



### Results:

- Approximately 1,297 lbs (590 kg) of contaminants were removed representing an estimated 95% reduction of trichloroethylene (TCE) mass.
- Thermal treatment significantly decreased the time needed for operation of the existing groundwater treatment plant (plant shutdown in 2014).

### Approach:

- In Situ Thermal Treatment (ISTT) utilizing McMillan-McGee's patented Electro-Thermal Dynamic Stripping Process (ET-DSP™) combined with steam injection.
- Target Treatment Zone (TTZ):
  - ◊ Area= 14,820 square feet (1,380 m<sup>2</sup>)
  - ◊ Volume= 17,450 cubic yards (13,340 m<sup>3</sup>)
- 64 Electrode wells
- 29 Vapor extraction wells
- 15 Multi-phase extraction wells
- 12 Steam injection wells
- Granular activated carbon for vapor treatment

### Time Frame:

February 2010 - September 2011

### Regulatory Oversight:

USEPA/MADEP

### Project Team:

TerraTherm performed this project under contract to Nobis Engineering, Inc. TerraTherm's principal teaming partner for the subsurface heating was McMillan-McGee Corporation.

**For further information:**

**TERRATHERM**, Inc.  
[www.terratherm.com](http://www.terratherm.com)

### Site Information:

In 1979, Volatile Organic Compound (VOC) contamination was detected at concentrations above drinking water standards in two municipal water supply wells in Groveland, MA. The wells were shut down. The main source of the contamination was identified as the former

Valley Manufacturing Products Company, which began manufacturing various metal parts in 1963. At the time, operators disposed of liquids through a leach field and it was later determined that a leaky underground storage tank containing TCE was also a source of groundwater contamination. Nearly 850 acres (344 hectares) (including the former Valley Manufacturing Products Company property now known as the Groveland Wells Superfund Site) were added to the National Priorities List in 1982. Remedial actions at the Site included the installations and operation of a Soil Vapor Extraction (SVE) system in the source area between 1992 and 2002 and a groundwater extraction and treatment system, which has operated since 2000. Following a remedial investigation, it was determined that the SVE system was ineffective, thus ISTT was recommended.

**Contaminants of Concern (COCs):** TCE; 1,1-dichloroethene; trans-1,2 dichloroethene; cis-1,2-dichloroethene; methylene chloride; tetrachloroethene; 1,1,1-trichloroethane; toluene; vinyl chloride.

### Site Geology/Hydrogeology:

- Shallow overburden (fill and dark brown loamy sand) layer extending from the ground surface to approximately 4 to 8 ft (1.2 to 2.4 m) below ground surface (bgs). The shallow overburden has a thin layer of perched groundwater in the sand layer just above the clay.
- Clay layer approximately 2 to 10 ft (0.6 to 3 m) thick, thinning north to south. The clay layer is approximately 8 to 16 ft (2.4 to 4.9 m) bgs with a downward hydraulic gradient
- Deep overburden composed of silty fine sand and/or glacial till extending to bedrock.
- Varying bedrock surface at approximately 45 ft (14 m) bgs.

**Objective:** The overall objective of the Remedial Action was to reduce concentrations of contaminants in the source area vadose zone soil and overburden groundwater to below the cleanup goals specified in the Record of Decision and Explanation of Significant Differences.

**Challenge/Solution:** Due to high soil resistivity and permeability encountered in the vadose zone during electrode operation, the heating system was modified to include shallow steam injection wells.



*An aerial view of the Groveland Wells Superfund Site*