EXPLANATION OF SIGNIFICANT DIFFERENCES (ESD)

GROVELAND WELLS NOS. 1 & 2 SUPERFUND SITE

Source Control/Operable Unit II

GROVELAND, MASSACHUSETTS

SEPTEMBER 2007

U.S. Environmental Protection Agency
Region 1 – New England
Boston, MA 02114

Groveland Wells Nos. 1 & 2 Superfund Site

Source Control/Operable Unit II
Explanation of Significant Differences
September 2007

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I. INTRODUCTION

A. Site Name and Location

Site Name: Groveland Wells Nos. 1 & 2 Superfund Site (Site)

Site Location: Groveland, Essex County, Massachusetts

B. Lead and Support Agencies

Lead Agency: United States Environmental Protection Agency (EPA)

Support Agency: Massachusetts Department of Environmental Protection (MassDEP)

C. Legal Authority

Under Section 117(c) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. § 9617 (c), Section 300.435(c) of the National Contingency Plan (NCP), 40 C.F.R. § 300.435(c)(2)(I), and Office of Solid Waste and Emergency Response (OSWER) Directive 9355.3-02, if EPA determines that differences in the remedial action significantly change but do not fundamentally alter the remedy selected in the Record of Decision (ROD) with respect to scope, performance, or cost, EPA shall publish an Explanation of Significant Differences (ESD). The ESD shall explain the differences between the remedial action being undertaken and the remedial action set forth in the ROD and ESD and the reasons such changes are being made.

D. Summary of Circumstances Necessitating this Explanation of Significant Differences

This ESD is being written to address modifications and enhancements planned for the existing soil vapor extraction (SVE) system for soil. This ESD is also being written to address the recalculation of the soil clean up levels that were originally specified in the 1988 Source Area Record of Decision (ROD). See Table 1 for the 1988 ROD specified soil cleanup levels and see Table 2 for a list of the 2007 recalculated soil cleanup levels. The purpose of the soil cleanup levels is to address the unacceptable risk which contamination in soil poses to groundwater.

1. <u>Modification to the Soil Vapor Extraction System.</u>

Pursuant to the 1988 ROD, an SVE system was constructed and began operations in 1992. The SVE system was operated and maintained by Valley's contractor from approximately December 1992 through April 2002. Historical data for the SVE system indicated that only a nominal amount of TCE was removed and the system was minimally effective in reaching soil clean up goals throughout the Site.

In 2004, a source area evaluation was conducted at the Site. Although the 2004 investigations provided a much better understanding of the remaining source area contamination, additional data gaps still remained. Therefore, from April of 2006 until

September 2006, EPA conducted an extensive source area re-evaluation at the Site. Based upon the results of this reevaluation, the existing SVE system should be modified to include in-situ thermal enhancement which would heat up the soil contamination and thus cause it to volatilize. The contaminated vapors would be recovered with vapor extraction. Reducing the levels of contaminants in soil will decrease amount of time (and money) that the existing groundwater treatment system will need to be operated and maintained in order to meet the groundwater cleanup goals (MCLs, etc.).

2. Recalulation of the soil cleanup levels.

Since the 1988 ROD was issued, EPA has made revisions to the approach and input parameters used to determine the soil levels. In addition, the soil numbers were recalculated based upon Site specific information (i.e., soil characteristics such as total organic carbon, chemical specific parameters, aquifer thickness, dimensions of the source area contamination, etc.).

As such, the source area soil levels have been updated and recalculated using the Groveland Site specific information and updated calculations. See Attachment A for the derivation and Site specific parameters which were used to recalculate the source area soil cleanup levels.

The recalculated levels specified in this 2007 ESD are protective and were evaluated using the following EPA guidance: *Soil Screening Guidance: User's Guide*, April 1996, OSWER Directive 9355.4-23 and the *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites*, August 2001, OSWER Directive 9355.4-24.

These recalculated Site specific soil clean up levels are protective of groundwater (MCLs), direct contact exposures (i.e., the incidental ingestion, dermal contact and inhalation of dust released from the soil) and for the subsurface vapor intrusion pathway (i.e., the inhalation of contaminated air), see Attachment A.

E. Availability of Documents

This 2007 ESD and supporting documentation shall become part of the Administrative Record for the Site. An index of information that has been added to the Administrative Record to support this ESD is included as Attachment B. The full Administrative Record, including its index, is available to the public at the following locations and may be reviewed at the times listed:

U.S. Environmental Protection Agency
Records Center
One Congress Street
Boston, MA 02114
(617) 918-1440
Monday through Friday 9:00 a.m. to 5:00 p.m.

Langley-Adams Library
Main Street

Groveland, MA 01834
(978) 372-1732

Monday 1:00 PM - 8:00 PM
Tuesday 10:00 AM - 5:30 PM
Wednesday 1:00 PM - 8:00 PM
Thursday 10:00 AM - 5:30 PM
Friday 12:00 PM – 5:00 PM
Saturday & Sunday - Closed

II. SUMMARY OF SITE HISTORY, CONTAMINATION PROBLEMS, AND SELECTED REMEDY

A. Site Description

The Groveland Wells Nos. 1 and 2 Superfund Site is located in Groveland, Essex County, Massachusetts within the Johnson Creek drainage basin. Johnson Creek is a tributary to the Merrimack River. The Site contains nearly 850 acres, mostly located in the southwestern part of the Town of Groveland.

The Site is bounded to the west by Washington Street and the former Haverhill Municipal Landfill, to the south by Salem Street, to the east by School Street, and to the north by the Merrimack River. See Figure 1 for the Site location map. The Haverhill Municipal Landfill was originally part of the Groveland Wells Site, but it has since been separately listed on the National Priorities List and is no longer part of the Groveland ite.

There are several small creeks and brooks flowing through the Site. Johnson Creek originates south of the Site and flows in a northerly direction to Mill Pond, located approximately 450 feet east of the Valley property. Argilla Brook, located to the east of Mill Pond, flows northwest through the Site and discharges to Johnson Creek. Brindle Brook is a small tributary to Johnson Creek that flows northwestward through the southeast corner of the Site area, eventually joining with Johnson Creek near Center Street. There are limited wetland areas at the Site, located mostly next to Mill Pond, Argilla Brook, Johnson Creek, Brindle Brook, and isolated areas east of Johnson Creek. A portion of the Site lies within the 100-year floodplain delineated by the Federal Emergency Management Agency (FEMA).

Land uses within the Site boundaries include numerous private residences, some industries and small businesses, and religious and community institutions. The Archdiocese of Boston property (Saint Patrick's Church) abuts the Valley property to the south and east. The Groveland Department of Public Works is in the central area of the Site, along with a sand and gravel operation. The former Valley Manufactured Products Company is located to the south on the western border of the Site. See Figure 2 for the Site map.

One of the Town's current municipal water supply wells, Station No. 1, and a former municipal supply well (Station No. 2) are located within the Site boundaries. The Site encompasses the approximate limits of the stratified drift aquifer that serves as the source of water for the current and former municipal supply wells. Groundwater generally flows to the north through the Site toward the Merrimack River.

B. Site History/Contamination Problems

1. Facility Operations

Valley Manufactured Products Company (Valley or PRP), a manufacturer of screw products as well as metal and plastic parts from 1963 until 2001, was located in the southwestern corner of the Site. The original building, in which the Valley Manufactured Products Company was housed, was constructed on the property around 1900 and prior to 1963, housed agricultural and textile operations. In 1963, Groveland Resources Corporation (GRC) leased the property and began on-site manufacturing of screw machine products. Connected to the original building, on the southern end, was a 400 square-foot wooden shed that was used to store virgin trichloroethene (TCE), "Solvosol" (an unspecified solvent), and cutting oils and mineral spirits. Waste cutting oils and solvents were also stored in the wooden shed. GRC reportedly purchased the property in 1966 and Valley Manufacturing acquired GRC's on-site operations in August 1979. GRC has retained ownership of the property.

On-site processes included machining, degreasing, and finishing of metal parts. The machining process used cutting oils and lubricants. After machining, metal parts were cleaned (degreased) in a hydrocarbon solvent vapor degreaser and then spun dry. TCE was used in the vapor degreasing operation from 1963 to 1979. Methylene chloride was used from 1979 to 1983. Solvosol and other solvents were also used. In 1984, Valley discontinued the use of solvents and replaced them with detergent types of degreasers.

If parts required additional cleaning, they were then immersed in either an alkaline cleaning solution (containing caustic soda) or an acid solution ("Brite Dip" process, containing nitric acid). Once cleaned, the parts were rinsed and excess rinse water was discharged to a Brite Dip subsurface disposal system. The Brite Dip subsurface disposal system was one of several such systems that were used on the property.

