



Groveland Well No. 1 & 2 Superfund Site Groveland, MA

U.S. EPA | HAZARDOUS WASTE PROGRAM AT EPA NEW ENGLAND



THE SUPERFUND PROGRAM protects human health and the environment by investigating and cleaning up often-abandoned hazardous waste sites and engaging communities throughout the process. Many of these sites are complex and need long-term cleanup actions. Those responsible for contamination are held liable for cleanup costs. EPA strives to return previously contaminated land and groundwater to productive use.

RESULTS OF THERMALLY ENHANCED SOIL VAPOR EXTRACTION (2010-2011):

In 2004 and 2006, EPA conducted further investigations and pilot tests to better define the extent of Trichloroethylene (TCE) contaminated soils that contribute to groundwater contamination, and the best means to clean up that source. These efforts concluded that a soil vapor extraction system enhanced by using heat (Thermally Enhanced Soil Vapor Extraction) would be the best way to clean up the source area contamination at the site.

The Thermally Enhanced Soil Vapor Extraction System was designed to reduce contaminant concentrations in the source area soils and overburden groundwater and will also shorten the length of time that the groundwater treatment system will operate in order to reach the groundwater cleanup goals.



Photograph of the piping & wiring for the thermally enhanced soil vapor extraction system

Construction of the Thermally Enhanced Soil Vapor Extraction System began in April 2009 and was concluded in August 2010. See Figure 2 for the location of system and treatment area. The system then operated from August 2010 to February 2011, under EPA and Massachusetts Department of Environmental Protection (MassDEP) oversight. During treatment operations the thermal system was constantly monitored and modified to optimize its performance. Groundwater, soil, and air monitoring were conducted to evaluate the progress and effectiveness of the system and to also ensure that there were no unacceptable risks to adjacent residents or onsite workers. The results of the air monitoring were all within acceptable limits.

The Thermally Enhanced Soil Vapor Extraction System addressed contamination at the source area which contained the highest concentrations of contamination.

These additional cleanup efforts will reduce the concentration and extent of the groundwater plume and will also ultimately reduce how many years the groundwater treatment plant will need to operate to reach cleanup levels.

Confirmation soil and groundwater sampling events that were conducted indicate significant reductions of TCE in both the soil and groundwater at the site.

Based on groundwater sampling results, the localized low concentrations of TCE remaining in the soil do not appear to increase contaminated groundwater concentrations.

GROUNDWATER EXTRACTION & TREATMENT PROGRESS:

Since the United States Environmental Protection Agency

continued >

KEY CONTACTS:

DERRICK GOLDEN
EPA New England
Project Manger
(617) 918-1448
golden.derrick@epa.gov

