Sulphur Bank Mercury Mine
Superfund Site – Proposed Plan Preview

September 28, 2021
Agenda

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

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

Principle Contaminants of Concern:

Soil
Arsenic
Mercury
Antimony

Groundwater
Mercury
Aluminum
Movement of Mercury through the Waste Rock Dam

Conceptual Site Model
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 Tentative Preferred Alternative

Phase 1:
- 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
Conceptual Site Model

1332 ft AMSL

Saturated Waste
EPA’s Tentative 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** –
  - On-Mine: 245 mg/kg;
  - Off-Mine: 35 mg/kg
- **Arsenic** –
  - On-Mine: 22 mg/kg;
  - Off-Mine: 18 mg/kg
- **Antimony** –
  - On-Mine: 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

Phase 1
- $49.9 Million
- WRD
- Source Area

Phase 2
- $11.3 Million
- WRD

Total Capital Cost $61.2 Million

- $42.8 Million (-30 percent)
- $61.2 Million
- $91.8 Million (+50 percent)
Phase 1
$49.9 million

- Stormwater Management: 1.3%
- Residential Soils: 0.2%
- South Waste Rock Pile - RCRA Cap with Geomembrane (HDPE) Liner: 21%
- North Waste Rock Pile - RCRA Cap with Geomembrane (HDPE) Liner: 17%
- Disturbed Rock and Surface: 14.7%
- Waste Rock Pile - RCRA Cap with Geomembrane (HDPE) Liner: 10.7%
- WRD Phase 1 - RCRA Cap with Geomembrane (HDPE) Liner: 10.5%
- Source Areas - Grading of consolidated material: 6.4%
- West Waste Rock Pile - RCRA Cap with Geomembrane (HDPE) Liner: 9.2%
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
Four primary goals:

- Clarify relationship between site contaminants and sediment mercury
- 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
Questions?