These systems are described as follows:

The Brite Dip disposal system included a distribution box and leaching field located near the southeastern corner of the building. This system accepted rinse waters from degreasing operations and wastes from the Brite Dip process. A floor drain in the former acid-dip room and another floor drain in a material storage area were also connected to this system. The Brite Dip process was reportedly used until 1984.

A drainage system for the loading dock (which slopes downward into the interior of the building from street level off Washington Street) consisted of a floor drain within the loading dock, and an oil/water separator and leaching field along the eastern portion of the building. This system may have received storm water runoff, oil from lathes, and TCE-contaminated oil. During the initial Remedial Investigation, the following contaminants were detected in a sample collected from the loading dock floor drain: 1,1,1-trichloroethane (1,1,1-TCA), 1,1-dichloroethane, methylene chloride and trans-1,2-dichloroethene. Vinyl chloride, 1,1-dichloroethene, 1,1-dichloroethane, tetrachloroethene (PCE), methylene chloride, trans-1,2-dichloroethene and TCE were detected in samples collected from the oil/water separator manhole. The floor drain in the truck loading dock was later sealed and replaced with a drainage trough, located outside the building just west of the entrance to the loading dock area. When not plugged with debris (as it currently is), the drainage trough system would intercept storm water runoff before it entered the loading dock and then conveyed it via a pipeline beneath the building to the oil/water separator and leach field.

A domestic sanitary wastewater disposal system, consisting of a septic tank and leaching field, is located under the parking lot area on the northeastern portion of the property. Although the leaching field is likely in the vicinity of the septic tank, the exact location of the leaching field is not known.

Historically, a combination storm water and cooling water collection system discharged to a 12-inch reinforced concrete drain pipe extending from the Town of Groveland drainage system in Washington Street, easterly across the northernmost portion of the Valley Manufacturing parking lot. The drain line discharged to a drainage swale located on the abutting Boston Archdiocese property, which extended easterly from the drain line to Mill Pond. Storm water accumulating on the roof of the Valley building was collected and discharged via a 4-inch drain line to a drain manhole located beneath the assembly room. Cooling water from an air compressor located in the basement of the facility and condensate water from the plant's air conditioning system was also discharged to the assembly room drain manhole. Storm water and cooling waters discharged from the assembly room manhole via a 12-inch drain pipe extending from the drain manhole to the 12-inch drain line crossing the Site. Storm water that was collected by catch basins located along Washington Street and from the existing roof drainage system eventually discharged to Mill Pond via the drainage swale.

In 1972 and 1973, GRC reportedly installed six underground storage tanks (USTs) for storage of cutting oils, solvents, and mineral spirits at the southern portion of the existing building. A concrete slab was constructed over the USTs. The USTs ranged from 700 gallons to 3,000 gallons. Some of the USTs contained cutting oil; the 700-gallon UST reportedly contained TCE. Cutting oils were pumped from the USTs into distribution piping running throughout the machining areas of the facility. Recovered oils were re-circulated back through the system. Waste oils were reportedly disposed off-site. During October 1983, pressure testing of the USTs was conducted. The USTs exhibited some initial pressure loss that was attributed to leakage occurring at the couplings on the tank vent lines.

From 1972 to 1979, 55-gallon drums of waste cutting oils were stored on the concrete slab. In September 1979, Valley constructed a shed roof over the concrete slab area. This area was known as the material storage area, but has also been referred to as the "porch area" or “shed area.”

The major contaminant released at the Site is TCE. In 1973, 500 gallons of TCE were reportedly released in the soil underneath the concrete slab from a UST. No less than 3,000 gallons of waste oil and solvent have been estimated to have discharged to the environment from several surface and subsurface sources, including the loading dock drainage system, the Brite-Dip disposal system, and the UST, and by routine operational practices. These releases migrated to groundwater beneath the Valley property and eventually contaminated the aquifer that supplied the town of Groveland's drinking water. In June and October 1979, two Town drinking water supply wells, Groveland Well Station Nos. 1 and 2 were impacted by TCE. The wells were taken off-line and the Town imposed water rationing. The Town subsequently developed another drinking water supply well, Station No.3; which is located outside of the Johnson Creek watershed/aquifer.

2. EPA & MassDEP Involvement.

In 1982, EPA determined that the contamination in the two Town drinking water supply wells constituted a threat to public health and to the environment. EPA placed the Site on the National Priorities List in December, 1982. In 1983, EPA and the Massachusetts Department of Environmental Protection (MassDEP, formerly known as the Department of Environmental Quality Engineering or DEQE) conducted inspections and sampling of the subsurface disposal systems on the Valley property and found elevated concentrations of TCE and some inorganics (metals). DEQE and Valley entered into a consent agreement in 1983 that was intended to bring plant discharges into compliance with state and federal regulations, and changes to the subsurface disposal systems were implemented by Valley as a result.

a. Source Control – Operable Unit 2

DEQE and Valley entered into a second consent agreement in March 1984 for the performance of a remedial investigation/feasibility study (RI/FS) and remedial action to address the entire Site (both Source Control and Management of Migration).
While the RI/FS was being conducted, in December 1986, the Valley property was nominated for a demonstration of the Terra-Vac, Incorporated Soil Vapor Extraction (SVE) system under the EPA Superfund Innovative Technology Evaluation (SITE) program. The demonstration was conducted over 56 days in 1988 and removed an estimated 1,300 pounds of VOCs from the unsaturated soil at the Valleyproperty.

Valley submitted an RI/FS, in 1985however EPA determined that it was inadequate and did not provide sufficient information to serve as the basis for selection of a Source Control or Management of Migration remedy. A supplemental RI was performed by Valley's consultant in 1988, after substantial development and negotiation of a detailed work plan with EPA. EPA oversaw the supplemental RI and also prepared an endangerment assessment and an endangerment assessment amendment. The RI concluded that there were high levels of contaminants in soil on the Valley property as well as in the groundwater beneath the property.

A supplemental feasibility study (FS) was prepared by EPA in 1988 that led to the issuance of a ROD in 1988. At that time, the decision was made to divide the Site into two operable units. Operable Unit 1 is designed to address the Management of Migration and Operable Unit 2 is designed to address the Source Control. The 1988 ROD addressed Source Control (Operable Unit 2) and required an SVE system be put in place to address soil contamination and required a groundwater extraction and treatment system to be installed to address groundwater beneath the Valley property

Pursuant to the 1988 ROD, an SVE system was constructed on the Valley property and began operations in 1992. The SVE system was operated and maintained by Valley's contractor from approximately December 1992 through April 2002. Historical data from the SVE system indicated that only a nominal amount of TCE was removed and the system was not effective in reaching soil clean up goals throughout the Valley property. Portions of the SVE system (soil vapor points, wells, blower, and carbon units) are currently present at the Site.

In April of 2002, Valley ceased operating and maintaining the SVE system due to financial difficulties. EPA Headquarters, in a report titled *Remedial Site Evaluations* (RSE) recommended that EPA take over the Source Area remediation. EPA subsequently issued a Notice of Violation to Valley and took over work on that portion of the Site. EPA would take an aggressive remediation approach which would decrease the overall timeframe that the groundwater extraction and treatment system would need to be operated and maintained. (i.e., the groundwater extraction and treatment system would reach protective levels sooner with the soil cleaned up and thus decrease long term operating costs of the groundwater extraction and treatment system).

Since that time, EPA has conducted a number of additional studies as outlined below.

In 2004, a source area evaluation was conducted at the Site. The 2004 field work included the following Site activities:

- Performed subsurface investigations to determine contaminant concentrations in the Source Area. This involved the installation, sampling and analysis of over 105 soil samples;

- Installed and sampled two new bedrock Source Area monitoring wells and replaced a damaged bedrock monitoring well;

- Inventoried and screened the remaining SVE wells and vapor points;

- Sampled and analyzed over 33 groundwater monitoring wells;

- Verified the approximate location of the abandoned underground storage tanks;

- Identified and evaluated potentially viable remedial alternatives for the residual Source Area contamination; and,

- Prepared a *Draft Source Area Evaluation Report.*

Although the 2004 investigations provided a much better understanding of the remaining Source Area contamination, additional data gaps still remained. Therefore, from April of 2006 until September 2006, EPA conducted an extensive source area re-evaluation at the Site. The 2006 Source Area Re-evaluation field work included the following Site activities:

- Ground Penetrating Radar (GPR) survey to locate the USTs and delineate underground utilities;

- Sub-slab soil gas sampling within the former Valley building;

- Demolition of the porch structure and installation of fencing;

- Collection of soil and groundwater VOC samples for field screening by the EPA Office of Environmental Measurement and Evaluation (OEME) mobile laboratory with confirmatory samples sent to the OEME fixed laboratory or a Routine Analytical Services (RAS) laboratory;

- Installation of 11 new overburden monitoring wells to further characterize Source Area groundwater contamination;

- Collection of soil total organic carbon (TOC) samples for analysis by the OEME fixed laboratory;

- Collection of residential soil VOC samples to assess potential impacts to an abutting residential property;

- Completion of slug testing in eight groundwater monitoring wells installed during June 2006;

- Completion of an in-situ chemical oxidation (ISCO) pilot test, including a pre-injection groundwater VOC monitoring round and a post-injection groundwater VOC monitoring round to assess effectiveness of the injection;

- Removal of six (6) USTs, the former Brite Dip acid leachfield, and excavation of soils for conducting an ex-situ chemical oxidation test;

- Completion of an ex-situ chemical oxidation test on excavated soils;

- Collection of light non-aqueous phase liquid (LNAPL) samples for product identification;

- Completion of an assessment of on-site and neighboring pine trees that appeared to be stressed;

- Completion of in-situ mixing and chemical oxidation of soils on abutting residential property; and,

- Evaluation of various source control remedial technologies to replace or enhance the SVE remedy.