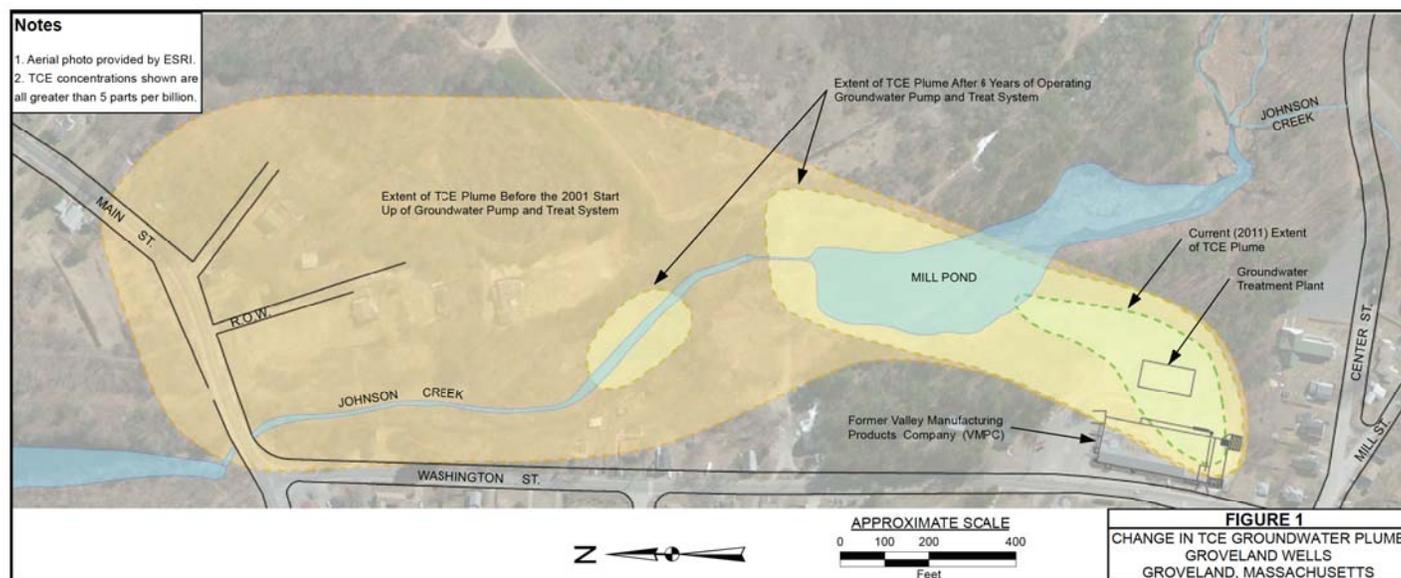
RODNEY ELLIOTT
EPA New England, Community
Involvement Coordinator
(617) 918-8372
elliott.rodney@epa.gov

GENERAL INFO:

EPA NEW ENGLAND
5 Post Office Square
Suite 100
Boston, MA 02109-3912
(617) 918-1111
www.epa.gov/region1/

**EPA TOLL-FREE
CUSTOMER SERVICE**
1-888-EPA-7341

LEARN MORE AT:
www.epa.gov/region1/
superfund/sites/groveland

Figure 1 – Decrease in TCE groundwater contamination over time (6/2001 – 10/2011)

(EPA) began groundwater extraction and treatment in May of 2000, there has been a continual decrease in the concentration and extent of contaminated groundwater in both the overburden (shallow) and bedrock (deep) aquifer. See Figure 1 which depicts the extent of groundwater contamination before treatment began, after five years of treatment and also depicts the present extent of groundwater contamination after 12 years of treatment.

TCE contaminated groundwater is extracted through both shallow and deep extraction wells at approximately 80 gallon per minute and is then pumped to the treatment plant where the TCE is then destroyed or oxidized by ultraviolet lamps. The clean water is then discharged back into the aquifer via Mill Pond. As of April 2012, the groundwater treatment system has extracted and treated over 510 million gallons of contaminated groundwater and has removed approximately 1,190 pounds of volatile organic compound (VOC) contamination from groundwater. As of June 1, 2011, the responsibility for operating and maintaining the groundwater extraction and treatment system was assumed by MassDEP. MassDEP will continue to operate and maintain the treatment system until Maximum Contaminant Levels (MCLs) are met and/or there are no longer any unacceptable risks to human health. The current MCL for TCE is 5 parts per billion.

SITE BACKGROUND:

The 850 acre Groveland Well Nos. 1 & 2 Superfund site is located off of Washington Street in Groveland MA. The site includes part of the Merrimack River watershed and aquifer which recharge Groveland Town Well No. 1. Groundwater in this area is mainly contaminated with TCE, a man-made chemical which was used at the former Valley Manufacturing Product Company (VMPC) to degrease screws and metal parts. At least 3,000 gallons of waste oil and TCE were released and other accidental spills occurred as a result of manufacturing operations at the company.

In 1979, the Town shut down two wells that were contaminated with TCE. In order to provide safe drinking water to residents, a new Town well was drilled into a different aquifer where there was no contamination.

