INNOVATIVE APPROACHES FOR EVALUATING AS/SVE SITE REMEDIATION OPTIMIZATION, COMPLETENESS AND CLOSURE

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This paper summarizes the application of an innovative remedial progress optimization and site closure process developed for the U.S. Army Alaska at the West Quartermaster's Fueling System (WQFS), Fort Wainwright, Alaska.

Historical spills of petroleum hydrocarbons – including gasoline, diesel, and JP-4 fuels – have resulted in soil and groundwater contamination at the WQFS Site. These petroleum spills occurred at various times starting in the 1940s. In 1997, the U.S. Army initiated installation of a soil vapor extraction and air sparging (SVE/AS) system at the 8-acre (3.2 Ha) WQFS Site. The system has operated, for the most part, continuously since this time. After the installation of the system, there were 376 air sparge and 70 vapor extraction wells operating at the site.

To provide quantitative evidence to regulators that desired remedial action goals have been achieved at this site, the U.S. Army reviewed operational data compiled to date and assessed remedial progress using the **CLOSES** (Cleanup Operations and Site Exit Strategy) process. The **CLOSES** protocol called for completion of source area, product, soil, vapor, groundwater, mass balance, site monitoring, and system operation and monitoring (O&M) assessments.

Source data were compiled for all operational zones of the SVE/AS system and used to quantify the initial mass of total petroleum hydrocarbons (TPH) and contaminants of concern (including benzene, toluene, and gasoline- and diesel-range organics [GRO and DRO]). Product thickness data prior to startup of the SVE/AS system were summarized for existing monitoring wells. Product samples were analyzed prior to treatment system operation and after startup to assess effects on product chemistry. Numerical modeling was conducted to compare actual system performance to predicted performance for soil, vapor, and groundwater remediation. This information was then used to estimate the mass of TPH removed as a function of soil air extracted and to estimate the time of system operation (in years) necessary to achieve groundwater cleanup goals (maximum contaminant levels [MCLs]) for benezene, toluene, GRO, and DRO. Field data are compared to the model simulations to demonstrate the accuracy of the predictive models.

The comparison of the predictive models to the actual site conditions and data allowed the Army to recommend several system O&M modifications to the regulators. These included eliminating requirements for soil sampling, a decrease in the number of groundwater wells and frequency of sampling, and reduced system operation time. Additionally, a groundwater rebound study was conducted at the site and showed that groundwater levels did not rebound to above cleanup levels based on the shutting down the system. These recommendations have been accepted by the regulators and have resulted in savings of over $2.5 million over the operation lifetime of the system.