The outcome of these activities forms the basis of the actions outlined in this ESD, as further described in Sections III. and IV.

b. Management of Migration (Operable Unit 1)

In July 1985, EPA approved an initial remedial measure to rehabilitate Groveland Town Water Supply Well Station No. 1 by using granular activated carbon treatment (wellhead treatment) to remove VOCs from the groundwater. In 1987, EPA completed installation of the treatment system.

In 1987, under an Administrative Order with MassDEP, then known as DEQE, Valley installed and operated the Mill Pond recovery and air stripper treatment system. The system was put into place to intercept the leading edge of the most highly contaminated portion of the TCE plume. This was an interim remedial step while EPA developed a more permanent long term cleanup.

Valley performed the RI/FS in 1984 and 1985. After review of this document EPA determined that it was insufficient and ordered Valley to conduct additional RI/FS work, which Valley completed in 1988. This additional work still contained data gaps, therefore in 1990 and 1991, EPA completed work on a supplemental MOM RI/FS. The Supplemental MOM RI described the full nature and extent of soil and groundwater contamination at the Valley property and other areas Site. The results of these investigations revealed that an extensive groundwater plume, containing principally TCE and 1,2-dichloroethene (1,2-DCE), was migrating toward the Merrimack River with the highest contaminant concentration found near the Valley property and the adjacent property owned by the Boston Archdiocese.

In 1991, a second ROD was issued for the Site that addressed Operable Unit 1 (Management of Migration). This ROD required installing a groundwater extraction system, to treat both organic and inorganic contamination. Groundwater would be extracted and treated (400 gallons per minute) and then discharged to Johnson Creek.

In April of 1994, MassDEP approved discontinuing wellhead treatment for Station No.1 because contamination was no longer detected at measurable concentrations in the well indicating that the TCE plume was no longer impacting the well. Station No. 1 is still used as a supplemental supply to Station No. 3, while Station No. 2 was permanently shut down and abandoned by the town.

In April of 2000, an EPA-funded Ground Water Treatment Plant (GWTP) was constructed adjacent to the Valley property and treatment operations began. EPA combined the Mill Pond recovery extraction system (which Valley Manufacturing had been operating separately under a MassDEP Consent Agreement and Order) with the Management of Migration GWTP.

In 1995, a Superfund State Contract (SSC) was signed between EPA and the MassDEP. Under the SSC, MassDEP provides EPA with 10% of the cost of the Remedial Action, which includes the first ten years of operation, maintenance and funding of the GWTP. In July of 2011, MassDEP will assure the operation and maintenance of the GWTP. To date, the GWTP has pumped over 312 million gallons of contaminated groundwater water and removed over 1,084 pounds of total volatile organic compounds. Semi-annual groundwater sampling has been conducted since April 1998 and results indicate that the TCE concentrations in areas North of Main Street, South of Main Street, within the Groveland Highway Department (immediately North of Mill Pond), and South of Mill Pond have been decreasing over time. However, TCE concentrations within the Source Area monitoring wells currently remain high with little fluctuation; demonstrating no clear upward or downward trend.

C. Summary of 1988 Source Control ROD

On September 30, 1988, EPA issued a Record of Decision (ROD) for the Operable Unit 2 (Source Control) at the Site. The 1988 ROD required cleanup of the organic chemical contamination source located on the Valley property. The major components of the selected remedy included:

- Design, install, operate and maintain a Soil Vapor Extraction (SVE) system in the vadose zone to clean all areas of subsurface soil contamination until soil cleanup levels are attained;
- Design, install, operate and maintain a groundwater recovery/re-circulation system for groundwater beneath the Valley property;
- Design, install, operate and maintain a groundwater treatment system to treat contaminated groundwater from the recovery/re-circulation system for groundwater beneath the Valley property; and,
- Effectively seal or disconnect all drains and lines to the Brite-Drip subsurface disposal system.

The following cleanup levels were established to address contamination in soil:

Table 1: Summary of 1988 ROD Specified Source Control Soil Clean-up Levels

Contaminant of Potential Concern	Soil Cleanup Levels (ug/kg)
Trichloroethene (TCE)	6.3
Vinyl Chloride	1.14
Methylene Chloride	0.44
Tetrachloroethene	18.2
1,1-Dichloroethene	4.6

D. Summary of the 1996 Explanations of Significant Differences

In November 1996, two Explanations of Significant Differences were issued by EPA. The 1988 Source ROD was modified by an ESD to eliminate the requirement to design, install, operate and maintain a groundwater treatment and recirculation system on the Valley property. This decision was made because the results from a pump test in the source area on the Valley property showed that limited water could be extracted from this area. The low flow of water made a separate groundwater treatment plant infeasible. In order to address the limited amount of water that was expected to be extracted from beneath the source area, the 1991 MOM ROD was also modified by an ESD to allow contaminated groundwater that was extracted beneath the Valley Manufacturing property be combined with groundwater being treated and discharged as part of the 1991 MOM ROD. Also the extraction rate was modified from 400 gallons per minute to 150 gallons per minute and treated groundwater would now be discharged to Mill Pond.

III. BASIS FOR 2007 ESD

A. Modification to the SVE system

The first change documented in this ESD is the modification to the SVE system to include in-situ thermal treatment. Review of the PRP's historical data for the SVE system indicated that only a nominal amount of TCE was removed and the system was minimally effective in reaching the soil cleanup goals in the Source Area. Therefore, EPA performed numerous investigations and gathered additional data in the Source Area over the last several years.

The investigations, which are outlined in the above Section II.C., were completed in order to better define the nature and extent of the remaining soil contamination in the Source Area and to provide an evaluation of potential remedial alternatives for EPA to consider in order to meet soil cleanup levels. If the soil clean up levels can be achieved quickly, this will decrease the time frame that the existing GWTP will need to operate in the long term in order to reach the groundwater cleanup levels (MCLs, etc.), thus reducing the timeframe to operate, maintain and fund the GWTP over the long term.

Two reports were prepared from the recent investigations: *A Draft Source Area Evaluation Report*, prepared by Metcalf & Eddy, dated April 2005, and a *Draft Final Source Area Re-evaluation Report*, prepared by Metcalf & Eddy, dated September 2006, (i.e., a remedial investigation/focused feasibility study). These reports are part of the official administrative record for the Site as these reports serve to support the basis and rational for preparing this ESD.

The final conclusions of these reports are summarized as follows:

- The current SVE system had minimal effects on reducing the VOC contamination in the Source Area soil;
- High levels of subsurface contamination remain in the Source Area soil;
- The potassium permanganate pilot tests were minimally effective due to the heterogeneity of the subsurface soils and the potential presence of Light Non-Aqueous Phase Liquids (LNAPLs);
- The existing SVE system should be modified to include in-situ thermal enhancement which would heat up the soil thus causing the contaminants to volatilize. The contaminated vapors would be recovered with vapor extraction. Examples of in-situ thermal technologies include electrical resistive heating (ERH); thermal conduction; radio-frequency heating; and air, steam, or water injection, which are described in greater detail below;

- Remediating the Source Area soil will decrease the amount of time (and monies) that the existing GWTP will need to be operated and maintained in order to meet the groundwater cleanup levels (MCLs, etc.) or other protective levels; and;

- The approximate costs associated with implementing and operating the in-situ thermal remediation is approximately $3-4 Million.

Many different methods and combinations of techniques can be used to apply heat to contaminated soil and/or groundwater in-situ. The heat can destroy or volatilize organic chemicals. As the chemicals change into gases, their mobility increases. These gases may then be extracted via collection wells for capture and cleanup in an ex-situ treatment unit. Thermal methods can be particularly useful for dense or light non-aqueous phase liquids (DNAPLs or LNAPLs). Heat can be introduced to the subsurface by electrical resistance heating, radio frequency heating, dynamic underground stripping, thermal conduction, or injection of hot water, hot air, or steam.

