Sulphur Bank Mercury Mine Superfund Site – Proposed Plan Preview

September 28, 2021





- Site Overview
- Conceptual Site Model
- Evaluation of Cleanup Options
- Tentative Proposed Plan
- Next Steps/Schedule
- USGS Work in Clear Lake
- Q&A



Site Overview

STATED STATES

Sulphur Bank Mercury Mine

- Operated 1865 to 1957
- Added to the Superfund in 1990
- Mercury and arsenic in soils; mercury in sediment and fish tissue
- Primary contributor to fish consumption advisory for Clear Lake
- 3 Operable Units
 - OU-1: Mine Site and Residential Soils
 - OU-2: Clear Lake Sediments and Fish Tissue
 - (New) OU-4: North Wetlands and nearby lands







- OU-1 Source Areas
 - Waste Rock, Ore, Tailings
 - Disturbed Rock
 - Northwest Pit
- Waste Rock Dam
- Herman
 Impoundment
- Off-Site Residential Soils

Nature and Extent of Contamination





Above Ground

Below Ground

Movement of Mercury through the Waste Rock Dam





Hammack, et al, 2003

Conceptual Site Model



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8

Focused Feasibility Study





- Expanding upon 2006 Feasibility Study. Finalized March 2021.
- Close collaboration with CA DTSC, RWQCB and Elem Tribe Incorporates:
 - Revised site conditions
 - Water balance and geochemical model for HI,
 - Background studies
 - Elem Tribal alternatives
 - Site-wide Human Health Risk Assessment

Remedy Influences



CERCLA Nine Criteria

1. Overall protection of human health and the environment

- 2. Compliance with regulatory requirements
- 3. Long-term effectiveness
- 4. Reduction of toxicity, mobility or volume
- 5. Short-term effectiveness
- 6. Implementability
- 7. Cost
- 8. State acceptance
- 9. Community acceptance

Key Regulatory Requirements:

- Basin Plan
 - discharge restrictions
 - Clear Lake Mercury TMDL
- California Title 27
 - repository siting, design, monitoring requirements

EPA's <u>Tentative</u> Preferred Alternative



FINNING PROTECTION

- Consolidation and cap exposed waste
 - ET vs RCRA-equivalent, based on waste characterization under CA Title 27
- Minimize inputs to Herman Impoundment
 - Lower HI water level
 - Chemistry modeled to move toward natural background
- Monitoring

Phase 1:

Conceptual Site Model



15

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EPA's <u>Tentative</u> Preferred Alternative





Phase 2:

- Excavate remaining portion of the Waste Rock Dam contributing to Hg migration
- Cap remaining areas

Consolidation & Capping



Proposed Remedial Goals:

- Mercury
 - <u>On-Mine</u>: 245 mg/kg;
 - <u>Off-Mine</u>: 35 mg/kg
- Arsenic
 - <u>On-Mine</u>: 22 mg/kg;
 - Off-Mine: 18 mg/kg
- Antimony
 - <u>On-Mine</u>: 622 mg/kg;
 - Off-Mine: 15 mg/kg



Current vs Projected Mercury Flux



- Current flux (Darcy's Law)
 3.2 kg/yr to 23 kg/yr
- Projected flux
 - At background = 0.26
 kg/year
 - w/10% clean stormwater = 0.11 kg/year



Mercury Flux Monitoring



- Mercury Flux Investigation
 - Refine baseline estimate of ongoing loading of Hg to Clear Lake through WRD
 - Clarify location and volume of saturated waste rock of significance
 - Establish monitoring protocol
 - To determine extent of excavation for phase 2 work
 - Monitor effectiveness relative to Clear Lake TMDL (0.5 kg/yr)



Preferred Alternative Cost







Next Steps

- OU-1 Draft Proposed Plan Winter 2021/22
 - Public comment period
 - Tribal consultation
 - Public Meeting(s)
- Record of Decision Spring/Summer 2022
- Pre-Design investigation 2022 to 2023
- Remedial Design 2023 to 2025
- Remedial Action
 - Phase 1 (as soon as) 2024
 - Phase 2 (as soon as) 2028





9/27/2021

U.S. Environmental Protection Agenc

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Four primary goals:

Clarify relationship between site contaminants and sediment mercury

Interagency Agreement with USGS

- Determine the proportion/form of site-derived Hg entering the food web
- Examine relationships between dissolved and particulate Hg to develop monitoring approaches
- Model mercury cycling in Clear Lake to inform remedial approaches that might disrupt that cycle



> 500 um zooplankton MeHg



Questions?