

Manufacturing Site Gets Closure using In Situ Desorption with Vacuum Enhanced Recovery for Petroleum Hydrocarbons

Successful PetroCleanze® Treatment Results in 90% Mass Reduction of Petroleum Hydrocarbons

Project Highlights

- VOC levels show a 99% decrease in soil and 66% decrease in groundwater contamination
- Unique desorption reagent and enhanced recovery process approved for use by Michigan DEQ
- Site closure granted for two petroleum releases within same general area

Project Summary

Two separate UST petroleum releases were identified within the same general area of the manufacturing site with one being more recent and the other an older historic release. Following soil hydro-excavation activities which were limited by a building footprint, residual VOC contamination was identified at concentrations of 770,820 µg/kg in soil and 12,387 µg/L in groundwater. In-situ remediation using PetroCleanze®, an enhanced desorption/extraction technology was planned for use to treat the remaining high levels of VOCs. PetroCleanze is optimized to desorb bound hydrocarbon mass and drive it from the soil matrix into the aqueous phase. Once pollutants are moved into the dissolved phase, its ability to chemically oxidize portions of the contamination coupled with enhanced recovery (physical extraction) effectively reduces contaminant concentrations.

Remediation Approach

A total of four initial PetroCleanze injection/extraction events took place in two treatment areas close to where the UST was once located. Each injection used a total of 1,320 lbs. of PetroCleanze and 925 lbs. of RegenOx Part A; the material was applied as a 5% solution (2000 gallons) through eight direct-push injection points. The vertical treatment interval ranged between 5 feet to 15 feet below ground surface. Following each injection, a vacuum enhanced recovery event was performed approximately two weeks later. The two week period was critical as it allowed PetroCleanze time to react and free up the bound hydrocarbon mass. Approximately 2,000 gallons of petroleum impacted water was removed during each extraction event and disposed of at a licensed disposal facility. Correlating soil samples in key treatment areas indicated that concentrations were reduced up to 99% with the exception of one area which required an additional injection event. Based on the site conditions, subsurface obstructions limited the influence of the PetroCleanze to this area. Therefore, a fifth injection event was conducted immediately surrounding the residual area in which the soil contamination remained to directly address the soil contamination. Correlating soil samples following the additional injection event indicated the concentrations were reduced up to 90%. Six months after treatment, groundwater VOC levels in EW-2 were reduced from 12,000 µg/L to 4000 µg/L marking a 66% reduction in the treatment zone. Within the same well, following each injection/extraction event, TPH data reported concentrations consistently decreasing from 20,000 µg/L to 10,000 µg/L to 5,900 µg/L. In 2014, as a result of the significant reductions in both soil and groundwater contamination, Michigan DEQ approved restricted UST closure for the two petroleum releases with no further action required.

Technology Description

PetroCleanze is a customized formulation of the widely used RegenOx in situ chemical oxidation technology. The primary function of PetroCleanze is to increase the desorption rates of hydrocarbons bound in saturated soil and make them available for more efficient and rapid treatment using a range of enhanced recovery technologies.




PetroCleanze®

Site Type: Manufacturing Operation

Contaminants of Concern:
Petroleum Hydrocarbons (BTEX,
TPHg, TPHd)

Remediation Approach: Enhanced
desorption and vacuum enhanced
recovery

Soil Type: Silty Sand

Technologies Used: PetroCleanze
and Vacuum Enhanced Recovery