In-situ thermal treatment will not trigger any new applicable or relevant and appropriate requirements (ARARs). Any air emissions can also be treated using granular activated carbon prior to being discharged into the atmosphere.

As a result, in-situ thermal technology is being added as an enhancement and modification to SVE, the technology originally selected in the 1988 ROD. There are no new or additional ARARs based on this remedy enhancement. Also, the ARARs established in the 1988 ROD will still be met.

A brief explanation of some examples of in-situ thermal technologies from EPA's CLU-IN database is provided below:

- **ELECTRICAL RESISTANCE HEATING** – This technique uses arrays of electrodes installed around a central neutral electrode to create a concentrated flow of current toward the central point. Resistance to flow in the soils generates heat greater than 100°C, producing steam and readily mobile contaminants that are recovered via vacuum extraction and processed at the surface. Electrical resistance heating is an extremely rapid form of remediation with case studies of effective treatment of soil and groundwater in less than 40 days. Three-phase heating and six-phase soil heating are varieties of this technology.

- **INJECTION OF HOT AIR** - This technique can volatilize organic contaminants (e.g., fuel hydrocarbons) in soils or sediments. With deeper subsurface applications, hot air is introduced at high pressure through wells or soil fractures. In surface soils, hot air is usually applied in combination with soil mixing or tilling, either in-situ or ex-situ.

- **INJECTION OF HOT WATER** –This method injects hot water via injection wells which heats the soil and ground water to enhance the release of contaminants. Hot water injection also displaces fluids (including LNAPL and DNAPL free product) and decreases contaminant viscosity in the subsurface to accelerate remediation through enhanced recovery.

- **INJECTION OF STEAM** –Steam is injected to heat both soil and groundwater to enhance the release of contaminants from the soil matrix by decreasing viscosity and accelerating volatilization. Steam injection may also destroy some contaminants. As steam is injected through a series of wells within and around a source area, the steam zone grows radially around each injection well. The steam front drives the contamination to a system of ground-water pumping wells in the saturated zone and soil vapor extraction wells in the vadose zone.

- **RADIO FREQUENCY HEATING -** Is an in situ process that uses electromagnetic energy to heat soil and enhance soil vapor extraction. The technique heats a discrete volume of soil using rows of vertical electrodes embedded in soil or other media. Heated soil volumes are bounded by two rows of ground electrodes with energy applied to a third row midway between the ground rows. The three rows act as a buried triplet capacitor. When energy is applied to the electrode array, heating begins at the top center and proceeds vertically downward and laterally outward through the soil volume. The technique can heat soils to over 300°C.

- **THERMAL CONDUCTION** – This technique is also referred to as Electrical Conductive Heating or In-situ Thermal Desorption. It supplies heat to the soil through steel wells or with a blanket that covers the ground surface. As the contaminated area is heated, the contaminants are destroyed or evaporate. Steel wells are used when the contaminated soil is deep. The blanket is used where the contaminated soil is shallow. Typically, a carrier gas or vacuum system transports the volatilized water and organics to a treatment system.

B. Recalculation of soil cleanup levels.

The second change documented in this ESD relates to soil cleanup levels. The soil cleanup levels were developed to address the risk posed to groundwater by the soil contamination. When the 1988 ROD was originally written, the soil clean up levels were calculated based upon certain assumptions regarding soil characteristics. Since that time, site-specific data has been generated that could be used to better refine the levels that would have to be met in soil in order for groundwater cleanup standards to be met.

The new levels were also developed based on the following new guidance: *Soil Screening Guidance: User's Guide*, April 1996, OSWER Directive 9355.4-23 and the *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites*, August 2001, OSWER Directive 9355.4-24. This change was supported by various investigations in the past several years the results of which are included in two reports: *A Draft Source Area Evaluation Report*, prepared by Metcalf & Eddy, dated April 2005, and a *Draft Final Source Area Re-evaluation Report*, prepared by Metcalf & Eddy, dated September 2006.

Two conclusions reached in these reports were:

- The current soil clean up levels should be recalculated and revised in order to reflect Site specific circumstances and information.
- The cumulative risk and hazard are within or below EPA's risk management criteria (cancer risk of 10^{-4} to 10^{-6} and a hazard index of 1) for the recalculated soil clean up levels. See attachment A.

IV. DESCRIPTION OF SIGNIFICANT DIFFERENCES

This 2007 ESD will document EPA's decisions to make the following modifications to the remedy as originally described in the 1988 ROD:

- In-situ thermal treatment with vapor extraction will be used to modify and enhance the SVE system for soil contamination. The contaminated vapors will be recovered with vapor extraction to more effectively remediate contaminated soils and thus reduce the long term operation and maintenance of the existing groundwater extraction, treatment and surface water discharge system.
- The soil cleanup levels for soil on the Valley property have been recalculated. EPA has recalculated the soil cleanup levels based on Site specific data and EPA guidance (See Table 2 and Attachment A). These levels will be used to confirm that residual soil contamination will not have an adverse effect on groundwater. The soil cleanup levels are protective of human health and the environment; and,
- The modifications of SVE will still meet ARARs identified in the 1988 ROD.

Table 2: Recalculated Soil Clean-up Levels

Contaminant of Potential Concern	Recalculated Soil Cleanup Levels (ug/kg)
Trichloroethene (TCE)	77
Vinyl Chloride	11
Methylene Chloride	22
Tetrachloroethene	56
1,1-Dichloroethene	45

V. SUPPORT AGENCY COMMENTS

MassDEP has participated with EPA in reviewing *A Draft Source Area Evaluation Report*, prepared by Metcalf & Eddy, dated April 2005, and a *Draft Final Source Area Re-evaluation Report*, prepared by Metcalf & Eddy, dated September 2006. MassDEP has also participated with EPA in developing this ESD and concurs with the changes. See Appendix C for the MassDEP concurrence letter.

VI. STATUTORY DETERMINATIONS

EPA has determined that the selected remedy specified in the 1988 ROD and 1996 ESD and the changes pursuant to this 2007 ESD, remain protective of human health and the environment, comply with Federal and State requirements that are applicable or relevant and appropriate, and are cost-effective. The revised remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable for this Site.

VII. PUBLIC PARTICIPATION

This ESD and supporting information are available for public review at the locations identified within this document. In addition, a notice of availability of the ESD will be provided to a local newspaper (The Eagle-Tribune) of general circulation.

VIII. DECLARATION

For the foregoing reasons, by my signature below, I approve the issuance of this 2007 Explanation of Significant Differences for the Groveland Wells Nos. 1 & 2 Superfund Site located in Groveland, Massachusetts and the changes and conclusions stated therein.

James T. Owens III, Director
Office of Site Remediation and Restoration
USEPA New England - Region 1
One Congress Street
Boston, MA 02114

