PROPOSED REMEDIAL ACTION PLAN

Solvent Finishers
State Superfund Project
Jericho, Nassau County
Site No. 130172
February 2016

Prepared by
Division of Environmental Remediation
New York State Department of Environmental Conservation

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SECTION 1: SUMMARY AND PURPOSE OF THE PROPOSED PLAN

The New York State Department of Environmental Conservation (the Department), in consultation with the New York State Department of Health (NYSDOH), is proposing a remedy for the above referenced site. The disposal of hazardous wastes at the site has resulted in threats to public health and the environment that would be addressed by the remedy proposed by this Proposed Remedial Action Plan (PRAP). The disposal of hazardous wastes at this site, as more fully described in Section 6 of this document, has contaminated various environmental media. The proposed remedy is intended to attain the remedial action objectives identified for this site for the protection of public health and the environment. This PRAP identifies the preferred remedy, summarizes the other alternatives considered, and discusses the reasons for the preferred remedy.

The New York State Inactive Hazardous Waste Disposal Site Remedial Program (also known as the State Superfund Program) is an enforcement program, the mission of which is to identify and characterize suspected inactive hazardous waste disposal sites and to investigate and remediate those sites found to pose a significant threat to public health and environment.

The Department has issued this document in accordance with the requirements of New York State Environmental Conservation Law and Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York; (6 NYCRR) Part 375. This document is a summary of the information that can be found in the site-related reports and documents in the document repository identified below.

SECTION 2: CITIZEN PARTICIPATION

The Department seeks input from the community on all PRAPs. This is an opportunity for public participation in the remedy selection process. The public is encouraged to review the reports and documents, which are available at the following repository:

A public comment period has been set from:

February 25, 2016 to March 25, 2016

A public meeting is scheduled for the following date:

March 15, 2016 at 7:00PM

Public meeting location:

Cantiague Elementary School
678 Cantiague Rock Road
Jericho, NY 11753

At the meeting, the findings of the remedial investigation (RI) and the feasibility study (FS) will be presented along with a summary of the proposed remedy. After the presentation, a question-and-answer period will be held, during which verbal or written comments may be submitted on the PRAP.

Written comments may also be sent through to:

Robert DeCandia
NYS Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway
Albany, NY 12233
rob.decandia@dec.ny.gov

The Department may modify the proposed remedy or select another of the alternatives presented in this PRAP based on new information or public comments. Therefore, the public is encouraged to review and comment on the proposed remedy identified herein. Comments will be summarized and addressed in the responsiveness summary section of the Record of Decision (ROD). The ROD is the Department's final selection of the remedy for this site.

Receive Site Citizen Participation Information By Email

Please note that the Department's Division of Environmental Remediation (DER) is "going paperless" relative to citizen participation information. The ultimate goal is to distribute citizen participation information about contaminated sites electronically by way of county email listservs. Information will be distributed for all sites that are being investigated and cleaned up in a particular county under the State Superfund Program, Environmental Restoration Program, Brownfield Cleanup Program, Voluntary Cleanup Program, and Resource Conservation and Recovery Act Program. We encourage the public to sign up for one or more county listservs at http://www.dec.ny.gov/chemical/61092.html

SECTION 3: SITE DESCRIPTION AND HISTORY

Location: The Solvent Finishers site is located in a suburban portion of Nassau County, New York. The site occupies about 3.8 acres at 601 Cantiague Rock Road. The site is located on Cantiague

Rock Road about 500 feet east of the intersection of Jericho Turnpike and Brush Hollow Road.

Site Features: The site is currently occupied. The main site features includes one large, extended one story building surrounded by paved and gravel parking areas.

Current Zoning and Land Use: The site is currently zoned Industrial (light manufacturing) and is occupied by Rubies Costume. The surrounding parcels include commercial, industrial and public use. A school is located across Cantiague Rock Road. The nearest residential property is about 400 feet northeast of the site.

Past Use of the Site: The site has a history of solvent use and has operated as a manufacturer of artificial leather and plastics, an industrial dry cleaner, and manufacturer of imprinted and embroidered sportswear. The Nassau County Department of Health documented wastewater discharges to the ground and site drainage structures starting in 1977. In 1998, 59 tons of tetrachloroethylene (PCE) contaminated soil was excavated from an abandoned cesspool and disposed off-site.

Site Geology and Hydrogeology: The geology at the site generally consists of stratified sand and gravel with some fine grain material from the ground surface down to about 200 feet where clay is found. The depth to groundwater in the Upper Glacial Aquifer is about 85 feet below ground surface. The groundwater generally flows in a southerly direction.

A site location map is attached as Figure 1.

SECTION 4: <u>LAND USE AND PHYSICAL SETTING</u>

The Department may consider the current, intended, and reasonably anticipated future land use of the site and its surroundings when evaluating a remedy for soil remediation. For this site, alternatives (or an alternative) that restrict(s) the use of the site to industrial use as described in Part 375-1.8(g) are/is being evaluated in addition to an alternative which would allow for unrestricted use of the site.

A comparison of the results of the investigation to the appropriate standards, criteria and guidance values (SCGs) for the identified land use and the unrestricted use SCGs for the site contaminants is included in the Tables for the media being evaluated in Exhibit A.

SECTION 5: <u>ENFORCEMENT STATUS</u>

Potentially Responsible Parties (PRPs) are those who may be legally liable for contamination at a site. This may include past or present owners and operators, waste generators, and haulers.

The PRPs for the site, documented to date, include:

Nassau County IDA

Skodnek Industries, Inc.

601 Canti Rd Corp.

Richmond Associates, L.P.

The PRPs for the site declined to implement a remedial program when requested by the Department. After the remedy is selected, the PRPs will again be contacted to assume responsibility for the remedial program. If an agreement cannot be reached with the PRPs, the Department will evaluate the site for further action under the State Superfund. The PRPs are subject to legal actions by the state for recovery of all response costs the state has incurred.

SECTION 6: SITE CONTAMINATION

6.1: Summary of the Remedial Investigation

A Remedial Investigation (RI) has been conducted. The purpose of the RI was to define the nature and extent of any contamination resulting from previous activities at the site. The field activities and findings of the investigation are described in the RI Report.

The following general activities are conducted during an RI:

- Research of historical information,
- Geophysical survey to determine the lateral extent of wastes,
- Test pits, soil borings, and monitoring well installations,
- Sampling of waste, surface and subsurface soils, groundwater, and soil vapor,
- Sampling of surface water and sediment,
- Ecological and Human Health Exposure Assessments.

The analytical data collected on this site includes data for:

- groundwater
- soil
- soil vapor
- indoor air
- sub-slab vapor

6.1.1: Standards, Criteria, and Guidance (SCGs)

The remedy must conform to promulgated standards and criteria that are directly applicable or that are relevant and appropriate. The selection of a remedy must also take into consideration guidance, as appropriate. Standards, Criteria and Guidance are hereafter called SCGs.

