

GEOCHEMICAL EVOLUTION OF GROUND WATER AND TRANSPORT OF MERCURY AT THE SULPHUR BANK MERCURY SUPERFUND SITE IN NORTHERN CALIFORNIA, USA

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The Sulphur Bank Mercury Mine is located on the shore of Clear Lake, Lake County, California. Mining ceased in 1957 and the open pit filled with water, creating Herman Impoundment. Herman Impoundment is a sink for ground water and also receives geothermal waters upwelling through fractured bedrock. The water in the pit is acidic due largely to the oxidation of hydrogen sulfide and sulfide minerals. Herman Impoundment and Clear Lake are separated by about 250 m of waste rock piles and the pit water level is 3.8 m greater than that of the lake. Subsurface outflow is a major component of discharge from the pit with ground water migrating to Clear Lake through the mercury-enriched waste piles. Water quality samples were collected along a hypothetical flowpath: (1) Herman Impoundment surface water in the vicinity of spring discharges (east end), (2) Herman Impoundment surface water (west end), (3) ground water sample from well MW-13 proximal to Clear Lake. Water pH decreases from 3.18 at (1) to 3.08 at (2) to less than 3.00 in the monitoring wells, while sulfate increases from 2390 to 4260 mg/L. Of particular importance, dissolved Hg increases from 1 ug/L near the spring discharge area of Herman Impoundment to 17 ug/L in the monitoring well nearest to Clear Lake. Other interesting and important geochemical trends will be discussed as well.