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Emulsified Vegetable Oil and Bioaugmentation for Remediation of a TCE Plume and Source Area

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Bioremediation using emulsified vegetable oil and bioaugmentation are planned for the full-scale remediation of a trichloroethene (TCE) plume at a former rocket engine test facility. Groundwater contamination extends from the water table near the source area to approximately 170 ft below ground surface (bgs). The dissolved phase plume extends approximately 2800 ft downgradient and is present in three hydrogeologic units: the first sand at approximately 65-105 ft bgs, the shell horizon at 105 to 135 ft bgs and the deep sand from 135 to 170 ft bgs. The site is located within an area of potential salt water intrusion, with sulfate concentrations ranging from several hundred to several thousand parts per million.

Several transects of electron donor injection wells (biobarriers) are planned for the dissolved phase plume and a grid of donor injection wells will be implemented for the source area. Emulsified vegetable oil will be used as the electron donor. In addition, all injection wells will receive a one-time addition of KB-1^{TM}, a dechlorinating culture capable of complete dechlorination of TCE to ethene. To determine the injection well spacing in the source and plume and to determine the optimal number and spacing of the biobarriers, biodegradation and natural attenuation rate constants were estimated, and emulsified vegetable oil (EVO) pilot injection tests and groundwater transport modeling were conducted.

To determine bioremediation and natural attenuation rate constants, a series of microcosm studies were conducted. These studies included KB-1^{TM}- bioaugmented treatments using aquifer material from the source and plume and amended with emulsified vegetable oil, three intrinsic control treatments using aquifer material from the shallow sand, shell layer, and deep sand (with no amendments) and a sterile control. All treatments were performed in triplicate.

This presentation will focus on the results of the microcosm studies, the EVO pilot tests and the proposed biobarrier configuration determined as a result of the groundwater transport modeling.