To determine whether the contaminants identified in various media are present at levels of concern, the data from the RI were compared to media-specific SCGs. The Department has developed SCGs for groundwater, surface water, sediments, and soil. The NYSDOH has developed SCGs for drinking water and soil vapor intrusion. The tables found in Exhibit A list the applicable SCGs in the footnotes. For a full listing of all SCGs see: http://www.dec.ny.gov/regulations/61794.html

6.1.2: RI Results

The data have identified contaminants of concern. A "contaminant of concern" is a hazardous waste that is sufficiently present in frequency and concentration in the environment to require evaluation for remedial action. Not all contaminants identified on the property are contaminants of concern. The nature and extent of contamination and environmental media requiring action are summarized in Exhibit A. Additionally, the RI Report contains a full discussion of the data. The contaminant(s) of concern identified at this site is/are:

tetrachloroethene (PCE) trichloroethene (TCE)

As illustrated in Exhibit A, the contaminant(s) of concern exceed the applicable SCGs for:

- groundwater
- soil
- soil vapor
- indoor air

6.2: Interim Remedial Measures

An interim remedial measure (IRM) is conducted at a site when a source of contamination or exposure pathway can be effectively addressed before issuance of the Record of Decision.

The following IRM(s) has/have been completed at this site based on conditions observed during the RI.

Air Sparge with Soil Vapor Extraction (AS/SVE)

Air sparging has been implemented by NYSDEC in October 2012 to address the groundwater plume contaminated by volatile organic compounds (VOCs). VOCs will be physically removed from the groundwater and soil below the water table (saturated soil) by injecting air into the subsurface. The injected air rising through the groundwater will volatilize and transfer VOCs from the groundwater and/or soil into the injected air. The VOCs are carried with the injected air into the vadose zone (the area below the ground surface but above the water table) where a soil vapor extraction (SVE) system designed to remove the injected air has been installed. The SVE system applies vacuum to wells that have been installed into the vadose zone to remove the VOCs along with the air introduced by the sparging process. The air extracted from the SVE wells is then treated as necessary prior to being discharged to the atmosphere.

At this site, two (2) air injection wells have been installed within the source area at the rear of the main building to a depth of about 92 feet. To capture the volatilized contaminants, four (4) SVE wells have been installed in the vadose zone to depths of about 25 feet and 65 feet below ground surface. The air containing VOCs extracted from the SVE wells will be treated by passing the air stream through activated carbon which removes the VOCs from the air prior to it being discharged to the atmosphere. The details of this system are documented in the June 2014 Construction Completion Report.

6.3: Summary of Environmental Assessment

This section summarizes the assessment of existing and potential future environmental impacts presented by the site. Environmental impacts may include existing and potential future exposure pathways to fish and wildlife receptors, wetlands, groundwater resources, and surface water.

Based upon the resources and pathways identified and the toxicity of the contaminants of ecological concern at this site, a Fish and Wildlife Resources Impact Analysis (FWRIA) was deemed not necessary for OU 01.

Nature and Extent of Contamination:
On-site soil was analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and metals. Both on-site and off-site groundwater was analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), iron and manganese. Based on investigations to date, the primary contaminants of concern are Tetrachloroethylene (PCE) and Trichloroethylene (TCE). They have been found in on-site and off-site groundwater, on-site soil, and both on-site and off-site soil vapor, sub-slab vapor and indoor air. The highest levels of contamination were found near the south side of the building where the presence of DNAPL is suspected.

Soil- Solvent contaminated soils are found on-site from 5 feet below the surface to the water table at 85 feet below ground surface. The highest soil contaminant concentration of PCE was reported at 7,300 ppm (parts per million) at the water table, which exceeds both the Industrial Use Soil Cleanup Objective of 300 ppm and the Protection of Groundwater Soil Cleanup Objective of 1.3 ppm. TCE at 1.2 ppm which exceeds the Protection of Groundwater Soil Cleanup Objective of 0.47 ppm.

Groundwater- PCE and its associated break down products were found in on-site and off-site groundwater at concentrations exceeding the groundwater standards of 5 ppb (parts per billion). The maximum on-site concentrations are; PCE of 300,000 ppb and TCE of 9,900 ppb. The contamination has migrated south about 4,000 feet off-site and the maximum off-site concentrations are PCE of 81,000 ppb and TCE of 89 ppb.

Soil Vapor and Indoor Air- VOCs were detected in on-site sub-slab soil vapor and indoor air. On-site sub-slab vapor contaminant concentrations were detected up to a maximum of 119,349 ug/m3 (micrograms per cubic meter) for PCE; and 2,466 ug/m3 for TCE. On-site indoor air VOC concentrations were detected up to a maximum of 335 ug/m3 for PCE; and 1.6 ug/m3 for TCE. While this TCE level is above concentrations commonly observed but below NYSDOH's guideline of 2 ug/m3, the maximum concentration of PCE detected exceeds both NYSDOH's air guideline of 30 ug/m3 and immediate action level of 300 ug/m3 for PCE. PCE and TCE were also detected at one off-site commercial property in sub-slab vapor and indoor air. PCE concentrations were detected to a maximum of 1,070 ug/m3 and TCE to a maximum of 1.67 ug/m3 in off-site sub-slab vapor. Off-site indoor air concentrations of PCE were detected to a maximum of 16.6 ug/m3 (which is above levels commonly observed) and TCE to a maximum of 0.81 ug/m3 in off-site indoor air. Off-site soil vapor (soil gas) was detected at 32.9 ug/m3 of PCE. TCE was not detected.

Significant Threat: This site presents a significant environmental threat because the dissolved plume is impacting a sole-source aquifer.

6.4: Summary of Human Exposure Pathways

This human exposure assessment identifies ways in which people may be exposed to site-related contaminants. Chemicals can enter the body through three major pathways (breathing, touching or swallowing). This is referred to as *exposure.*

Direct contact with contaminants in the soil is unlikely because the majority of the site is covered with buildings and pavement. People are not drinking the contaminated groundwater because the area is served by a public water supply that is treated to remove contaminants before the water is distributed to consumers. Volatile organic compounds in the groundwater and/or soil may move into the soil vapor (air spaces within the soil), which in turn may move into overlying buildings and affect the indoor air quality. This process, which is similar to the movement of radon gas from the subsurface into the indoor air of buildings, is referred to as soil vapor intrusion. The potential exists for people to inhale site contaminants in indoor air due to soil vapor intrusion in the on-site building and one off-site building.

6.5: Summary of the Remediation Objectives

The objectives for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375. The goal for the remedial program is to restore the site to pre-disposal conditions to the extent feasible. At a minimum, the remedy shall eliminate or mitigate all significant threats to public health and the environment presented by the contamination identified at the site through the proper application of scientific and engineering principles.