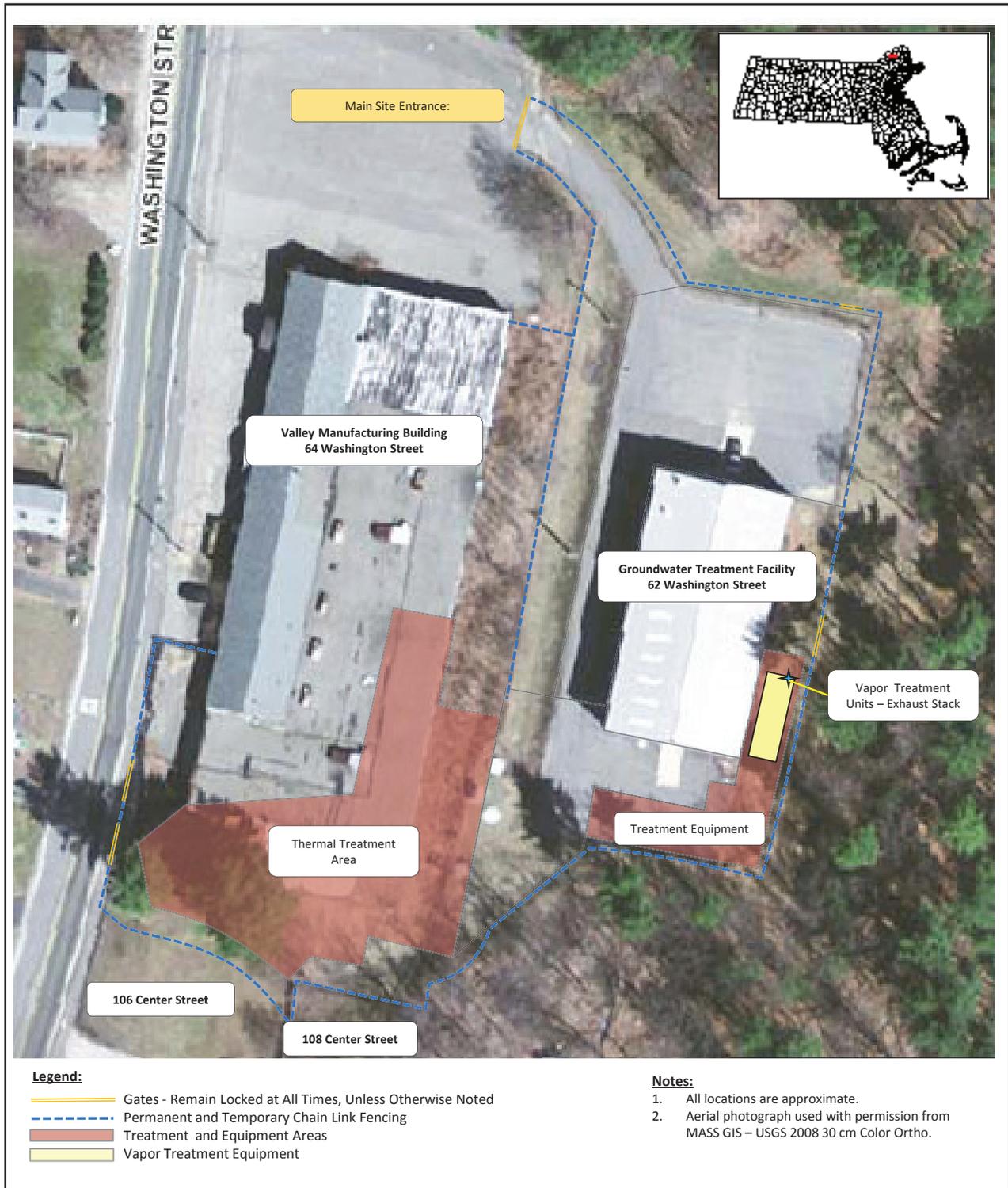
The Town of Groveland continues to provide safe drinking water to residents and consistently confirms that these safe levels are being achieved. This is accomplished through quarterly groundwater sampling of the Town wells and by testing groundwater quality from downgradient sentinel monitoring wells. Downgradient wells are groundwater monitoring wells which are not contaminated and are located in between the Town drinking water well and the area of contamination.

