GTR+C^3 Case Study:

Redwood City

GTR + C3 Overview

Neighborhood:
Downtown

Heating Tubes: 9

Heating Period: 6.5 Months

Destruction Rate Efficiency:
> 99%

Contaminant:
PCE, TCE

Geology:
Silt
Silty Clay

Volume:
142 yd^3

Overview

The former Dry Cleaner site was located in Redwood City, California, contaminated by tetrachloroethylene (PCE) with a maximum concentration of 7,100 µg/kg in soils at a depth of 5 feet below ground surface (bgs). Affected soils also contained low levels of PCE degradation byproducts such as trichloroethylene (TCE) and were presumed to have an approximate extent of 384 square feet (16' x 24' area) to a depth of 10 feet beneath the building. The remediation goal was driven by vapor intrusion risk requiring final levels to be below commercial soil gas screening criteria.

GEO's patented GTR© system was used for In-Situ Thermal Remediation (ISTR) to significantly accelerate PCE mass removal by heating affected soils and/or groundwater to target temperatures of 100°C. C3 Technology refrigerated vapor condensation process was utilized to compress, refridgerate, and condense >99.9% of the PCE and TCE from the vapor stream. The combination of ISTR and C3 technologies enable rapid volatilization and removal of PCE from subsurface soil and groundwater, and condense the PCE above ground rather than transfer to the atmosphere or onto activated carbon destined for landfill.

Full Scale Approach

The In Situ Thermal Remediation was installed in three overlapping stages. In total, GEO installed 9 thermal conductive heating wells with co-located vapor extraction wells in a triangular grid pattern over the 384 sq ft rectangular treatment zone. 6 GTR+F© heaters energized the wells, fueled by a temporary propane tank system. 10 thermocouples were placed throughout the target treatment area, at varying distances and depths from the heating wells. A central PLC system monitored and controlled each GTR+F© heater to achieve optimum in situ heating results.

Results

The remediation goals were achieved in 6.5 months resulting in 99% reduction of PCE contamination from the subsurface soils. All air quality management agency discharge requirements were met satisfactorily. One of the lessons learned was highlighted by unknown neighboring contamination beneath a railroad line which began to migrate into the treatment zone resulting in extended heating time and highlighting the need for high-resolution site characterization with clearly defined treatment goals and boundaries.