

PROJECT SNAPSHOT

SEE

Remediation of Former Waste Oil Site PHASE 2

Location: Southern New Hampshire

Client: Confidential

Contamination: Waste oil mixed with TCE, PCE, cis-1,2-DCE, 1,1,1-TCA, benzene, ethylbenzene, and naphthalene

Volume: 21,456 cy. Treatment to depths of up to 28 ft bgs in a 56,148 ft² footprint.

Goal: Meet ROD soil clean-up goals for naphthalene, VOCs and CVOCs

Duration: 16 months of operation

Number of Steam Injection Well Clusters: 112 clusters each with 2 injection screens, totaling 224 injection screens.

Mass Removed: 329,140 lbs.

WHAT MAKES THIS PROJECT UNIQUE?

The steam enhanced extraction (SEE) design was developed to meet EPA Superfund Record of Decision (ROD) soil leachability clean-up goals for benzene, naphthalene, and selected CVOCs at 95% upper confidence limit (UCL) certainty. While the naphthalene treatment goal was the driver for the design, meeting the low benzene ROD standard of 0.1 mg/kg was also a major focus of the remedy.

Steam was supplied at an injection rate of up to 13,000 lbs/hr, and water from the wellfield was extracted at rates up to 40 gpm. The liquid treatment system included a dedicated NAPL slurping system that enables skimming off any LNAPL from all multi-phase extraction (MPE) wells, along with a metals treatment system and associated sludge management system.

IMPORTANT PROJECT DETAILS

- **Approach:** The 224 steam injection well clusters each had two injection intervals. 66.3 million pounds of steam were injected, while more than 17.1 million gallons of water were extracted as steam and condensate.
- **Challenges:** Due to the high volume of low-density NAPL, a slurper system was included in the design in addition to pneumatic high temperature pumps, to remove the top layer of oil from the wells. Despite significant winterization of the steam system, some upgrades had to be performed to the system during operation to address freezing.
- **Results:** A total of 69 confirmatory soil samples were collected. ROD clean-up standards were met for all target chemicals, and post-treatment concentrations of naphthalene and benzene were 3.09 and 0.005 mg/kg respectively, measures with a 95% UCL.



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