



# Removing CVOCs Under a Building Equals Increased Property Value

## Tucker, Georgia

### Project Summary

TRS Group, Inc. (TRS) worked as a subcontractor to Brown and Caldwell to remediate five chlorinated volatile organic contaminant (CVOc) source areas in the soil under a manufacturing building. To accomplish this, Electrical Resistance Heating (ERH) remediation, it was necessary to place over 70 electrodes and vapor recovery wells through the main floor of the facility and to use angled electrodes to access soil under an inaccessible compressor room.

Contaminants of concern included Tetrachloroethene (PCE), Trichloroethene (TCE), 1,2-Dichloroethene (DCE), and Methylene Chloride (MeCl). An extensive confirmatory soil sampling program showed that the ERH system accomplished every project goal and average Total CVOc concentrations in soil were reduced by 99.98%. Rapid remediation and elimination of environmental restrictions will allow the client to realize a \$10 million increase in the property value.

<i>TRS Project Manager:</i>	<i>Mr. Jerry Wolf</i>
<i>TRS Engineer:</i>	<i>Mr. Greg Beyke, P.E.</i>
<i>Site Geology and Hydrology:</i>	<i>Silty-clay saprolite (weathered bedrock)</i>
<i>Treatment Area Size, Volume, and Depth:</i>	<i>16,357 ft<sup>2</sup>; 10,453 yds<sup>3</sup>; and 0-19 ft bgs</i>
<i>Beginning Contaminant Mass:</i>	<i>20 pounds of Total CVOcs</i>
<i>Mass Removed by ERH:</i>	<i>175.6 pounds of Total CVOcs</i>
<i>Remedial Goal(s):</i>	<i>PCE 180 µg/kg; MeCl 80 µg/kg; TCE 130 µg/kg; DCE 530 µg/kg</i>
<i>Actual Cleanup Achieved:</i>	<i>PCE 2.6 µg/kg; MeCl 4.1 µg/kg; TCE 2.5 µg/kg; DCE 2.2 µg/kg = 99.98% CVOcs</i>
<i>Period of Performance:</i>	<i>148 days of ERH operations</i>
<i>Contract Terms:</i>	<i>Standard Fixed Price Remediation (SFPR)</i>

### Background

The five separate source areas were underneath a former manufacturing facility located in Tucker, Georgia. Well before ERH remediation, operations in the building had ceased and most facility equipment had been removed. While not necessary for ERH, working in an empty facility did make system installation easier.

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### Site Characteristics & Design Parameters

The treatment regions, with areas, depth intervals and remediation volumes, are described in Table 1.

**Table 1.** ERH Treatment Areas, Depth Intervals, and Volumes

<b>Region</b>	<b>Treatment Area (Square Feet)</b>	<b>Depth Interval (Feet Below Ground Surface)</b>	<b>Volume (Cubic Yards)</b>
Area 1	2,107	0 – 20	1,561
Area 2	1,722	0 – 10	638
Area 3	2,772	10 – 20	1,027
Area 4	9,756	0 – 20	7,227
<b>Totals</b>	<b>16,357</b>		<b>10,453</b>

Site lithology in the remediation area consists of silty-clay saprolite (weathered bedrock) over partially weathered rock and then bedrock. Groundwater was encountered on aver-

age across the site at 20-feet below ground surface (bgs), and active ERH heating stopped just above the top of the groundwater table.

## System Construction and Operations

The ERH system incorporated 73 electrodes, each with a co-located vapor recovery (VR) well. Subsurface temperatures were measured using 60 thermocouples placed at 2, 6, 10, 14, and 18-ft bgs within 15 temperature monitoring points (TMPs). Temperature data was automatically uploaded to the ERH control computer.

Recovered soil vapors were treated using vapor phase granular activated carbon (GAC), while recovered steam was condensed, and either evaporated in the condenser-

cooling tower or treated with liquid phase GAC before being returned to the subsurface at each electrode.

ERH operations lasted 148 days and a total of 1,820,712 kilowatt hours (kW-hrs) of energy were applied to the subsurface. The total amount of energy input into the subsurface and the number of days necessary to apply that energy were both lower than original design estimates and represented direct project savings for the property owner.