9/26/07
Date

Figures 1-3

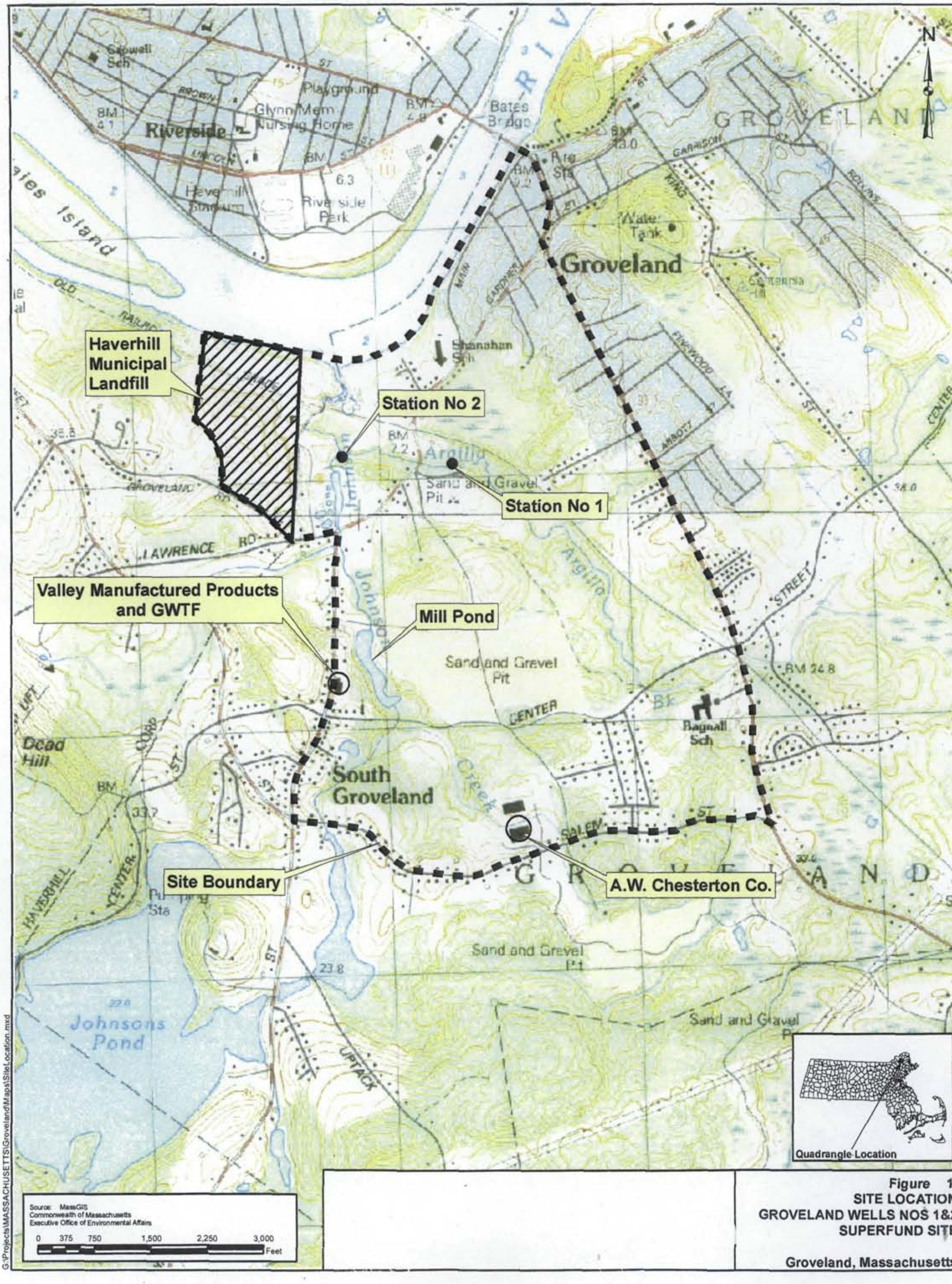
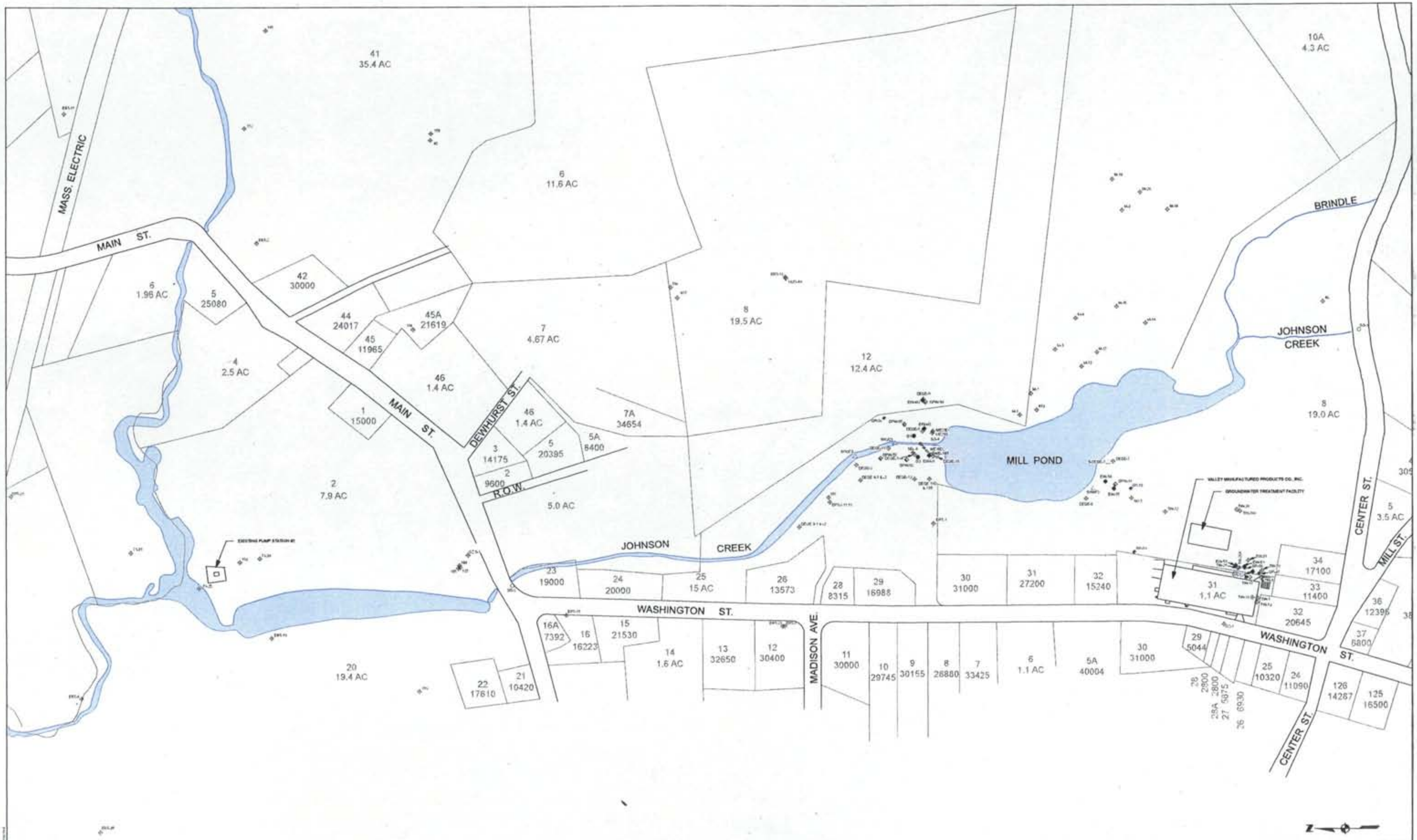


Figure 1.
SITE LOCATION
GROVELAND WELLS NOS 1&2
SUPERFUND SITE

Groveland, Massachusetts



LEGEND

- EXISTING EXTRACTION WELL
- SURFACE WATER ELEVATION GAUGE
- GROUNDWATER PROBE WELL
- MONITORING WELL
- GROUNDWATER PROBE LOCATION
- INACTIVE EXTRACTION WELL

NOTES:

1. BASE MAP WAS COMPILED FROM TOWN OF GROVELAND TAX MAPS. LOCATIONS OF PROPERTY LINES AND SURFACE WATER BOUNDARIES ARE APPROXIMATE. CHANGES THAT MAY HAVE OCCURRED SINCE 1994 ARE NOT INCLUDED.
2. EXTRACTION WELL EW#2 IS CURRENTLY INACTIVE.

0 37.5 75 150 225 300 Feet

SCALE: 1" = 120'

