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Life-Cycle Optimization of an Existing Remediation System for Treatment of Perchlorate-Contaminated Groundwater

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Background/Objectives. Naval Weapons Industrial Reserve Plant (NWIRP) McGregor was used until its closure in 1995 as a bomb and rocket motor manufacturing facility and consisted of isolated industrial sites located on 9,700 acres, 20 miles west of Waco, Texas. During the course of its history, volatile organic compounds such as trichloroethene and 1,1,1-trichloroethane and ammonium perchlorate were released into the environment. Due to its fate and transport characteristics, perchlorate was able to migrate over one mile downgradient from some release locations and became the primary contaminant of concern. To prevent the spread of perchlorate contamination, the Navy installed a series of groundwater collection trenches (effluent treated with an aboveground fluidized bed reactor) and in situ bio-barriers between 2002 and 2005. The primary exposure pathway of concern is the discharge of perchlorate-contaminated groundwater to on site tributaries, which ultimately flow into a downstream reservoir used to provide drinking water. The Navy has implemented a life-cycle optimization process for this site to ensure the remedy is protective of human health and the environment and to ensure cost-effectiveness.

Approach/Activities. The Navy's optimization approach has consisted of five major efforts: 1) initial optimization efforts to improve automation and remote system monitoring of the groundwater collection trenches and FBR operations, 2) continuous optimization of the long-term monitoring system to reduce groundwater analyte and monitoring well redundancy, 3) re-evaluation of the groundwater resource classification based on data collected during remedial activities with the goal of changing the groundwater classification from Class 2 to Class 3 and potentially raising cleanup criteria by a factor of 100 times, 4) re-evaluation of the groundwater to surface water pathway in regards to the attenuation capacity of the surface water system and the ecological risked posed by perchlorate, and 5) ultimately transitioning the groundwater collection/FBR system to a passive remediation system consisting of a series of in situ bio-barriers.

Results/Lessons Learned. The presentation will provide a summary of the Navy's life-cycle optimization of the NWIRP McGregor remediation system. Optimization of the long-term groundwater monitoring system has reduced the number of monitoring wells from approximately 160 to less than 100. Through successful negotiation with Texas Commission on Environmental Quality (TCEQ), the Navy was able to re-classify the groundwater resource at the former facility from Class 2 to Class 3 and increase the groundwater cleanup goal for perchlorate to 1,700 µg/L (residential) or 5,100 µg/L (commercial/industrial), depending on the land use. Through additional laboratory testing, new ecological criteria for perchlorate in surface water were developed, demonstrating that current levels of perchlorate are not a concern for ecological receptors. Finally, progress is being made to transition the site from active treatment of the perchlorate plume at the former property boundary through pump and treat to a passive remedy that will involve in situ biological treatment of perchlorate. In preparation for transitioning the site to passive treatment, the Navy plans to temporarily suspend the aboveground treatment system and monitor groundwater and surface water conditions to evaluate the assimilative capacity of the groundwater/surface water system. Following the

temporary shutdown period, the Navy will make final recommendation on remedial designs for future in situ bio-barrier installations.