The remedial action objectives for this site are:

Groundwater

RAOs for Public Health Protection

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.
- Prevent contact with, or inhalation of volatiles, from contaminated groundwater.

RAOs for Environmental Protection

- Restore ground water aquifer to pre-disposal/pre-release conditions, to the extent practicable.
- Remove the source of ground or surface water contamination.

<u>Soil</u>

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation of or exposure from contaminants volatilizing from contaminants in soil.

RAOs for Environmental Protection

- Prevent migration of contaminants that would result in groundwater or surface water contamination.

<u>Soil Vapor</u>

RAOs for Public Health Protection

- Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into buildings at a site.

SECTION 7: <u>SUMMARY OF THE PROPOSED REMEDY</u>

To be selected, the remedy must be protective of human health and the environment, be cost-effective, comply with other statutory requirements, and utilize permanent solutions, alternative technologies or resource recovery technologies to the maximum extent practicable. The remedy must also attain the remedial action objectives identified for the site, which are presented in Section 6.5. Potential remedial alternatives for the Site were identified, screened and evaluated in the FS report.

A summary of the remedial alternatives that were considered for this site is presented in Exhibit B. Cost information is presented in the form of present worth, which represents the amount of money invested in the current year that would be sufficient to cover all present and future costs associated with the alternative. This enables the costs of remedial alternatives to be compared on a common basis. As a convention, a time frame of 30 years is used to evaluate present worth costs for alternatives with an indefinite duration. This does not imply that operation, maintenance, or monitoring would cease after 30 years if remediation goals are not achieved. A summary of the Remedial Alternatives Costs is included as Exhibit C.

The basis for the Department's proposed remedy is set forth at Exhibit D.

The proposed remedy is referred to as the AS/SVE, ISCO, Enhanced Bioremediation, and Vapor Mitigation remedy.

The estimated present worth cost to implement the remedy is $14,181,000. The cost to construct the remedy is estimated to be $12,036,000 and the estimated average annual cost is $204,000.

The elements of the proposed remedy are as follows:

1. Remedial Design

A remedial design program will be implemented to provide the details necessary for the construction, operation, optimization, maintenance, and monitoring of the remedial program.

Additional soil investigation and sampling will be conducted to determine if on-site soils meet the industrial use criteria. Green remediation principles and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows;

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term,
- Reducing direct and indirect greenhouse gases and other emissions,
- Increasing energy efficiency and minimizing use of non-renewable energy,
- Conserving and efficiently managing resources and materials,
- Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste,
- Maximizing habitat value and creating habitat when possible,
- Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals, and
- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development.

2. Air Sparge/Soil Vapor Extraction

Continued operation of the air sparge and soil vapor extraction system that was implemented in October 2012 to address the groundwater plume contaminated by volatile organic compounds (VOCs). At this site, two (2) air injection wells have been installed within the source area at the rear of the main building to a depth of about 92 feet. To capture the volatilized contaminants, four (4) SVE wells have been installed in the vadose zone to depths of about 25 feet and 65 feet below ground surface. This existing system will be optimized and/or modified, based on the data and evaluation conducted during the remedial design phase, so the influence of the system can more efficiently address the soil, soil vapor, and shallow groundwater contamination by volatile organic compounds (VOCs).

3. In-Situ Chemical Oxidation

In-situ chemical oxidation (ISCO) will be implemented to treat contaminants in soil and groundwater. A chemical oxidant will be injected into the subsurface to destroy the contaminants in the source area south of the building where the VOCs are elevated. The method and depth of injection will be determined during the remedial design.

4. Enhanced Bioremediation

In-situ enhanced bioremediation will be employed to treat contaminants in soil and groundwater in areas downgradient of the source area. The biological breakdown of contaminants through anaerobic reductive dechlorination will be enhanced by injection of an electron donor product and other amendments. The electron donor materials will be injected into the subsurface to promote microbe growth via injection wells screened at multiple locations and depths along the length of the plume that will be determined during the remedial design.

5. Vapor Mitigation

Any on-site buildings and off-site buildings impacted by the site will be required to have a sub-slab depressurization system, or similar engineered system, to mitigate the migration of vapors into the building from soil and/or groundwater.

6. Institutional Control

Imposition of an institutional control in the form of an environmental easement for the controlled property which will:

- require the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3),
- allow the use and development of the controlled property for industrial use as defined by Part 375-1.8(g), although land use is subject to local zoning laws,
- restrict the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH or Nassau County DOH, and
- require compliance with the Department approved Site Management Plan.

7. Site Management Plan

A Site Management Plan is required, which includes the following:

a) an Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective:

Institutional Controls: The Environmental Easement discussed in Paragraph 6 above.

Engineering Controls: The AS/SVE, ISCO, Enhanced Bioremediation, and Vapor Mitigation discussed in Paragraphs 2 through 5 above.

This plan includes, but may not be limited to:

- an Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination,
- descriptions of the provisions of the environmental easement including any land use, and/or groundwater use restrictions,
- a provision for evaluation of the potential for soil vapor intrusion for future buildings developed on the site, and in off-site area affected by site related contamination, including provision for implementing actions recommended to address exposures related to soil vapor intrusion,
- provisions for the management and inspection of the identified engineering controls,
- maintaining site access controls and Department notification,and
- the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.

b) a Monitoring Plan to assess the performance and effectiveness of the remedy. The plan includes, but may not be limited to:

- monitoring of soil, groundwater and soil vapor to assess the performance and effectiveness of the remedy, including sampling and evaluation to confirm restricted use SCOs are achieved.
- a schedule of monitoring and frequency of submittals to the Department, and
- monitoring for vapor intrusion for any buildings required by the Institutional and Engineering Control Plan discussed above.

c) an Operation and Maintenance (O&M) Plan to ensure continued operation, maintenance, optimization, monitoring, inspection, and reporting of any mechanical or physical components of the remedy. The plan includes, but is not limited to:

- procedures for operating and maintaining the remedy,
- compliance monitoring of treatment systems to ensure proper O&M as well as providing the data for any necessary permit or permit equivalent reporting,
- maintaining site access controls and Department notification; and
- providing the Department access to the site and O&M records.

