

# Chlorinated Solvent Plume Remediation

Midwest United States



ERM was contracted by a confidential client to implement a remedial action program to address groundwater impacted by chlorinated solvents. The site is a former manufacturing facility, which used an underground storage tank for waste oil generated by manufacturing operations and cleaning activities. During excavation of the tank, it was determined the feeder line was leaking waste oil containing chlorinated solvents, including PCE and 1,1,1-TCA.

The site is located in the river deposits of a Midwestern United States river characterized by interbedded silts and sands to a depth of about 12 feet, and medium to fine grained sands below 12 feet. Groundwater was encountered at a depth of approximately 30 to 35 feet.

## ERM's Approach

ERM evaluated several different remedial technologies including air sparge and soil vapor extraction, pump and treat, and in-situ chemical oxidation. When evaluating these alternatives, ERM considered several different factors, including:

- Stratigraphy
- Short term capital investment and operating costs
- Impact to current operations and neighbors
- Potential longer term costs to closure

ERM identified the ART In-Well Stripping System as the preferred technology at this site. ERM designed an approach that initially included one ART well with a mechanical system capable of manifolded up to three wells, if required. The ART well was installed to a depth of 65 feet, with the pump installed at a depth of 50 feet. ERM worked closely with ART to establish the optimum operating parameters and observe the impact of the system on the aquifer system. ERM operated the system in different configurations to establish the efficacy of each component of the system, as well as assessing where the majority of mass was expected to be recovered. ERM recorded water levels and vacuum reading in observation wells and existing monitoring wells, collected frequent groundwater samples, collected frequent air samples from the system piping, while varying the flow and pumping rates within the system, and dissolved oxygen levels in observation points

and groundwater monitoring wells to assess the sphere of influence from the system

After reviewing the data obtained from the pilot study and establishing the longer term operating parameters, ERM implemented the system on a full scale basis.

## Results

Induced vacuum was detected in wells located up to about 40 feet from the ART well, while the water levels showed impacts approximately 30 feet away from the ART well. The analytical results from groundwater samples collected over time showed that the concentrations of constituents of concern (primarily PCE) decreased from approximately 200 micrograms/liter ( $\mu\text{g/L}$ ) to less than the MCL ( $5 \mu\text{g/L}$ ) in the source area in about 8 months.

The system was operated for approximately 14 months total, and then shut down. Rebound sampling showed very little rebound in groundwater concentrations at the source area. Site is pursuing a No Further Action conclusion from the regulatory authority.

## Conclusions

The installation of the ART In-Well system achieved the remedial cleanup objective at the source in a time frame that was faster than anticipated with other traditional remedial technologies at a cost estimated to be approximately 20 to 30 percent less than other technologies, including installation and power costs. Importantly though, the ART system did not require above ground treatment of groundwater or wasting of water to the sewer, thus providing a sustainable approach to the remediation of the impacted groundwater.

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