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Case Study:

Petroleum Hydrocarbon and Chlorinated Solvent Extraction and Treatment
Van Nuys, California | 2009

Project Overview

Location:
Van Nuys, CA

Duration:
11 months

Wells:
30 SVE wells at a depth of 160 ft bgs

Process Flow:
250-300 ACFM

Contaminants:
Benzene,
Toluene,
Ethylbenzene,
Xylenes,
Methyl-tert-butyl-ether (MTBE), PCE & TCE

VOC Mass Recovered:
Approximately 10,000 lbs

Project Savings:
Approximately \$105,200

Site History

The site is an active fueling terminal located in Van Nuys, California. The site has underground storage tanks of petroleum fuel as well as numerous above ground storage tanks for containment of various hydrocarbon and chlorinated solvent compounds.



Vapor Treatment

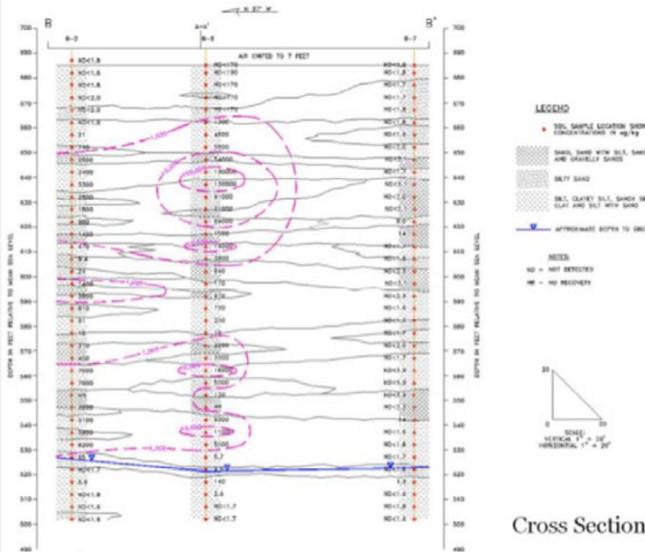
- 250-300 ACFM
- 30 Vapor extraction wells across shallow, intermediate and deep screened zones down to 160 ft bgs.
- Designed with the objective of maximizing hydrocarbon and VOC removal in one year or less

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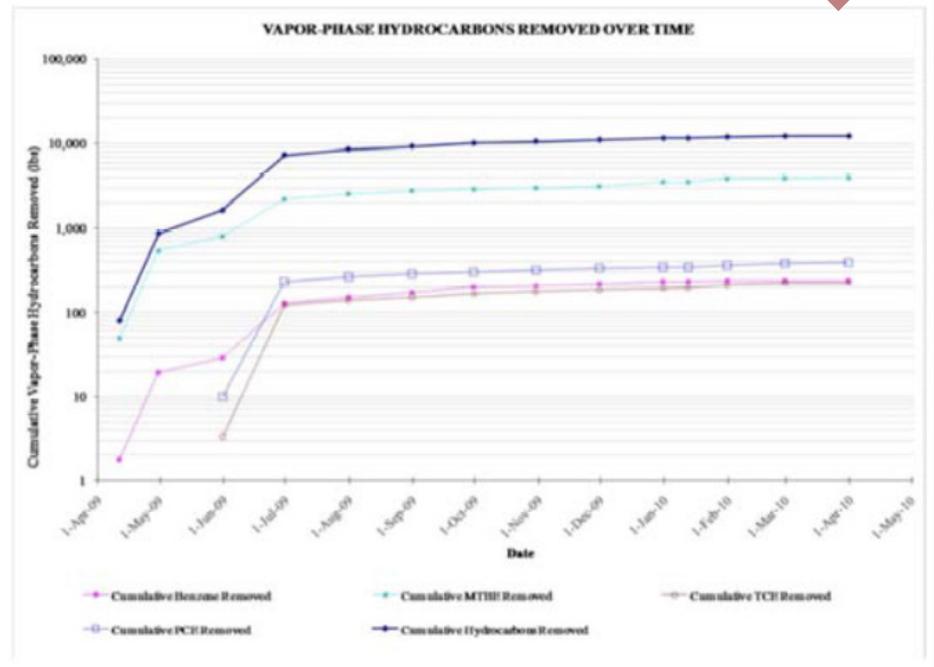


