FIU PROJECT 3 - 2012 FACT SHEET

Modeling of Groundwater Flow and Contaminant Transport at the Moab Site

FIU's Applied Research Center (ARC) has utilized a groundwater numerical model to evaluate the tailings pore-water seepage in order to assist in effective dewatering of the tailings pile and to optimize the groundwater extraction well field as part of the DOE Uranium Mill Tailings Remedial Action (UMTRA) for the Moab site.

In order to reduce contaminant mass in the groundwater system and to be protective of potential endangered fish habitat in backwater areas of the river, the model will be used to simulate the following remedial actions proposed by DOE: (i) Pumping contaminated groundwater from the shallow plume to an evaporation pond on top of the tailings pile, and (ii) Injecting the diverted Colorado River water into the alluvial aquifer. The numerical simulator SEAWAT is used to model variable density groundwater flow and transport at Moab site.

Figure 1. Moab project site

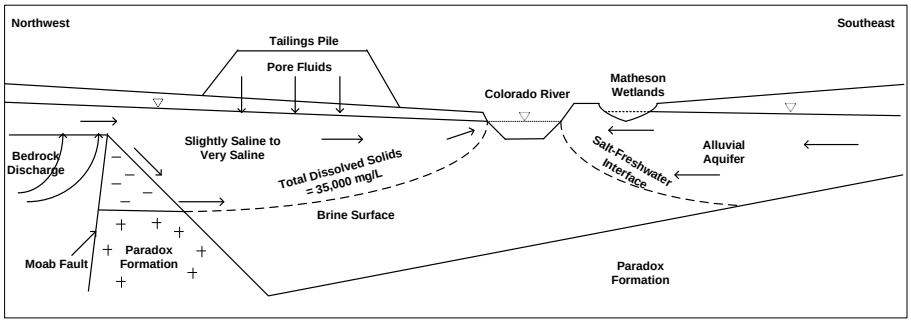

Figure 2. Conceptual model of groundwater system geometry and flow process

Project Objectives

- Utilization of a density-dependent model of groundwater flow to assess the general effects of brine on subsurface water movement and associated transport of contaminants released from a legacy tailings pile.
- Numerical simulations of remedial scenarios proposed by DOE including pumping of contaminated groundwater from the shallow plume to an evaporation pond on top of the tailings pile, and injecting the diverted Colorado River water into the alluvial aquifer in order to predict the outcome of each remedial action and to investigate the effectiveness of each scenario.

Project Benefits

- Simulation of the effectiveness of planned remediation activities for reducing ammonia and uranium concentrations in groundwater that discharges to riparian areas of the Colorado River that contain endangered fish.
- Optimization of the operation of groundwater extraction well fields, infiltration of treated water, and injection of clean fresh water for DOE UMTRA site in Moab, Utah.
- Simulation of the effects of discharge of a legacy ammonia plume located in the brine zone beneath the site on the overlying saline zone.
- Development of models capable of simulating nitrogen and uranium transformations along flow paths and density-dependent flows related to brine in the groundwater system beneath the site.

Project Accomplishments

- Reconfiguration of an existing Moab model with current spatial and timeseries data. The model was calibrated using pumping test data and several years of regular monitoring data to show natural seasonal variations and responses to other stresses.
- The model reasonably matches conceptual mass balance information and replicates expected temporal groundwater flow patterns.
- The difference in measured and modeled groundwater levels is likely a function of the assigned Colorado River stage.
- The model predicts that approximately 60% of the water entering the groundwater flow system from Moab Wash and bedrock occurs in the upper three model layers. This result is in agreement with the conceptual model that hypothesizes that recharge and salinity are correlated; the fresher the groundwater the higher the recharge rate.

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