Construction of a Deep Permeable Reactive Barrier in a Slurry-Supported Trench

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A deep permeable reactive-iron barrier (PRB) was constructed to contain and treat groundwater contaminated with chlorinated solvents at the Lake City Army Ammunition Plant, Independence, Missouri. The plume occurs in unconsolidated sediments of residual and colluvial clay overlying Pennsylvanian claystone. The bulk hydraulic conductivity of the unconsolidated sediments at the PRB is approximately 7 x 10^{-4} cm/sec. Concentrations of individual compounds are 1,000 µg/L or less. Treatability tests confirmed acceptable contaminant degradation by zero-valent iron that had been in contact with a guargum-based biopolymer slurry. A long-stick hydraulic excavator was used to excavate the trench while biopolymer slurry provided liquid shoring. A mixture of sand and iron was placed in the trench, with temporary steel endstops separating the backfill from the active excavation. Construction was delayed due to an unstable working surface for the excavator and premature breakdown of the slurry, but was completed after resuming excavation from the far end of the PRB alignment with an improved working surface. Post-construction testing is being done to assess the distribution of treatment media. The 400-foot long barrier is keyed into bedrock, with an average depth of 43 feet and a maximum depth of 64 feet.