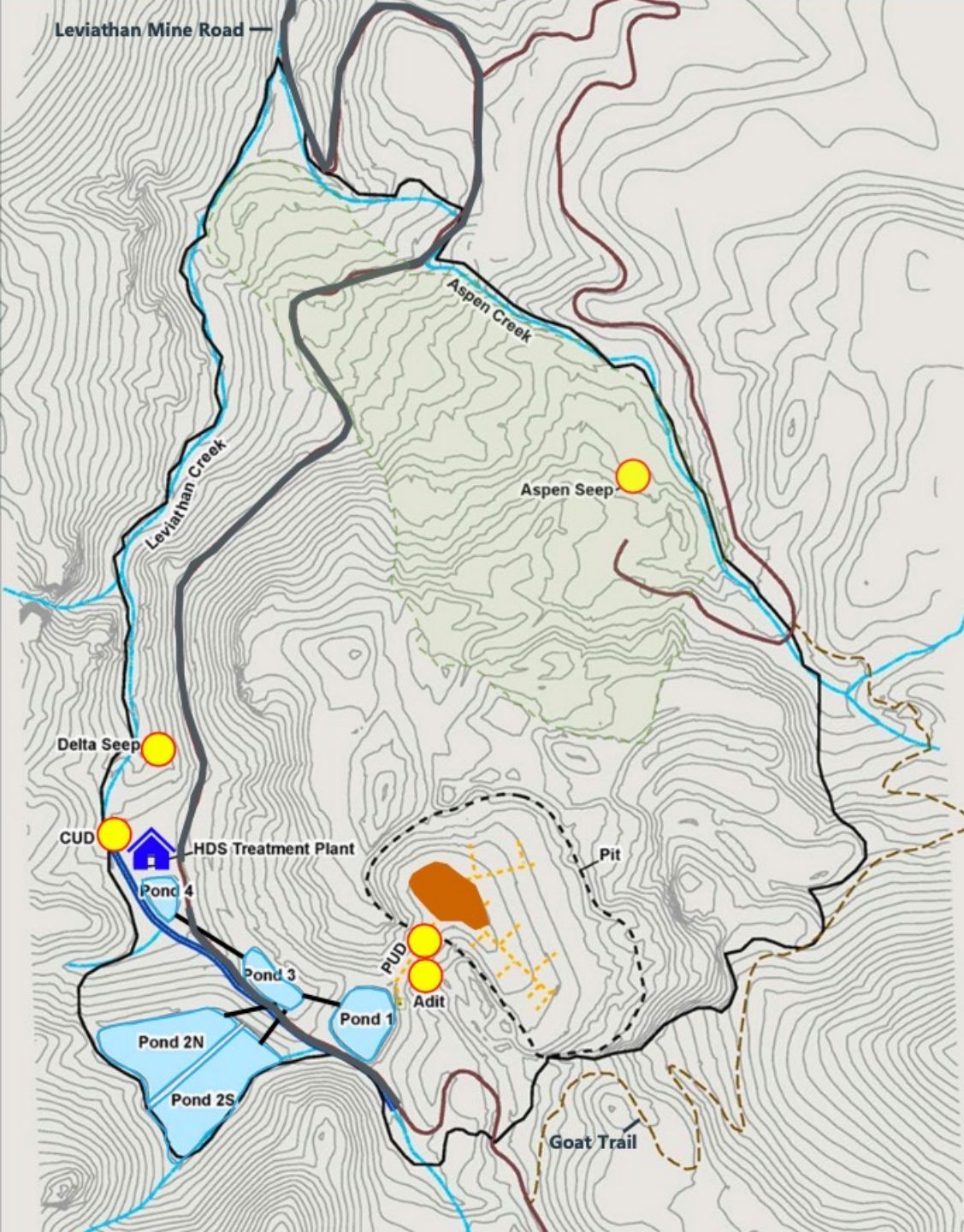


Image courtesy WSP

Acid Mine Drainage

The Leviathan Mine Superfund site is a 250-acre area of land located on the eastern slope of the Sierra Nevada Mountain range. Sulfuric acid is created when water, such as rainwater, snowmelt, and subsurface water, interacts with exposed rock containing sulfur-bearing minerals. The resulting highly acidic water moves into groundwater, surface water, and soil and may have harmful effects on humans, plants, and animals. This process is called Acid Mine Drainage (AMD). AMD from the Leviathan site has historically affected a nine-mile stretch of the Leviathan-Bryant-Creek watershed including the Washoe Homelands. While the mine is located in California, the watershed extends into Nevada. Although a long-term treatment plan has not been developed, early cleanup activities are being conducted to reduce the discharge of AMD.