GROVELAND WELLS
SUPERFUND SITE
GROVELAND, MASSACHUSETTS

FIGURE 2
SITE MAP

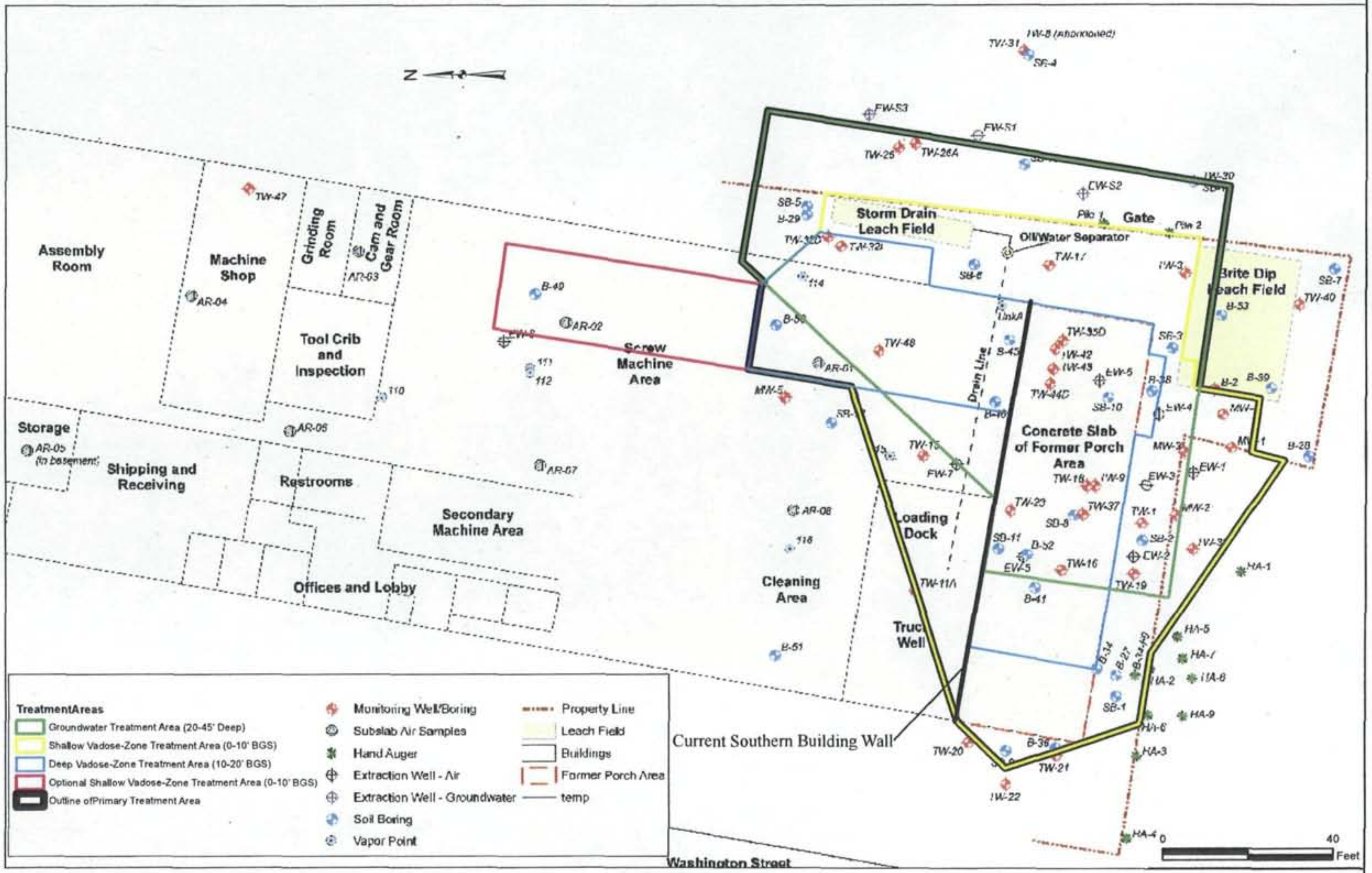


Figure 3

ERH Remediation Areas
Groveland Superfund Site
Groveland, MA

M:\Projects\Superfund\Groveland\Figures\Fig2-ERH_Remed091907.pdf
M:\Projects\Superfund\Groveland\Figures\Fig2-ERH_Remed091907.mxd
September 19, 2007 DWN: MTW CHKD: THD

Appendix A

METCALF & EDDY | AECOM

Memorandum

DATE: September 27, 2006

TO: Cindy McLane (M&E), Derrick Golden (USEPA)

FROM: Paul Dombrowski

SUBJECT: Soil Cleanup Level - Groveland Wells Superfund Site

In response to updates made to United States Environmental Protection Agency (USEPA) soil screening guidance, revised site-specific cleanup levels for unsaturated soil were developed for remediation of the Source Area at the Groveland Wells Superfund Site in Groveland, Massachusetts. Proposed cleanup levels were calculated utilizing site-specific data collected during the Source Area Re-Evaluation for nine volatile organic compounds (VOCs), including the eight contaminants of concern listed in the Record of Decision (ROD) for Operable Unit 2 (OU2) (trichloroethene, vinyl chloride, methylene chloride, tetrachloroethene, 1,1-dichloroethene, trans-1,2-Dichloroethene, toluene, 1,1,1-trichloroethane) and cis-1,2-dichloroethene which was not listed in the ROD [USEPA, 1988]. These propsed cleanup levels were determined based on current soil screening guidance (SSG) from the USEPA to compute soil screening levels (SSLs), concentrations below which no further action or study at a site is warranted under CERCLA [USEPA, 1996a and 2002]. Soil screening levels can be used for developing site-specific cleanup levels if the nine-criteria evaluation of remedial alternatives indicates that alternatives achieving the SSLs are protective, comply with Applicable or Relevant and Appropriate Requirements (ARARs), and appropriately balance the other criteria, including cost [USEPA, 2002].

The site-specific cleanup levels for unsaturated soil in the Source Area at Groveland Wells Superfund Site are intended to be protective of off-site receptors, who may ingest contaminated groundwater that migrates from the Source Area as a result of leaching; direct contact exposures (i.e., incidental ingestion, dermal contact, and inhalation of dust released from soil); and risks associated with the subsurface vapor intrusion pathway (i.e., the inhalation of impacted air). As stated in the ROD [USEPA, 1988], the ultimate goal is the reduction of contaminant concentrations in groundwater to Maximum Contaminant Levels (MCLs) [USEPA, 2003a].

Migration to Groundwater Soil Screening Level.

Migration to groundwater SSLs were computed for the nine contaminants for the ingestion of leachate-contaminated ground water by downgradient receptors based on a linear equilibrium soil/water partition equation to estimate the contaminant concentration in soil leachate, as shown in Equation 1 [USEPA, 2002].

$$\textit{Screening Level in Soil}\ (mg/kg) = C_w\left[K_D + \frac{\theta_w + \theta_a H'}{\rho_b}\right] \qquad \text{Eq. 1}$$

The parameters used in computing the screening level in soil are summarized in Table 1. Chemical specifc parameters are provided for trichloroethene (TCE), which is the primary contaminant of concern. A dilution attenuation factor (DAF) is calculated to account for reduction of contaminant concentrations from soil leachate mixing with a clean aquifer [USEPA, 2002]. Figure 1 presents a conceptual model of soil leachate mixing within an aquifer. The DAF is multiplied by the groundwater remedial goal (MCL, ug/L) to determine an acceptable target soil leachate concentration (C_w, ug/L). The soil remedial goals in the ROD were calculated within the initial Remedial Investigation (RI) using used a simplified linear equilibrium soil/water partition equation (soil cleanup concentration = K_D x MCL) to determine the contaminant concentration in soil such that pore water concentrations at the moment of dissolution would be less than the MCL [Lally, 1985].

The inclusion of dilution and attenuation in current USEPA guidance [USEPA, 2002, USEPA, 1996b] is the primary parameter accounting for the difference in the SSLs calculated herein and the soil cleanup goals in the ROD. USEPA guidance provides two default values for sites with a source area smaller than one-half acre: DAF=20 and DAF=1 [US EPA, 2002]. A DAF of 1 is appropriate for sites where little or no dilution or attenuation of soil leachate concentrations is expected between the source and the receptor well, such as sites with a shallow water table, fractured media, or a souce area greater than 30 acres [USEPA, 2002, Appendix A]. The Source Area at Groveland Wells is no larger than 6,000 square feet, significantly smaller than one-half acre. Where sufficient hydrogeologic information is available, USEPA guidance provides tools to calculate a site-specific DAF: Equation 2 to compute DAF and Equation 3 for the mixing zone depth used therein [USEPA, 2002].

$$Dilution\ Attenuation\ Factor\ (DAF) = 1 + \frac{K \cdot i \cdot d}{I \cdot L} \qquad \text{Eq. 2}$$

$$Mixing\ Zone\ Depth\ (d) = (0.0112 L^2)^{0.5} + d_a \left(1 - \exp\left(\frac{(-L \cdot I)}{K \cdot i \cdot d_a}\right)\right) \qquad \text{Eq. 3}$$

A site-specific DAF of 12.6 was calculated for the Source Area at Groveland Wells and used to determine the target soil leachate concentrations (C_w) as well as the migration to groundwater SSL. The parameters used in computing theDAF and mixing zone depth are summarized in Table 1 and the associated computations are provided as Attachment A. The migration to groundwater SSLs are provided in Table 2 for the nine contaminants of concern. Complete tabulation is provided in Attachment A.

The migration to groundwater pathway SSLs are based on several simplifying assumptions [USEPA, 2002], including

- Infinite source (i.e., steady-state concentrations are maintained over the exposure period);
- Uniformly distributed contamination from the surface to the top of the aquifer;
- No contaminant attenuation (i.e., adsorption, biodegradation, chemical degradation) in soil;
- Instantaneous and linear equilibrium soil/water partitioning;
- Unconfined, unconsolidated aquifer with homogeneous and isotropic hydrologic properties;
- Receptor well at the downgradient edge of the source and screened within the plume;
- No contaminant attenuation in the aquifer;
- No NAPLs present (If NAPLs are present, the SSLs do not apply)