CDM Smith

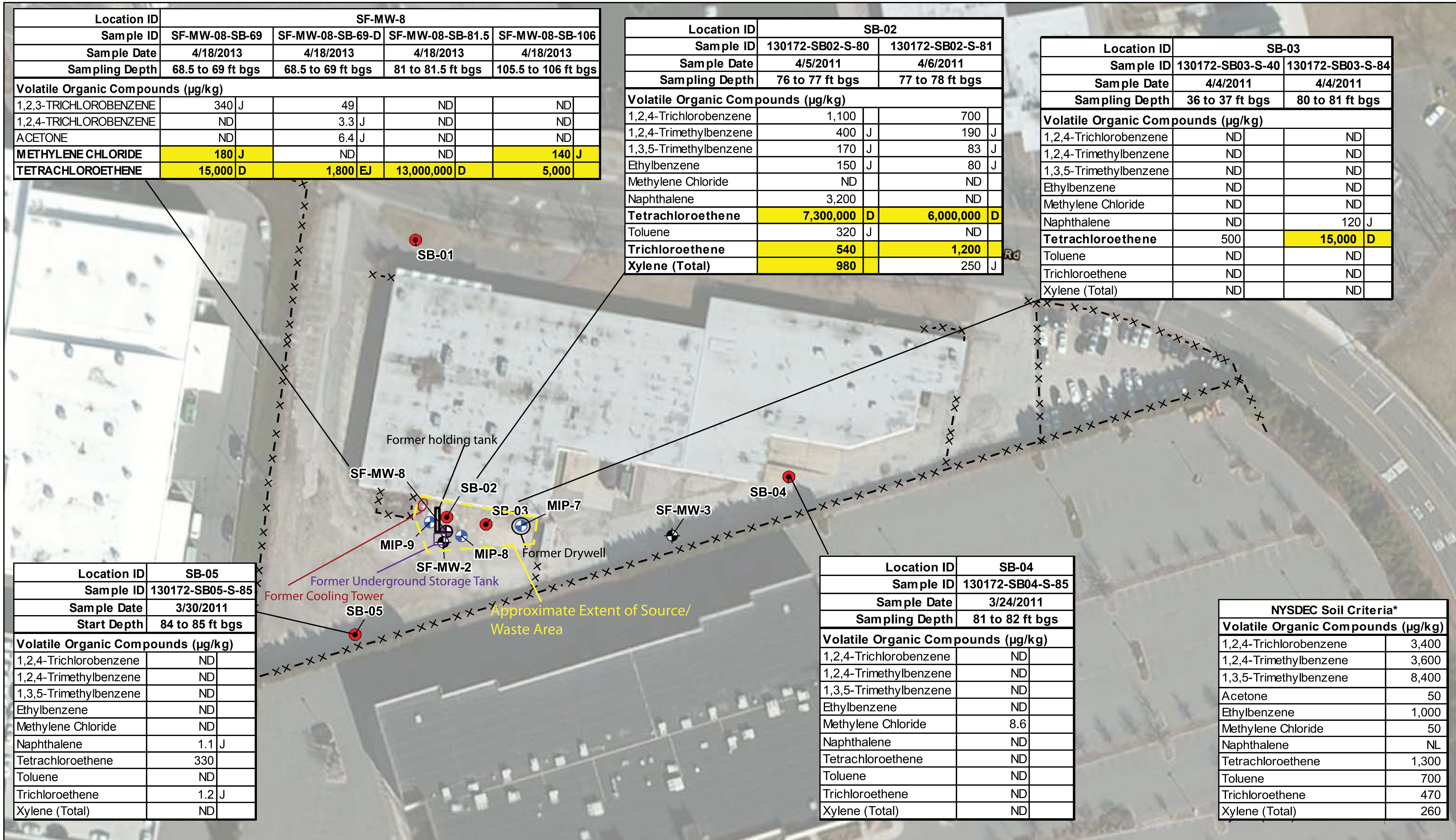
Legend

Site Boundary

N

0 200 400 Feet

Figure -1
Site Location Map
Solvent Finishers Site
Jericho, New York



Location ID	SF-MW-8							
Sample ID	SF-MW-08-SB-69		SF-MW-08-SB-69-D		SF-MW-08-SB-81.5		SF-MW-08-SB-106	
Sample Date	4/18/2013		4/18/2013		4/18/2013		4/18/2013	
Sampling Depth	68.5 to 69 ft bgs		68.5 to 69 ft bgs		81 to 81.5 ft bgs		105.5 to 106 ft bgs	
Volatile Organic Compounds (µg/kg)								
1,2,3-TRICHLOROBENZENE	340	J	49		ND		ND	
1,2,4-TRICHLOROBENZENE	ND		3.3	J	ND		ND	
ACETONE	ND		6.4	J	ND		ND	
METHYLENE CHLORIDE	**180**	**J**	ND		ND		**140**	**J**
TETRACHLOROETHENE	**15,000**	**D**	**1,800**	**EJ**	**13,000,000**	**D**	**5,000**	

Location ID	SB-02			
Sample ID	130172-SB02-S-80		130172-SB02-S-81	
Sample Date	4/5/2011		4/6/2011	
Sampling Depth	76 to 77 ft bgs		77 to 78 ft bgs	
Volatile Organic Compounds (µg/kg)				
1,2,4-Trichlorobenzene	1,100		700	
1,2,4-Trimethylbenzene	400	J	190	J
1,3,5-Trimethylbenzene	170	J	83	J
Ethylbenzene	150	J	80	J
Methylene Chloride	ND		ND	
Naphthalene	3,200		ND	
Tetrachloroethene	**7,300,000**	**D**	**6,000,000**	**D**
Toluene	320	J	ND	
Trichloroethene	**540**		**1,200**	
Xylene (Total)	**980**		250	J

Location ID	SB-03			
Sample ID	130172-SB03-S-40		130172-SB03-S-84	
Sample Date	4/4/2011		4/4/2011	
Sampling Depth	36 to 37 ft bgs		80 to 81 ft bgs	
Volatile Organic Compounds (µg/kg)				
1,2,4-Trichlorobenzene	ND		ND	
1,2,4-Trimethylbenzene	ND		ND	
1,3,5-Trimethylbenzene	ND		ND	
Ethylbenzene	ND		ND	
Methylene Chloride	ND		ND	
Naphthalene	ND		120	J
Tetrachloroethene	500		**15,000**	**D**
Toluene	ND		ND	
Trichloroethene	ND		ND	
Xylene (Total)	ND		ND	

Location ID	SB-05	
Sample ID	130172-SB05-S-85	
Sample Date	3/30/2011	
Start Depth	84 to 85 ft bgs	
Volatile Organic Compounds (µg/kg)		
1,2,4-Trichlorobenzene	ND	
1,2,4-Trimethylbenzene	ND	
1,3,5-Trimethylbenzene	ND	
Ethylbenzene	ND	
Methylene Chloride	ND	
Naphthalene	1.1	J
Tetrachloroethene	330	
Toluene	ND	
Trichloroethene	1.2	J
Xylene (Total)	ND	

Location ID	SB-04	
Sample ID	130172-SB04-S-85	
Sample Date	3/24/2011	
Sampling Depth	81 to 82 ft bgs	
Volatile Organic Compounds (µg/kg)		
1,2,4-Trichlorobenzene	ND	
1,2,4-Trimethylbenzene	ND	
1,3,5-Trimethylbenzene	ND	
Ethylbenzene	ND	
Methylene Chloride	8.6	
Naphthalene	ND	
Tetrachloroethene	ND	
Toluene	ND	
Trichloroethene	ND	
Xylene (Total)	ND	