3 Treatment Processes

There are three water treatment processes that occur at the site: the Pond Water Treatment System, the Aspen Seep Bioreactor, and the High-Density Sludge Treatment Plant. Because of the remoteness and harsh winter conditions at the site, water treatment only occurs from late spring through early fall. Both water treatment systems remove aluminum, arsenic, iron, and nickel from the water. Our tour consisted of 6 stops.

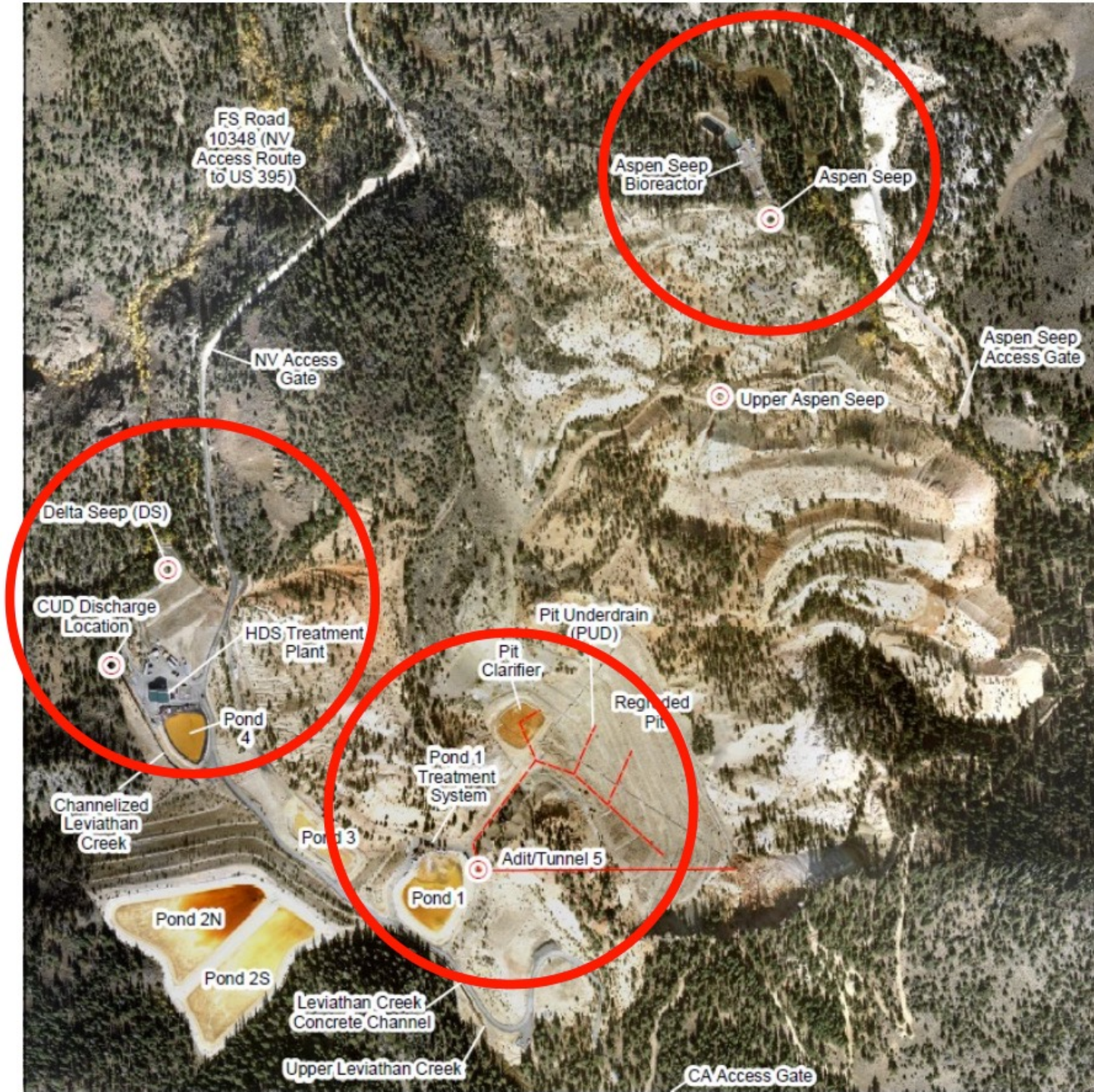


Image courtesy WSP



Freyja Knapp, US
EPA Superfund
Project Manager and
one of our tour guides



Cale Pete,
Environmental
Manager for the
Washoe Tribe of
Nevada and
California and one of
our tour guides



We kicked off the tour with some safety guidelines. The site sits at an elevation of over 7000 feet so lots of water is recommended. Long sleeves, pants and closed toed shoes are required as well.



Stop 1: Upper Ponds and Treatment Area Overlook

Ponds in the southern part of the site are part of the pond water treatment system treating the water with lime to reduce acidity and settle out heavy metals.

Up in the top right you can see the Tamarack Fire scar. Revegetation efforts at the site had to be balanced with the growing threat of wildfire.



Stop 2: Pit and Pit Clarifier

After the water is treated, the clean water is routed to Leviathan Creek while the remaining heavy metals that were mentioned on the previous slide become sludge. This sludge is pumped into an evaporation pond. As the sludge dries it becomes lighter and reduces in volume. Dry sludge is cheaper to contain and then transport off site.



Each year sludge from the previous treatment season is excavated from the pit clarifier and hauled offsite for disposal in a hazardous waste landfill.



Next to the pit clarifier is the site of the open pit mine site. A 350-foot-tall peak was mined from this spot - that's the equivalent of a 32-story building.

You can see the revegetation efforts. While they only planted native species, non-native species have been introduced to the area from trucks. They now have a process to clean trucks before they arrive on site.