Table 1. Migration to Groundwater SSL – Computation Parameters

Parameter	Definition	Units	Value	Reference
Reference Values				
MCL	Maximum Contaminant Level	mg/L	Chemical specific (TCE=5 μg/L)	USEPA, 2003a
K_{oc}	Soil organic carbon-water partition coefficient	L/kg	Chemical specific (TCE = 166 L/kg)	ORNL, 2004; USEPA, 2000
θ_w	Water-filled porosity	L/L	0.3	USEPA, 2002
H	Henry's Law Constant	$\frac{atm \cdot m^3}{mol}$	Chemical specific (TCE = 0.0101)	USEPA, 2004a; USEPA, 2000
I	Infiltration Rate	m/yr	0.51 (20 in/yr) ½ average rainfall	USGS, 1985
ρ_b	Dry bulk soil density	kg/L	1.5	USEPA, 2002
ρ_s	Soil particle density	kg/L	2.65	USEPA, 2002
n	Soil Porosity	L/L	$1 - (\rho_b / \rho_s) = 0.43$	USEPA, 2002
θ_a	Air Filled Porosity	L/L	$n - \theta_w = 0.13$	USEPA, 2002
T	Groundwater Temperature	°F	49 (282 K)	USEPA, 2001
R	Universal Gas Constant	$\frac{atm \cdot m^3}{mol \cdot K}$	8.25E-05 $\frac{atm \cdot m^3}{mol \cdot K}$	USEPA, 2001
Site-Specific Values				
K	Hydraulic Conductivity	m/yr	700	Geometric Mean from slug tests M&E, 2006 (Table 4-14)
f_{oc}	Fraction organic carbon in soil	g/g	0.006	Average in vadose zone M&E, 2006 (Table 4-9)
I	Hydraulic Gradient	m/m	0.09	M&E, 2006 (Figure 4-11)
L	Source area length	m	37	See Figure 1
d_a	Aquifer thickness	m	4.6 (15 feet)	M&E, 2006 (Figure 4-2)
Calculated Values				
K_d	Soil-water partition coefficient	L/kg	$K_{oc} \times f_{oc}$ (TCE = 0.98)	USEPA, 2002
H'	Dimensionless Henry's Law Constant	--	H' = H / RT Chemical Specific (TCE = 0.433)	USEPA, 2004a; USEPA, 2000
D	Mixing Zone Depth	m	3.5 (Eq . 3)	USEPA, 2002 (Eq. 4-12)
DAF	Dilution Attenuation Factor	--	12.6	USEPA, 2002 (Eq. 4-11)
C_w	Target soil leachate concentration	mg/L	MCL x DAF (TCE = 63 μg/L)	USEPA, 2002

Table 2. Migration to Groundwater Soil Screening Levels

Contaminant of Concern	**Soil Screening Level (2006) (ug/kg)**	**ROD Soil Cleanup Goal (1988) (ug/kg)**
Trichloroethene	77	6.3
Vinyl Chloride	11	1.14
Methylene Chloride	22	0.44
Tetrachloroethene	56	18.2
1,1-Dichloroethene	45	4.6
Trans-1,2-Dichloroethene	626	41.3
Toluene	22,753	6,000
1,1,1-Trichloroethane	1,388	302
Cis-1,2-Dichloroethene	418	--

Elevated TCE concentrations have been measured in groundwater and soil for greater than 25 years. Due to the low total organic carbon in saturated soils, attenuation is assumed to be low in the aquifer, and DNAPL is not likely present in unsaturated soils. The subsurface at the site contains heterogeneous layers, including a buried soil horizon, amid sand and gravel, and a confining clay layer is present beneath much of the Source Area. However, the clay layer was noted to be not completely impermeable [M&E jar test observations, 2006]. Although these two simplified assumptions may not be completely valid for the site, the migration to groundwater SSLs do provide a quantitative value for use as a remediation goal, particularly for shallow soils.

Direct Contact Exposures.

The development of site-specific migration to groundwater SSLs requires confirmation that the SSL soil concentrations are also protective of direct contact exposures including the incidental ingestion of, dermal contact with, and inhalation of particulates containing contaminants released from soil. In order to evaluate the protectiveness of the site-specific SSLs for these direct contact exposure pathways, the site-specific SSLs were compared to residential soil Region 9 Preliminary Remediation Goals (PRGs), developed using conservative generic exposure assumptions and set at the lower of a cumulative cancer risk of 1×10^{-6} or noncancer hazard quotient of 0.1.

Table 3. Comparison of SSLs to Residential Soil PRGs.

Contaminant of Concern	SSL (ug/kg)	PRG (ug/kg)
Trichloroethene	77	53
Vinyl Chloride	11	79
Methylene Chloride	22	9,100
Tetrachloroethene	56	480
1,1-Dichloroethene	45	12,000
Trans-1,2-Dichloroethene	626	6,900
Toluene	22,753	66,000
1,1,1-Trichloroethane	1,388	200,000
Cis-1,2-Dichloroethene	418	4,300

Only the site-specific migration to groundwater SSL for trichloroethene exceeds the generic Region 9 PRG based on a cancer risk of 1×10^{-6}. However, the exceedance is minor and corresponds to a cancer risk of 1.5 $\times 10^{-6}$. All other site-specific migration to groundwater SSLs are associated with a risk or hazard significantly below a level of concern for the direct contact exposure pathways.

Inhalation Risks.

Migration to groundwater SSLs are generally protective of inhalation risk to outdoor workers [USEPA, 1996b, Section 2.1.4, p. 16]. This statement is generally true because of the high degree of dilution and dispersion associated with the volatilization of compounds into ambient air. However, the subsurface vapor intrusion pathway requires additional evaluation to confirm that the site-specific SSLs are protective of the migration of volatile compounds to indoor air where dilution and dispersion may not occur to a significant extent. The Johnson and Ettinger model [Johnson and Ettinger, 1991; USEPA, 2003b] was used to estimate an indoor air concentration for each migration to groundwater SSL soil concentration, using conservative default fate and transport assumptions. The estimated indoor air concentrations were then used to calculate a cancer risk and noncancer hazard, based on a residential exposure scenario. The residential scenario assumes that children and adults are exposed to contaminants in indoor air 24 hours/day for 350 days/year for a total duration of 30 years. For TCE, the primary contaminant of concern, the migration to groundwater SSL (77 ug/kg) corresponded to an indoor air concentration of 1.62 ug/m^3. The residential risk associated with this indoor air concentration is approximately 7 x 10^{-5}, with a noncancer hazard quotient of 0.04. A soil TCE concentration of 100 ug/kg is associated with a cancer risk of 1 x 10^{-4}, which is at the upper end of USEPA's acceptable risk range. Based on the modeling performed for the migration to groundwater SSLs for the nine contaminants of concern, the cumulative risk and hazard associated with exposure to the nine compounds in indoor air is estimated to be 9 x 10^{-5} and 0.6, respectively. The cumulative risk and hazard are within or below USEPA's risk management criteria (cancer risk of 10^{-4} to 10^{-6} and hazard index of 1). The Residential Indoor Air Risk and Hazard Calculations are included at Attachment B.

Therefore, the site-specific migration to groundwater SSLs calculated are protective of both direct contact exposures and of the subsurface vapor intrusion pathway.

References

Johnson, P.C. and R.A. Ettinger. 1991. Heuristic model for predicting the intrusion rate of contaminant vapors into buildings. Environment Science and Technology. 25(8):1445-1452.

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Oak Ridge National Laboratory (ORNL). 2004. Risk Assessment Information System, Chemical-Specific Factors. 2004.

United States Environmental Protection Agency (USEPA). 1988. Record of Decision (ROD), *Groveland Wells OU2.* EPA ID: MAD98732317. September 1988.

United States Environmental Protection Agency (USEPA). 1996a. Soil Screening Guidance: User's Guide. Office of Solid Waste and Emergency Response. Publication 9355.4-23. July 1996.

United States Environmental Protection Agency (USEPA). 1996b. Soil Screening Guidance: Technical Background Document (TBD). EPA Document Number: EPA/540/R-95/128. July 1996.

United States Environmental Protection Agency (USEPA). 2000. EPI (Estimation Programs Interface) Suite. Office of Pollution Prevention Toxics and Syracuse Research Corporation (SRC). 2000.

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United States Environmental Protection Agency (USEPA). 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24. December 2002.

United States Environmental Protection Agency (USEPA). 2003a. National Primary Drinking Water Standards. Office of Water (4606M). EPA 816-F-03-016. June 2003. http://www.epa.gov/safewater/consumer/pdf/mcl.pdf

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United States Geologic Survey (USGS). 1985. Hydrology and Water Resources of Tributary Basins to the Merrimack River from Salmon Brook to the Concord River, MA. 1985.

Appendix B

Groveland Wells No. 1 & 2
NPL Site Administrative Record
Explanation of Significant Differences (ESD)
Operable Unit 2 – Source Control Area

Index

ESD Dated September 2007
Released October 2007

Prepared by
EPA New England
Office of Site Remediation & Restoration

Introduction to the Collection

This is the administrative record for the Groveland Wells 1 & 2 Superfund Site, Groveland, MA, Operable Unit 2, Explanation of Significant Differences (ESD), released September, 2007. The file contains site-specific documents and a list of guidance documents used by EPA staff in selecting a response action at the site.

This record includes, by reference, the administrative record for the Groveland Wells 1 & 2 OU1 Record of Decision (ROD), issued September 1991; OU2 Record of Decision (ROD), issued September 1988; OU1 Explanation of Significant Differences (ESD), issued November 1996; and OU2 Explanation of Significant Differences (ESD), issued November 1996.