NYSDEC Soil Criteria*	
Volatile Organic Compounds (µg/kg)	
1,2,4-Trichlorobenzene	3,400
1,2,4-Trimethylbenzene	3,600
1,3,5-Trimethylbenzene	8,400
Acetone	50
Ethylbenzene	1,000
Methylene Chloride	50
Naphthalene	NL
Tetrachloroethene	1,300
Toluene	700
Trichloroethene	470
Xylene (Total)	260

Legend

- Membrane Interface Probe Boring
- Monitoring Well
- Vertical Profile Boring
- Fence line
- Deep Monitoring Well

Notes

D - dilution
J - estimated value
ND - non detect
NL - no limit
µg/kg - micrograms per kilogram

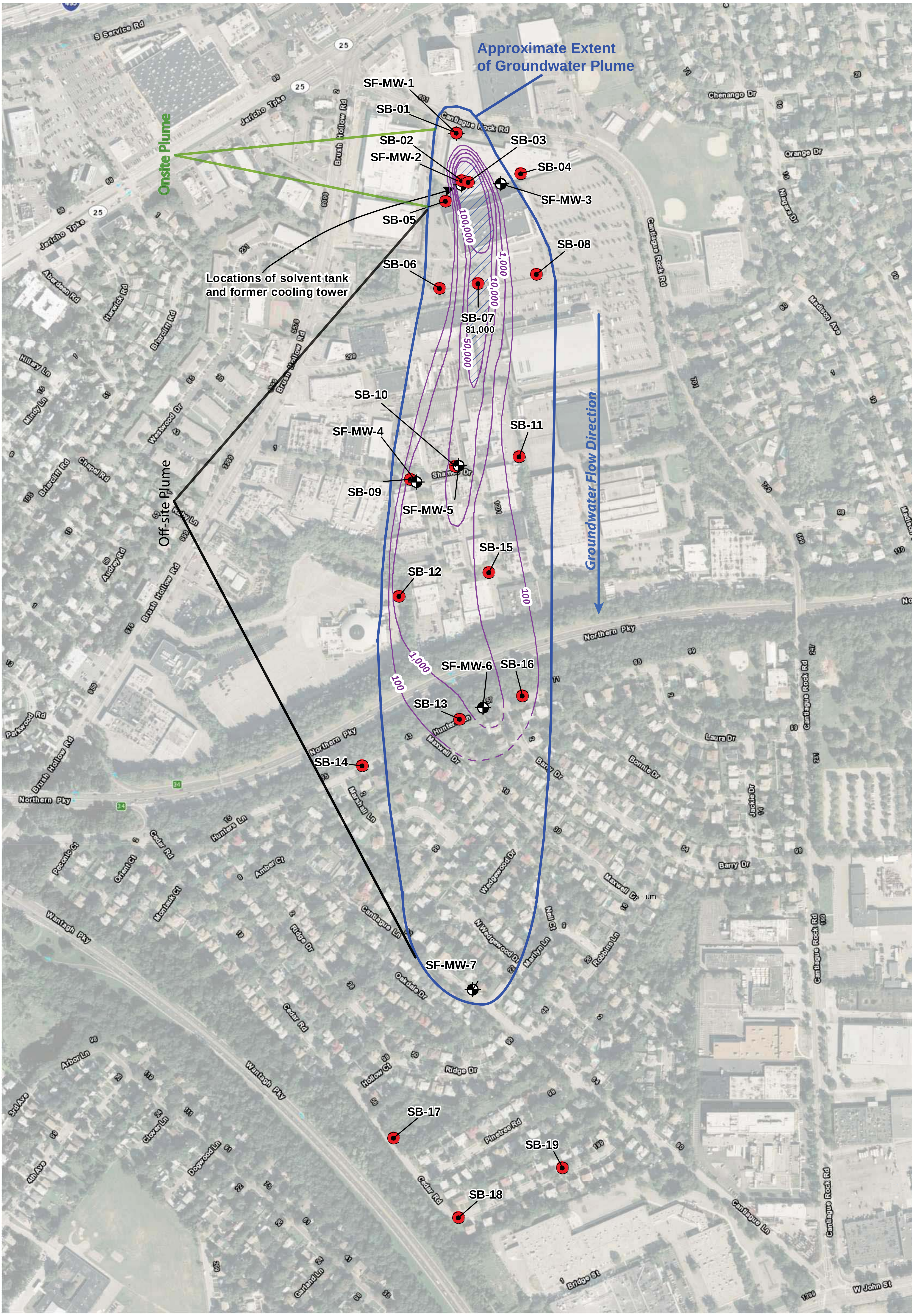
*Soil Cleanup Objectives (SCOs) are Comprised of:
1.) New York State Department of Environmental Conservation (NYSDEC) Part 375-6.8(a) Unrestricted Use Criteria.
2.) NYSDEC Part 375.6.8(b) Restricted Use – Protection of Groundwater Criteria.
3.) NYSDEC CP-51 Supplemental SCOs.

N

0 37.5 75 150 Feet

Figure 2
Waste/Source Areas and Soil Sample Results
Solvent Finishers Site
Jericho, New York

CDM Smith



— PCE Isoconcentration Contour, dashed where inferred (micrograms/liter)

Monitoring Well

Vertical Profile Boring

N

0 200 400 800 Feet

Figure 3
Extent of Groundwater Contamination
Jericho, Long Island
Nassau County, New York

