

# Groundwater Modeling Used to Design of a Tailings Impoundment Removal near Yellowstone National Park<sup>1</sup>

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By the late 1960s, Soda Butte Creek was considered the most polluted stream entering Yellowstone National Park. A significant portion of the pollution was coming from the McLaren Tailings impoundment, constructed in the channel and floodplain of Soda Butte Creek near the community of Cooke City, Montana. The majority of the tailings impoundment was saturated with metals-contaminated groundwater. Following the 1988 Yellowstone fires, the site was designated an Emergency Response Action Site by the Environmental Protection Agency due concerns with flooding and a tailings release to Soda Butte Creek and the National Park. To remove the impoundment, the Montana AML program was faced with excavating tailings to depths of 35 feet below ground surface and up to 30 feet below the water table in the impoundment. A confined aquifer system was directly beneath the impoundment and contained groundwater under artesian conditions. Extensive hydrological and modeling investigations were conducted to design the water management portion of the project. A three-dimensional groundwater flow model was developed to evaluate well locations, required groundwater extraction rates, dewatering timeframes, seasonal pumping schedules, and alternate management strategies. A critical insight gained through this work was that the construction dewatering and water treatment efforts would be best achieved by pumping the aquifer system underlying the impoundment instead of extracting water directly from the tailings. The modeling work was tested by the installation of a 17-well dewatering system, groundwater pumping rates exceeding 800 gallons per minute and complete excavation of the tailings impoundment. The successful design and operation of the dewatering system resulted in project completion one year ahead of schedule. Project innovations have been recognized by awards given by the American Council of Engineering Companies and the National Association of Abandoned Mine Land Programs.

Additional Key Words: Construction dewatering, mine reclamation, numerical modeling.

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<sup>1</sup>. Oral paper presented at the 2017 National Meeting of the American Society of Mining and Reclamation, Morgantown, WV: *What's Next for Reclamation?* April 9 - 13, 2017. Published by ASMR, 1305 Weathervane Dr. Champaign, IL 61821.

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