The administrative record file is available for review at:

EPA New England Office of
Site Remediation & Restoration
1 Congress Street, Suite 1100 (HSC)
Boston, MA 02114
(by appointment)
617-918-1440 (phone)
617-918-0440 (fax)
www.epa.gov/region01/superfund/resource/records.htm

Langley-Adams Library
185 Main Street
Groveland, MA 01834
978-372-1732 (phone)
www.grovelandma.com/Pages/GrovelandMA_Library

Questions about this administrative record file should be directed to the EPA New England site manager.

An administrative record file is required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA).

04: FEASIBILITY STUDY (FS)

278226 **DRAFT SOURCE AREA EVALUATION REPORT, SOURCE RE-EVALUATION, VOLUME 1**

Author: METCALF AND EDDY INC
Addressee:
Doc Date: 04/01/2005 **# of Pages:** 99
File Break: 04.06
Doc Type: REPORT
FEASIBILITY STUDY (FS)

275763 **COMMENTS ON ADDENDUM TO THE SOURCE AREA EVALUATION REPORT - RECOMMENDATIONS FOR FUTURE SAMPLING**

Author: JANET S WALDRON MA DEPT OF ENVIRONMENTAL PROTECTION
Addressee: DERRICK GOLDEN US EPA REGION 1
Doc Date: 12/06/2005 **# of Pages:** 2
File Break: 04.06
Doc Type: LETTER

257989 **DRAFT FINAL SOURCE AREA RE-EVALUATION REPORT, VOLUME 1 OF 4**

Author: METCALF & EDDY INC
Addressee: US EPA REGION 1
Doc Date: 09/01/2006 **# of Pages:** 140
File Break: 04.06
Doc Type: REPORT
FEASIBILITY STUDY (FS)

257990 **DRAFT FINAL SOURCE AREA RE-EVALUATION REPORT, VOLUME 2 OF 4, APPENDICES A - D**

Author: METCALF & EDDY INC
Addressee: US EPA REGION 1
Doc Date: 09/01/2006 **# of Pages:** 680
File Break: 04.06
Doc Type: REPORT
FEASIBILITY STUDY (FS)

04: FEASIBILITY STUDY (FS)

257991 **DRAFT FINAL SOURCE AREA RE-EVALUATION REPORT, VOLUME 3 OF 4, APPENDICES E - K**

Author: METCALF & EDDY INC
Addressee: US EPA REGION 1
Doc Date: 09/01/2006 **# of Pages:** 378
File Break: 04.06
Doc Type: REPORT
FEASIBILITY STUDY (FS)

257992 **DRAFT FINAL SOURCE AREA RE-EVALUATION REPORT, VOLUME 4 OF 4, APPENDICES L - N**

Author: METCALF & EDDY INC
Addressee: US EPA REGION 1
Doc Date: 09/01/2006 **# of Pages:** 459
File Break: 04.06
Doc Type: REPORT
FEASIBILITY STUDY (FS)

05: RECORD OF DECISION (ROD)

278322 **EXPLANATION OF SIGNIFICANT DIFFERENCES (ESD)**

Author: US EPA REGION 1
Addressee:
Doc Date: 09/26/2007 **# of Pages:** 40
File Break: 05.04
Doc Type: EXP SIGNFICANT DIFF (ESD)
REPORT
DECISION DOCUMENT

06: REMEDIAL DESIGN (RD)

204827 FINAL SAMPLING AND ANALYSIS PLAN - VOLUME 1

Author: METCALF & EDDY
Addressee:
Doc Type: WORK PLAN

Doc Date: 06/01/2004 **# of Pages:** 34
File Break: 06.02

07: REMEDIAL ACTION (RA)

275002 SAMPLING AND ANALYSIS PLAN FOR SOURCE RE-EVALUATION (05/09/2006 TRANSMITTAL LETTER ATTACHED)

Author: CINTHIA MCLANE METCALF & EDDY
Addressee: METCALF & EDDY INC
DERRICK GOLDEN US EPA REGION 1
US EPA REGION 1
Doc Type: WORK PLAN

Doc Date: 05/01/2006 **# of Pages:** 34
File Break: 07.02

08: POST REMEDIAL ACTION

212316 INITIATION OF FIVE YEAR REVIEW - 01/31/05

Author: DERRICK GOLDEN US EPA REGION 1
Addressee:
Doc Type: MEMO
FIVE YEAR REVIEW START MEMO

Doc Date: 02/08/2005 **# of Pages:** 1
File Break: 08.03

08: POST REMEDIAL ACTION

232795 **FIVE-YEAR REVIEW REPORT**

Author: US EPA REGION 1
Addressee:
Doc Type: REPORT
FIVE YR REVIEW RPT & APPROVAL

Doc Date: 06/30/2005 **# of Pages:** 188
File Break: 08.03

Number of Documents in Collection: 11

EPA Region 1 AR Compendium GUIDANCE DOCUMENTS

EPA guidance documents may be reviewed at the EPA Region I Superfund Records Center in Boston, Massachusetts.

TITLE

GUIDANCE ON PREPARING SUPERFUND DECISION DOCUMENTS: THE PROPOSED PLAN, THE RECORD OF DECISION, E.S.D.'S, R.O.D. AMENDMENT. INTERIM FINAL.

DOCDATE	OSWER/EPA ID	DOCNUMBER
7/1/1989	OSWER 9355.3-02	C179

TITLE

GUIDE TO PREPARING SUPERFUND PROPOSED PLANS RECORDS OF DECISION AND OTHER REMEDY SELECTION DECISION DOCUMENTS

DOCDATE	OSWER/EPA ID	DOCNUMBER
7/1/1999	OSWER 9200.1-23P	C525

TITLE

SOIL SCREENING GUIDANCE: USER'S GUIDE

DOCDATE	OSWER/EPA ID	DOCNUMBER
7/1/1996	OSWER NO. 9355.4-23	C577

TITLE

SUPPLEMENTAL GUIDANCE FOR DEVELOPING SOIL SCREENING LEVELS FOR SUPERFUND SITES

DOCDATE	OSWER/EPA ID	DOCNUMBER
12/1/2002	OSWER 9355.4-24	C655

Appendix C

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENERGY & ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
ONE WINTER STREET, BOSTON, MA 02108 617-292-5500

DEVAL L. PATRICK
Governor

TIMOTHY P. MURRAY
Lieutenant Governor

IAN A. BOWLES
Secretary

LAURIE BURT
Commissioner

September 26, 2007

James T. Owens, Director
Office of Site Remediation and Restoration
Region 1
U.S. Environmental Protection Agency
One Congress Street, Suite 1100 (HIO)
Boston, MA 02114-2023

RE: Explanation of Significant Differences for the Groveland Wells No.s 1 & 2 Superfund Site
Operable Unit #2
Groveland, MA

Dear Mr. Owens:

The Massachusetts Department of Environmental Protection (MassDEP) has reviewed the proposed Explanation of Significant Differences (ESD) dated September 2007 for the Groveland Wells No.s 1 & 2 Site Operable Unit #2 (the Site). This ESD modifies the remedy documented in the September 1988 EPA Source Area Record of Decision (ROD) for the Site. MassDEP concurred with the original ROD. After careful review of the ESD and the supporting documentation, MassDEP hereby also provides its concurrence with the changes to the ROD remedy as described in the ESD.

The purpose of this ESD is twofold. The first is to update the soil clean-up goals established in the original ROD. The second is to enhance the technology used to achieve these cleanup goals.

The original soil cleanup goals contained in the 1988 ROD were based on leaching and other exposure models that are now at least 20 years old. The recalculated soil cleanup numbers contained in the ESD meet all applicable ARARs but are based on more sophisticated models and input parameters, and rely more heavily on site-specific soil characteristics gathered subsequent to the ROD. We believe they reflect a more realistic conceptual site model. The recalculated soil cleanup goals are also more consistent with the relevant MassDEP soil cleanup numbers.

In addition, the ESD calls for enhancement of the ROD remedial technology through the addition of complementary technology. In-situ thermal desorption (ISTD) will be used to enhance the vapor extraction process by facilitating the volatilization of soil contaminants in the saturated and unsaturated zones. This change is expected to increase the performance of the original remedy and thereby decrease the overall time required to clean up the Site.

The Department appreciates the opportunity to provide input on this ESD and looks forward to the continuing implementation of the remedy at the Site.

If you have any questions or comments, please contact Janet Waldron, Project Manager, at (617) 556-1156.

Sincerely,

Janine Commerford
Assistant Commissioner
Bureau of Waste Site Cleanup

e-copy:Derrick Golden, US EPA
e-copy: Steve Johnson, MassDEP - NERO
e-file: 5.01 Record of Decision/070918DEP_ConcurrenceLetter