The EPA funded and oversaw the construction of the groundwater extraction and treatment facility in 1999 and it began operating in 2000. Under a legal agreement with the Archdiocese of Boston, the treatment facility was built on their property. In 2002, VMPC ceased all manufacturing operations and vacated the former Washington Street facility. In 2007, EPA and VMPC reached a legal settlement requiring the company to pay 100% of any proceeds from the sale or lease of the property. This settlement also requires VMPC to implement land use restrictions on their property until protective cleanup levels are achieved.

FUTURE SITE ACTIVITIES:

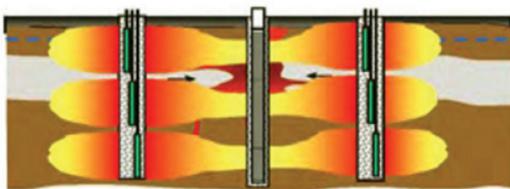
MassDEP will continue to operate and maintain the groundwater extraction and treatment system until MCLs are met and/or there are no longer any unacceptable risks to human health. Also, as part of operation and maintenance activities, MassDEP will continue to conduct groundwater sampling and sampling of the treatment plant processes. Because contamination remains above levels that allow for unlimited use and unrestricted exposure, every five years EPA is required to complete a comprehensive review of all clean up actions. This review is performed to ensure the continued protection of human health and the environment. This comprehensive review is known

Figure 2 – Aerial View of Enhanced Soil Vapor Extraction Treatment Area



Electrical Resistive Heating

- Passes an electric current between electrodes installed into subsurface
- Electricity travels through moisture present in subsurface soil, where resistance it encounters leads to subsurface heating
- Volatile contaminants are removed from groundwater by combination of volatilization and boiling
- Contaminated vapors and groundwater captured by soil vapor recovery wells and treated above ground



ERH Treatment Results

- 1,300 pounds of VOCs removed
- 18 gallons of NAPL
- 311 million cubic feet of vapors
- 2 million gallons of groundwater & condensate
- **97%** reduction of Trichloroethene in groundwater
 - Example groundwater concentrations:
 - Before ERH treatment = 11,000 ppb (TCE)
 - After ERH treatment = 15 ppb (TCE)

as a Five Year Review and will be completed again for the Groveland Wells Superfund site in 2015.

CONCLUSIONS AND RECOMMENDATIONS:

In total, the Thermally Enhanced Soil Vapor Extraction System operated for 192 days, removed 1,300 pounds of VOCs, recovered over 18 gallons of pure TCE, pumped and treated over two million gallons of contaminated water and condensate, and extracted over 311 million cubic feet of gaseous vapors. For example, before treatment monitoring well RW-05 had a TCE concentration of 11,000 parts per billion. After treatment, this same monitoring well had a TCE concentration of only 15 parts per billion.

In order to ensure that the remedies remain protective until cleanup standards are achieved throughout the site, institutional controls or deed restrictions are needed to prevent contact with contaminated groundwater in the source area (Valley property) and prohibit the use of groundwater within the contaminant plume until the clean up levels have been achieved. Institutional controls, in the form of a grant of environmental restriction, are currently being developed by EPA, MassDEP, the Town, VMPC and the Archdiocese.

When cleanup levels are achieved, the site could be re-developed for any unrestricted use.

ADDITIONAL CONTACT:

Janet Waldron
 MassDEP Project Manager
 Massachusetts Department of
 Environmental Protection
 (617) 556-1156
 janet.waldron@State.MA.US