CDM Smith

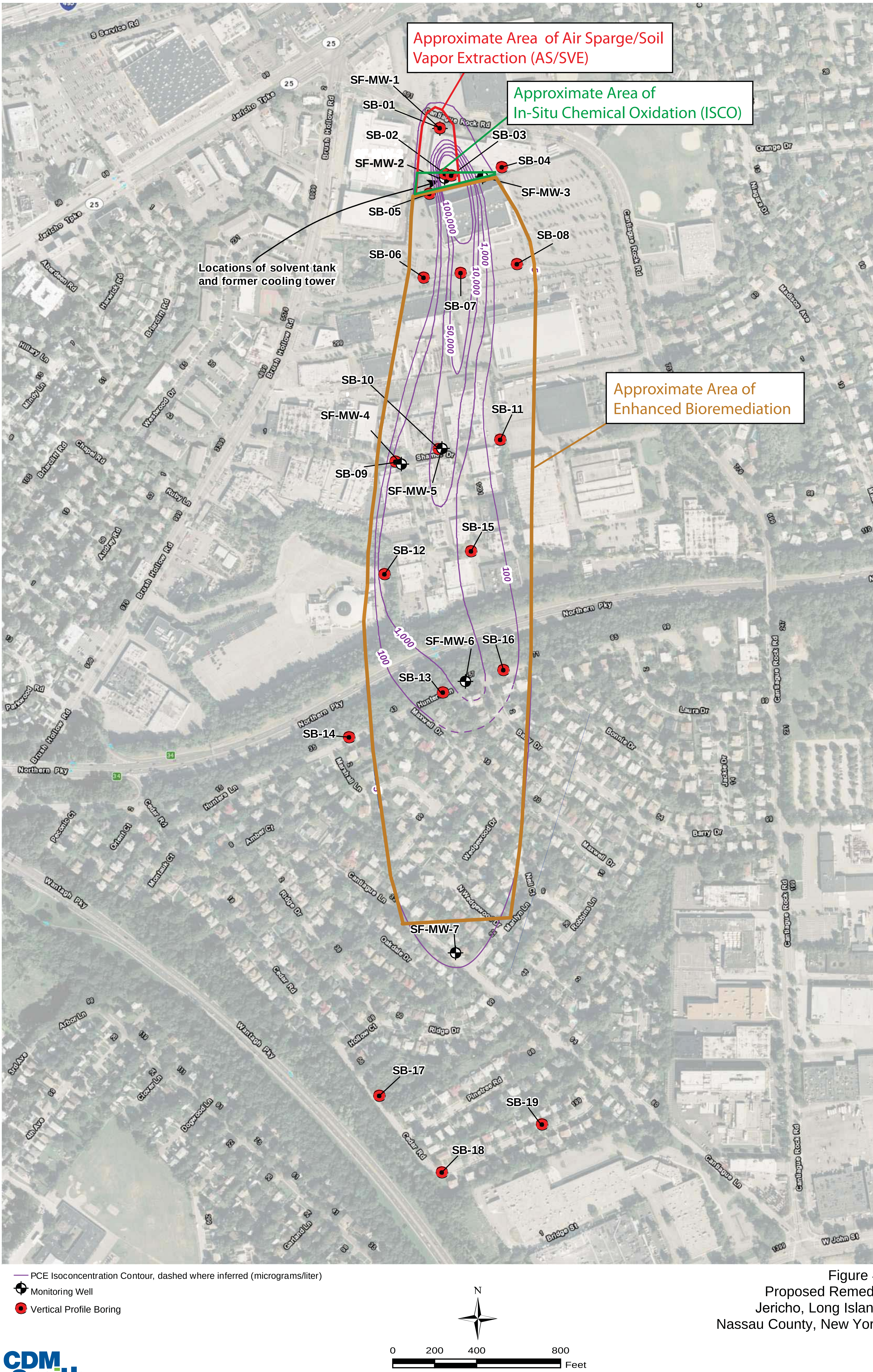


Figure 4
Proposed Remedy
Jericho, Long Island
Nassau County, New York

CDM Smith

Exhibit A

<u>Nature and Extent of Contamination</u>

This section describes the findings of the Remedial Investigation (RI) for all environmental media that were evaluated. As described in Section 6.1, samples were collected from various environmental media to characterize the nature and extent of contamination.

For each medium for which contamination was identified, a table summarizes the findings of the investigation. The tables present the range of contamination found at the site in the media and compares the data with the applicable SCGs for the site. The contaminants of concern are volatile organic compounds (VOCs). For comparison purposes, the SCGs are provided for each medium that allows for unrestricted use. For soil, if applicable, the Restricted Use SCGs identified in Section 4 and Section 6.1.1 are also presented.

Waste/Source Areas

As described in the RI report, waste/source materials were identified at the site and are impacting groundwater, soil and soil vapor.

Wastes are defined in 6 NYCRR Part 375-1.2 (aw) and include solid, industrial and/or hazardous wastes. Source Areas are defined in 6 NYCRR Part 375 (au). Source areas are areas of concern at a site where substantial quantities of contaminants are found which can migrate and release significant levels of contaminants to another environmental medium. Wastes and Source Areas were identified at the site near the former underground solvent storage tank, former cooling tower and former dry well located on the south side of the building. Tetrachloroethylene (PCE) was discharged into the ground in these areas as noted on Figure 2. In addition to soil and groundwater contamination, sampling suggests the presence of a Dense Non-Aqueous Phase Liquid (DNAPL) in this area, both in the upper portions of the water column and in deeper areas at approximately 200 feet below grade.

Certain waste/source areas identified at the site were addressed by the IRM(s) described in Section 6.2. The remaining waste/source area(s) identified during the RI will be addressed in the remedy selection process.

Groundwater

Groundwater samples were collected from different depths to assess the groundwater conditions both on-site and off-site. The samples were analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), iron and manganese to determine the nature and extent of contamination related to the historical operation of the site. The investigation results indicate that contamination in the groundwater at the site exceeds the SCGs for volatile organic compounds, semi-volatile organic compounds, iron and manganese.

The primary groundwater contaminants are Tetrachloroethylene (PCE) and Trichloroethene (TCE) associated with former site operations. The primary groundwater contamination is concentrated in the source area located on the south side of the building and extends off-site. A contaminated groundwater plume of PCE and its associated breakdown products TCE, Cis-1,2-Dichlorethene (DCE) emanates from the site to the south. This groundwater contamination extends approximately 4000 feet downgradient from the site to a depth of about 325 feet below grade. See Figure 3 for a generalized representation of the area of groundwater contamination that exceeds drinking water standards.

Other Metal, SVOC and VOC constituents have been reported above SCGs but are a lesser concern due to their location, nature, relatively low concentration results and/or low occurrence frequency. The VOC and SVOC exceedances can also be remediated by the methods required to treat the PCE and TCE plume. The metal exceedances are most likely related to changes in groundwater chemistry resulting from the reduced conditions during the breakdown of the PCE.

Table 1 – Groundwater

Detected Constituents	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)	Frequency Exceeding SCG
Metals NYS CLASS GA			
Iron	ND-1,500	300	3/4
Iron (DISSOLVED)	ND-28,500	300	12/15
Manganese	25.0-5,440	300	9/18
Manganese (DISSOLVED)	418-6,590	300	15/15
SVOC NYS CLASS GA			
Bis(2-Ethylhexyl) Phthalate	ND-3.40	5	0/5
Phenol	ND-1.80	1	1/5
VOC NYS CLASS GA			
1,1,1-Trichloroethane	ND-6.10	5	1/330
1,1-Dichloroethane	ND-0.860	5	0/330
1,1-Dichloroethene	ND-3.50	5	0/330
1,2,3-Trichlorobenzene	ND-3.10	5	0/330
1,2,4-Trichlorobenzene	ND-0.280	5	0/16
Acetone	ND-32.0	50	0/314
Benzene	ND-0.380	1	0/330
Bromodichloromethane	ND-0.230	50	0/330
Bromoform	ND-0.850	50	0/330
Carbon Disulfide	ND-0.460	60	0/330
Chlorobenzene	ND-2.10	5	0/330
Chloroform	ND-0.720	7	0/330
Cis-1,2-Dichloroethylene	ND-58.0	5	20/330
Dibromochloromethane	ND-0.670	50	0/330
Ethylbenzene	ND-0.360	5	0/330
Methylene Chloride	ND-0.200	5	0/16
Naphthalene	ND-3.00	10	0/10
O-Xylene (1,2-Dimethylbenzene)	ND-3.10	5	0/330
Tert-Butyl Methyl Ether	ND-2.20	10	0/330
Tetrachloroethylene (PCE)	ND-300,000	5	169/330
Toluene	ND-4.20	5	0/330
Trichloroethylene (TCE)	ND-9,900	5	33/330
Vinyl Chloride	ND-2.00	2	1/330

a - ppb: parts per billion, which is equivalent to micrograms per liter, ug/L, in water.
b- SCG: Standard Criteria or Guidance - Ambient Water Quality Standards and Guidance Values (TOGs 1.1.1), 6 NYCRR Part 703, Surface water and Groundwater Quality Standards, and Part 5 of the New York State Sanitary Code (10 NYCRR Part 5).