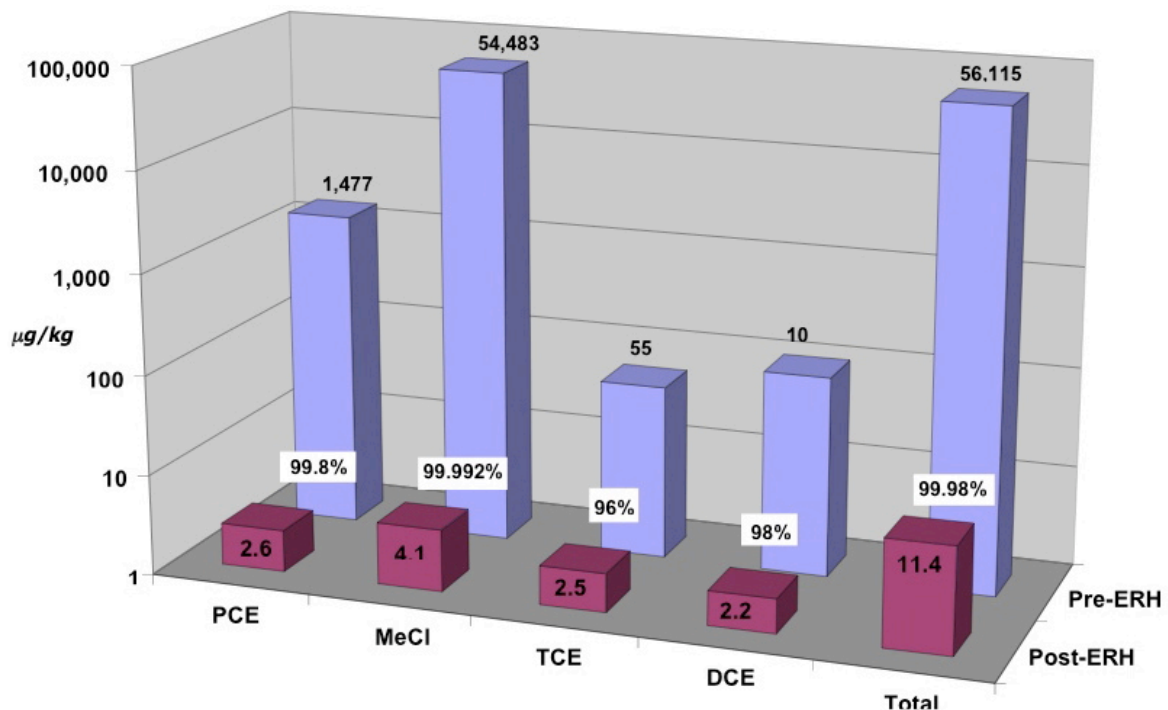
## Project Results

The estimated pre-ERH mass of CVOCs in the treatment volume was 20 pounds. Weekly vapor sampling indicated that at least 175.6 pounds of CVOCs were removed by the ERH operations. A total of 61 confirmatory soil samples were collected at 40 locations within the treatment area. Sampling indicated that the concentration of each CVOC had been reduced to below its clean-up criteria. Additionally, concentrations of the CVOCs in all but 1 of the 61 soil samples were below analytical detection limits.

During post-ERH sampling, soil samples from outside the northern perimeter of the ERH treatment area were analyzed for CVOCs. Results indicated that a small area to the north of the original treatment volume contained PCE concentrations in excess of the site cleanup goal.

As a result, TRS installed four electrodes in this area and performed ERH on an Additional Treatment Volume (ATV). The ERH application to the ATV quickly and efficiently reduced PCE concentrations in soil by a minimum of 98.5%. Client reported post sample results all returned basically ND for the entire site.

The cleanup goals for both the original and the ATV source areas were met on time and on budget. Confirmatory soil sampling indicated that the ERH system successfully accomplished every project goal and an average reduction in Total CVOC concentrations of 99.98% was achieved within the treatment volumes. Figure 1 illustrates Total CVOC concentrations in soil before and after the application of ERH.



**Figure 1.** Concentrations of Total CVOCs in Soil Pre- and Post- ERH