This doesn't look like much, but this is mycorrhizae. As part of the revegetation effort, the roots of new plants were treated with mycorrhizae to help them flourish. This volunteer brown 'puff' shows that the mycorrhizae is helping to establish an underground network.



Stop 3: Overview from the Top of Pond 2N

This stop included
additional ponds and
an overhead view of
the high-density
sludge treatment
plant.



Pond 2 South: part of
the pond water
treatment system



Pond 2 North: part of
the pond water
treatment system



An overhead view of Pond 4 and the high-density sludge treatment plant. To the right of the pond, you can see a stretch of grey gravel reinforcing the hill where a landslide previously occurred.



Stop 4: The High-Density Sludge Treatment Plant

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FALLING



The recommended treatment speed of the plant is 100 gallons per minute (GPM). During drier years, this might mean that the plant must pause until enough water has been collected to resume treatment. Alternately, during high precipitation years, the plant may struggle to keep up. In 2023 there was so much rain and snow that plant managers received approval from EPA to test equipment at speeds as high as 150 GPM.



Lunch break!



Stop 5: Aspen Seep Bioreactor

The bioreactor at the site relies on sulfate-reducing microbial organisms, such as *Desulfovibrio* sp., to reduce sulfate to sulfide.



Stop 6: Confluence of Leviathan Creek and Aspen Creek

Mark Lombardi, Geologist for WSP, discusses the benthic microinvertebrate research that has occurred for almost 30 years. Data indicating the health of Leviathan Creek correlate with when water treatment operations are running at the Superfund site.



Photo courtesy of the Washoe Environmental Protection Department

This photo from the 1990s shows the confluence of Leviathan and Mountaineer Creeks (a little further down the creek from the previous slide) prior to the development of the water treatment facilities.



Final remarks as we close out our site tour.



The tour, content, and select images shown in this slide show were
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