Based on the findings of the RI, the past disposal of hazardous waste has resulted in the contamination of groundwater. The site contaminants that are considered to be the primary contaminants of concern which will drive the remediation of groundwater to be addressed by the remedy selection process are: Tetrachloroethylene (PCE), Trichloroethene (TCE).

Soil

Soil samples were collected at the site during the RI, during the Site Characterization and during prior site activities. The samples were analyzed for volatile organic compounds, semi-volatile organic compounds and metals to determine the nature and extent of contamination related to historical operations at the site. Soil samples were collected at different depths from the surface to the groundwater table on-site. The results of these samples indicate that on-site soil contamination exceeds the unrestricted SCGs for volatile organic compounds near the former underground storage tank and cooling tower located on the south side of the building. There is VOC contaminated soil from about 5 feet below the surface to the groundwater table at 85 feet. Limited non-VOC soil data requires the collection of additional soil samples during the remedial design phase to determine if on-site soils meet industrial use criteria. Based on the investigation results near the property boundaries, no site related off-site soil contamination was expected, consequently, no off-site soil samples were collected. Figure 2 shows the location of soil samples collected during the remedial investigation.

Table 2 - Soil

Detected Constituents	Concentration Range Detected (ppm)[a]	Unrestricted Use SCG[b] (ppm)	Frequency Exceeding Unrestricted Use SCG	Restricted Use SCG[c] (ppm)	Frequency Exceeding Restricted Use SCG
METALS PART 375					
Arsenic	ND-1.95	16	0/7	16	0/7
Barium	ND-8.57	350	0/4	433	0/4
Cadmium	ND-8.97	2.5	2/7	7.5	0/7
Chromium	ND-38.3	22	2/7	19	0/7
Lead	ND-135	400	0/7	450	0/7
Mercury	ND-0.371	0.81	0/7	0.73	0/7
Selenium	ND-0.384	36	0/7	4	0/7
Silver	ND	36	0/7	8.3	0/7
Beryllium	ND	14	0/3	47	0/3
Copper	ND-862	270	1/3	1,720	0/3
Zinc	ND-434	2,200	0/3	2,480	0/3
Nickel	ND-8.59	140	0/3	130	0/3
SVOC PART 375					
Anthracene	ND-0.0510	100	0/15	500	0/15
Benzo(A)Anthracene	ND-0.320	1	0/15	1	0/15
Benzo(A)Pyrene	ND-0.300	1	0/15	1	0/15
Benzo(B)Fluoranthene	ND-0.510	1	0/15	1.7	0/15
Benzo(G,H,I)Perylene	ND-0.300	100	0/15	500	0/15
Benzo(K)Fluoranthene	ND-0.240	0.8	0/15	1.7	0/15
Chrysene	ND-0.380	1	0/15	1	0/15
Dibenz(A,H)Anthracene	ND-0.0480	0.33	0/15	0.56	0/15
Fluoranthene	ND-0.450	100	0/15	500	0/15
Indeno(1,2,3-C,D)Pyrene	ND-0.240	0.5	0/15	5.6	0/15
Naphthalene	ND-3.20	12	0/25	12	0/25
Pentachlorophenol	ND-0.540	0.8	0/15	0.8	0/15
Phenanthrene	ND-0.200	100	0/15	500	0/15
Pyrene	ND-1.20	100	0/15	500	0/15
VOC PART 375					
1,2,4-Trimethylbenzene	ND-0.400	3.6	0/10	3.6	0/10
1,3,5-Trimethylbenzene (Mesitylene)	ND-0.170	8.4	0/10	8.4	0/10
Acetone	ND-0.0230	0.05	0/16	0.05	0/16
Cis-1,2-Dichloroethylene	ND-0.00920	0.25	0/16	0.25	0/16
Ethylbenzene	ND-0.150	1	0/16	1	0/16

Methyl Ethyl Ketone (2-Butanone)	ND-0.00470	0.12	0/16	0.12	0/16
Methylene Chloride	ND-0.00860	0.05	0/16	0.05	0/16
O-Xylene (1,2-Dimethylbenzene)	ND-0.370	0.26	1/16	1.6	0/16
Tetrachloroethylene (PCE)	ND-7,300	1.3	3/16	1.3	3/16
Toluene	ND-0.320	0.7	0/16	0.7	0/16
Trichloroethylene (TCE)	ND-1.20	0.47	2/16	0.47	2/16

a - ppm: parts per million, which is equivalent to milligrams per kilogram, mg/kg, in soil;
b - SCG: Part 375-6.8(a), Unrestricted Soil Cleanup Objectives.
c - SCG: Part 375-6.8(b), Restricted Use Soil Cleanup Objectives for the Protection of Groundwater.

The primary soil contaminants are Tetrachloroethylene (PCE) and Trichloroethene (TCE) associated with former site operations on the south side of the building and is being addressed by the IRM described in Section 6.2.

Based on the findings of the Remedial Investigation, the past disposal of hazardous waste has resulted in the contamination of soil. The site contaminants identified in soil which are considered to be the primary contaminants of concern, to be addressed by the remedy selection process are: Tetrachloroethylene (PCE), Trichloroethene (TCE).

Soil Vapor

The potential for soil vapor intrusion resulting from the presence of site-related soil or groundwater contamination was evaluated by sampling soil vapor, sub-slab soil vapor under structures, and indoor air inside structures. At this site, due to the presence of buildings in the impacted area, a full suite of samples were collected to evaluate whether actions are needed to address exposures related to soil vapor intrusion.

Samples were collected at the Solvent Finishers site and at three adjacent commercial properties. The results from these samples indicate the PCE and TCE contamination related to the on-site disposal of hazardous wastes was detected in the soil vapor, sub-slab vapor and indoor air of the on-site building and at one off-site property. Results of the investigation are detailed in PRAP Section 6.3

Based on the concentration detected, the primary soil vapor contaminants are PCE and TCE which are associated with the former site operations. Actions are needed to address exposures at the on-site structure and one adjacent off-site property.

