



TRS
Accelerating Value

Guaranteed Fixed Price Remediation of TCE, PCE and VC in Soil and Bedrock under an Active Manufacturing Facility Confidential Client Greensburg, IN

Project Summary

TRS Group, Inc. (TRS), as a subcontractor to St. John, Mittelhauser and Associates (SMA) provided a guaranteed fixed price remediation of trichloroethene (TCE), tetrachloroethene (PCE) and vinyl chloride (VC) in soil using Electrical Resistance Heating (ERH) at a confidential site located in Greensburg, IN.

Unique aspects of this project included:

1. Operation of one ERH system to treat four distinct and separate source areas.
2. Design of eleven different custom electrodes to match the contaminant profile in the four treatment areas.
3. The contaminants of concern extended into bedrock in two of the source areas, requiring an electrode design and installation technique to treat the overburden soil and bedrock simultaneously.
4. Half of the system was installed under an active manufacturing facility.

The total treatment volume was 20,611 cubic yards. The entire ERH system was installed in four months. The full system operated for six months and achieved the guaranteed remediation goals. The remedial goals at the site were to reduce TCE and VC soil concentrations to the 95% upper confidence limit (UCL) of 13 mg/kg and 1 mg/kg, respectively. The PCE remediation goal was 23.8 mg/kg in soil.

System Construction

The ERH system included 133 electrodes with co-located vapor recovery (VR) wells. Thirty-five of the electrodes were installed using Sonic Drilling techniques and extended into the bedrock (Figure 1). Fifty electrodes were installed within the active facility using a limited access drill rig (Figure 2).



Figure 1. Mini Sonic Drilling Technique



Figure 2. Limited Access drilling in the NED

Background

This active manufacturing facility is located in Greensburg, IN. The four ERH treatment areas were identified as: the North West Degreaser (NWD); the North East Degreaser (NED); the TCE Aboveground Storage Tank (AST); and the Used Coolant Underground Storage Tank (UST). While PCE was present at elevated levels in the UST area, and all four treatment areas contained measurable amounts of TCE breakdown products (i.e. VC and cis-1,2-dichloroethene), TCE was the primary contaminant of concern at the site.

Site Characteristics & Design Parameters

The total treatment area was approximately 26,436 square feet. The depth of active subsurface heating varied not only between the four treatment areas, but also within the treatment areas. The largest heating interval extended from 2 to 38-ft below grade surface (bgs), while the average heating interval extended from 7 to 28-ft bgs. The resulting target remediation volume was approximately 20,611 cubic yards. The site lithology in the remediation area consisted of clay with sand lenses to 30-ft bgs. Dolomite bedrock was encountered at 30-ft bgs. Groundwater was encountered, on average at 17-ft bgs.

TRS Contact Information

Mr. David Fleming, (425) 396-4266, dfleming@thermalrs.com, www.thermalrs.com





Figure 3. Completed UST Area



Figure 4. Completed NWD Area

The remaining electrodes were installed using hollow stem auger drilling. Ninety percent of the electrode installations were completed above grade. All conveyance piping and electrode cabling were routed below grade or along walls to keep storage areas open, and maintain the facility personnel and vehicle traffic routes. The completed outdoor UST installation is shown in Figure 3 and the completed indoor NWD installation is shown in Figure 4.

Operations

The ERH specialty equipment from the TRS fleet included: one custom-manufactured 2,000-kW Power Control Unit (PCU) for continuous power delivery to the treatment volume; one 40-horsepower blower for vapor recovery; and, one condenser to separate water from the recovered vapor. Granular Activated Carbon (GAC) was used for vapor treatment to remove volatile organic compounds from the air stream.

ERH operations began on September 9, 2008 and were completed by April, 2009. Once soil sampling performed in December 2008 confirmed that 80% of the treatment areas had met the remediation goals, the energy in these areas was halted and redirected into the remaining 20% of the treatment areas. The remaining areas were remediated between January 2009 and April 2009.

Project Results

The confirmatory soil sampling program included the analysis of 204 soil samples collected from 71 locations. Post-ERH sampling confirmed that the site closure 95% UCL criteria for TCE soil had been met or exceeded in all four treatment areas. The remediation goals for VC and PCE were also met. The average and 95% UCL results for TCE in soil are shown in Figure 5.

During system installation, and prior to operations, the floor slab and walls of the facility were surveyed and mapped for cracks. At the conclusion of the ERH project, the building was examined again, and no changes in building conditions were observed.

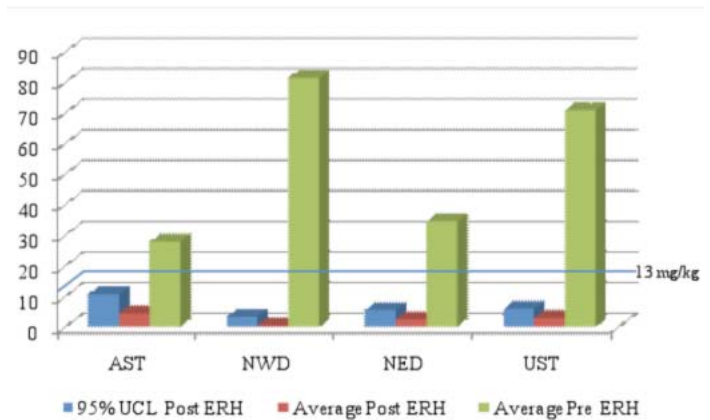


Figure 5. Pre- and Post-ERH Average and 95% UCL TCE in Soil

Summary

TRs Project Manager:
 TRs Project Engineer:
 Site Geology and Hydrology:

Mr. Chris Thomas
 Mr. Eric Maki
 Clay with Sand lenses to 30-ft bgs. Dolomite bedrock below 30 ft-bgs;
 Groundwater on average 17-ft bgs

Treatment Area Size, Volume, and Depth:
 Beginning Maximum Contaminant Concentrations:
 Remedial Goal(s):

26,436 ft²; 20,611 yd³; and average 7 to 28-ft bgs
 1,400 mg/kg TCE; 560 mg/kg PCE in soil
 TCE concentrations less than the 95% UCL of 13 mg/kg. VC concentrations less than the 95% UCL of 1 mg/kg. PCE concentrations less than 23.8 mg/kg
 Averages - 2.6 mg/kg TCE; 0.17 PCE; and 0.70 VC in soil
 80% September – December 2008 and remaining 20% January - April, 2009
 Guaranteed Fixed Price Remediation

Actual Cleanup Achieved:
 Period of Performance:
 Contract Terms: