

PROJECT SNAPSHOT

ERH Remediation of Active Gas Station

ERH

Location: Bremerton, WA

Client: Confidential

Contamination: TPH-g and BTEX

Volume: 21,800 cy

Goal: Remove LNAPL and reduce dissolved phase concentrations by at least 90%

Number of Electrodes: 76

Duration: 5 months of operation

Mass Removed: 19,000 lbs.

WHAT MAKES THIS PROJECT UNIQUE?

Electrical Resistance Heating (ERH) was selected to address both soil and groundwater impact within the source area. Underlying geologic units included sandy silt, fill, dense till, and a deep gravel outwash. Due to their varying electrical conductivities, different voltages and currents were applied to the distinct soil layers using a system of stacked electrodes. A multi-phase extraction (MPE) system was used to remove LNAPL from the top of the groundwater table and captured steam and contaminant vapors from the vadose zone.

Important Project Details

- **Approach:** Electrodes were placed across the steeply sloping 12,800 ft² treatment area. Heating extended to a maximum depth of 52 ft below ground surface. The electrode design included a shallow heating element in the fill/till and a deep heating element in the outwash. Each electrode also contained a co-located MPE well capable of “slurping” LNAPL from the top of the groundwater table.
- **Challenges:** To uniformly heat the treatment volume, energy input to the fill and till layers had to be nearly identical to the level delivered to the outwash. To accomplish this, the shallow and deep electrode elements were operated at separate voltages and currents. As steam extraction during ERH lowers the groundwater table, the depths of the MPE slurping stingers had to be readjusted throughout the project.
- **Results:** Confirmatory soil and groundwater samples showed that LNAPL had been removed and dissolved phase contaminant concentrations were reduced by an average of 99%.



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