EVALUATION OF A LARGE AREA SHALLOW EVAPORATION BASIN (LASEB) IN A PLAYA ENVIRONMENT FOR FINAL HEAP LEACH DRAIN-DOWN DISPOSAL[1]

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Abstract. A heap leach gold mining company located in northern Nevada is preparing for closure. The mine must dispose of approximately 1.89 billion liters of heap leach drain-down solution from the leach pad. The mine proposes to apply the initial drain-down solution to the surface of a playa for evaporation, located approximately 10 kilometers southeast of the mine property. The mine must demonstrate to the regulatory authorities that solution will not degrade the groundwater or significantly increase the specific constituent load on the playa surface.

AMEC Earth & Environmental (AMEC) in Sparks, Nevada provides engineering consulting services for the mine's closure preparation. AMEC performed the playa investigation for the design of the LASEB. The investigation involved drilling, sampling and installing two piezometers to 15 meters (m), installing a nested piezometer cluster to 30.5 m, 15 m and 4.6 m, performing a playa surface crust sampling program for profile II analyses, and the design construction and instrumentation of a 36.5 m^2 infiltrometer coupled with a meteorological station. The total LASEB area is approximately 8.9 million square meters. Solution will be gravity drained via pipeline to the LASEB and discharged at the land surface for containment and evaporation. Materials testing results show that the playa near surface clays and elastic silts have an average hydraulic conductivity of 2.0 $x10^{-7}$ cm/sec.

The infiltrometer data, high evaporation rates and the nested piezometer data all support a net upward hydraulic gradient within the playa system. Analytical results from a playa surface crust sampling program indicate that the playa has an average pH of 10.0 and a calculated average total dissolved solids of 195,000 parts per million. The playa investigation results support the hydrologic characteristics of a discharge playa with a net upward hydraulic gradient and meet the design criteria for a solution containment and evaporation basin.

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[1]Paper was presented at the 2003 National Meeting of the American Society of Mining and Reclamation and the 9th Billings Land Reclamation Symposium, Billings MT, June 3-6, 2003. Published by ASMR, 3134 Montavesta Rd., Lexington, KY 40502.

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