

Enhancing Hydrocarbon Recovery in a Low Permeability Montmorillonitic Clay Through Pneumatic Fracturing – A Case Study.

Joseph M. Fuhr, Enviro-Logical Solutions, Inc. Pneumatic fracturing, a technique developed during the early 1990's, utilizes low pressure injections of large volumes of air over discreet intervals to enhance existing fractures and to create new ones, thereby increasing the effective permeability of a formation. This technique was recently applied to a site in the panhandle of Florida. The site is an active gasoline service station with contamination present in the stratigraphic column from the surface to approximately forty feet. A low permeability montmorillonitic clay exists from approximately fifteen to twenty-seven feet. The existing remediation system employs dual-phase extraction and has effectively remediated all but the fifteen to twenty-seven foot zone. To enhance the permeability of this zone, pneumatic fracturing was applied to five specially installed wells strategically placed around the site to maximize the efficiency of the existing system. Injections were made in each of the five wells from approximately seven and one-half feet to thirty-two feet below grade at two and one-half foot intervals. Injection pressures ranged between 125 psi and 175 psi, depending on depth. Pre and post-fracture dual-phase extraction tests were performed to determine the effectiveness of the pneumatic fracturing. Results from the tests indicated a dramatic increase in the radius of influence, hydrocarbon concentrations in soil vapor, and air flow within the zone. The results suggest that pneumatic fracturing effectively increased the permeability of the formation and reduced heterogeneities with depth adjacent to the borehole, which should expedite the cleanup and closure of the site.

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