Cost Performance

Client reviewed estimated operational costs for thermal oxidation and refrigerated condensation (C3 Technology) and estimated a cost savings of \$105,200 during the short period of time needed to reduce the vapor concentrations and change to granular activated carbon at a lower cost. C3 Technology removed over 13,000 pounds of hydrocarbons/VOCs in less than 11 months. The client has chosen to utilize GEO's unit as the long term SVE technology.

Site Geology

Soils at the location consist primarily of interbedded layers of silt, clayey silt, sandy silt, and fin- to coarse-grained sand to the total depth of 190 feet below ground surface (bgs). Depth to groundwater was approximately 160 feet bgs.



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Case Study:

Chlorinated Solvents: Methylene Chloride and TCE

Long Beach, California

Vapor Treatment

The vapor treatment system consisted of the following:

- Two SVE treatment units, each consisting of two skid-mounted extraction/compression units. Each SVE treatment unit was capable of producing a maximum airflow rate of 200 scfm for a combined treatment capacity of 400 scfm.
- Two refrigeration condensation (C3) mobile units, with regenerated absorbers.
- A 2,000-gallon double-walled aboveground storage tank for storing accumulated VOC condensate.
- Two 2,000-pound Granular Activated Carbon (GAC) adsorption vessels operated in a lead-lag (series) to meet the air quality permit requirements.
- One 2,000-pound permanganate-impregnated zeolite media vessel to remove traces of vinyl chloride, if present, in the effluent from the C3 systems.

Performance Evaluation

Phase I operation of the GEO system resulted in near 100% removal efficiency for VOCs, including TCE and MeCl. The GEO system removed approximately 92,000 pounds of VOCs (including 21,000 pounds of TCE and 56,000 pounds of MeCl). These quantities were calculated by averaging influent vapor concentrations collected from monthly sampling and assuming that these average concentrations were constant between the two sampling events. The calculation for VOC mass removed is equivalent to approximately 1,800 gallons of TCE and 5,100 gallons of MeCl. Removal efficiency and VOC mass removal by the SVE system were calculated for total VOCs, TCE, and MeCl, using laboratory analytical data and system flow rate measurements.

Figure 2 illustrates the total mass removed over time based on laboratory data. The total condensate removed, condensed water and VOCs extracted from soil vapors and transferred to the AST by the C3 G.E.O. units since start up was 16,763 gallons. The actual volume of removed condensate differs from the calculated VOC mass removal volume (6,900 gallons) primarily due to water that is also condensed by the C3 units adding to the total actual volume recovered in the condensate. The system ran for 16,881 hours (approximately 700 days). The SVE system was shut off on December 19, 2008, due to low influent VOC concentrations in preparation of Phase II.

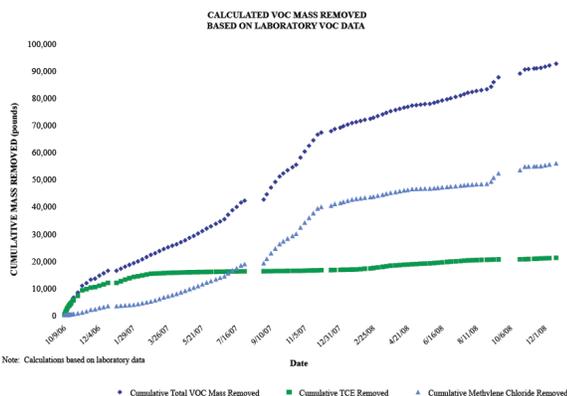


Figure 2. Cumulative mass removed for total VOCs, TCE, and MeCl based on laboratory analytical data