Based on the findings of the Remedial Investigation, the disposal of hazardous waste has resulted in the contamination of soil vapor and indoor air. The site contaminants that are considered to be the primary contaminants of concern which will drive the remediation of soil vapor to be addressed by the remedy selection process are: Tetrachloroethylene (PCE) and Trichloroethene (TCE).

Exhibit B

Description of Remedial Alternatives

The following alternatives were considered based on the remedial action objectives (see Section 6.5) to address the contaminated media identified at the site as described in Exhibit A.

Alternative 1: No Action

The No Action Alternative is evaluated as a procedural requirement and as a basis for comparison. This alternative leaves the site in its present condition and does not provide any additional protection to public health and the environment.

Alternative 2: Air Sparge/Soil Vapor Extraction (AS/SVE), and Enhanced Bioremediation

This alternative would include continued use and modification of the existing on-site AS/SVE with on-site and off-site Enhanced Bioremediation, and Vapor Mitigation. This alternative also employs site management, including institutional and engineering controls (IC/EC), to ensure the remedy continues to be protective and to ensure the safe reuse of the property where contamination will remain in place.

Continued operation of the air sparge and soil vapor extraction system that was implemented in October 2012 to address the groundwater plume contaminated by volatile organic compounds (VOCs). At this site, two (2) air injection wells have been installed within the source area at the rear of the main building to a depth of about 92 feet. To capture the volatilized contaminants, four (4) SVE wells have been installed in the vadose zone to depths of about 25 feet and 65 feet below ground surface. This existing system will be optimized and/or modified, based on the data and evaluation conducted during the remedial design phase, so the influence of the system can more efficiently address the soil, soil vapor, and shallow groundwater contamination by volatile organic compounds (VOCs).

Enhanced Bioremediation will be employed to treat contaminants in on-site and off-site groundwater in an area to be determined during the remedial design. The biological breakdown of contaminants through anaerobic reductive dechlorination will be enhanced by the placement of chemical amendments into the subsurface to promote microbial growth. The amendments, method and depth of injection will be determined during the remedial design.

Vapor Mitigation of any on-site and off-site buildings impacted by the site will be required to have a sub-slab depressurization system, or a similar engineered system, to mitigate the migration of vapors into the building from soil and/or groundwater.

The cost to implement this alternative varies based on the specific chemicals used. The upper range of costs from the feasibility study has been used for comparison purposes.

Present Worth:..$10,081,000
Capital Cost: $7,936,000
Annual Costs:..$204,000

Alternative 3: Air Sparge/Soil Vapor Extraction (AS/SVE), In-Situ Thermal Remediation (ISTR) and Enhanced Bioremediation

This alternative would include continued use and modification of the existing on-site AS/SVE with on-site ISTR and off-site Enhanced Bioremediation, and Vapor Mitigation. This alternative also employs site management, including institutional and engineering controls (IC/EC), to ensure the remedy continues to be protective and to ensure the safe reuse of the property where contamination will remain in place.

Continued operation of the air sparge and soil vapor extraction system that was implemented in October 2012 to address the groundwater plume contaminated by volatile organic compounds (VOCs). At this site, two (2) air injection wells have been installed within the source area at the rear of the main building to a depth of about 92 feet. To capture the volatilized contaminants, four (4) SVE wells have been installed in the vadose zone to depths of about 25 feet and 65 feet below ground surface. This existing system will be optimized and/or modified, based on the data and evaluation conducted during the remedial design phase, so the influence of the system can more efficiently address the soil, soil vapor, and shallow groundwater contamination by volatile organic compounds (VOCs).

In-Situ Thermal Treatment will be implemented to destroy or volatilize volatile organic compounds (VOCs) in the source area located south of the building. Heat will be supplied to the soil and groundwater either by steam or electrical heating methods to mobilize and evaporate the contaminants. The gases produced by the thermal treatment will be collected by vapor extraction wells and treated in an ex-situ treatment unit. Effluent vapors will be treated prior to discharge. Details of the thermal and vapor treatment systems will be determined during the remedial design.

Enhanced Bioremediation will be employed to treat contaminants in off-site groundwater in an area to be determined during the remedial design. The biological breakdown of contaminants through anaerobic reductive dechlorination will be enhanced by the placement of chemical amendments into the subsurface to promote microbial growth. The amendments, method and depth of injection will be determined during the remedial design.

Vapor Mitigation of any on-site and off-site buildings impacted by the site will be required to have a sub-slab depressurization system, or a similar engineered system, to mitigate the migration of vapors into the building from soil and/or groundwater.

The cost to implement this alternative varies based on the specific ISTR technology and the chemicals used. The upper range of costs from the feasibility study has been used for comparison purposes below.

Present Worth:..$20,879,000
Capital Cost: $18,734,000
Annual Costs:...$204,000

Alternative 4: Air Sparge/Soil Vapor Extraction (AS/SVE), Groundwater Extraction and Treatment, and Enhanced Bioremediation

This alternative would include continued use and modification of the existing on-site AS/SVE with on-site Groundwater Extraction and Treatment, and off-site Enhanced Bioremediation, and Vapor Mitigation. This alternative also employs site management, including institutional and engineering controls (IC/EC), to ensure the remedy continues to be protective and to ensure the safe reuse of the property where contamination will remain in place.

Continued operation of the air sparge and soil vapor extraction system that was implemented in October 2012 to address the groundwater plume contaminated by volatile organic compounds (VOCs). At this site, two (2) air injection wells have been installed within the source area at the rear of the main building to a depth of about 92 feet. To capture the volatilized contaminants, four (4) SVE wells have been installed in the vadose zone to depths of about 25 feet and 65 feet below ground surface. This existing system will be optimized and/or modified, based on the data and evaluation conducted during the remedial design phase, so the influence of the system can more efficiently address the soil, soil vapor, and shallow groundwater contamination by volatile organic compounds (VOCs).

Groundwater extraction and treatment will be implemented to treat contaminants in groundwater. The groundwater extraction system will be designed and installed so that the capture zone is sufficient to cover the areal and vertical extent of the area of concern. The extraction system will create a depression of the water table so that contaminated groundwater is directed toward the extraction wells within the plume area. The extracted groundwater will be treated using air stripping. Air stripping will be implemented ex-situ to remove volatile contaminants from extracted groundwater. The groundwater will be contacted with an air stream to volatilize contaminants from groundwater to air. The extracted air stream containing the volatile contaminants will be treated prior to discharge to the atmosphere and following treatment, the groundwater will be discharged. Further details of the extraction and treatment systems will be determined during the remedial design.

Enhanced Bioremediation will be employed to treat contaminants in off-site groundwater in an area to be determined during the remedial design. The biological breakdown of contaminants through anaerobic reductive dechlorination will be enhanced by the placement of chemical amendments into the subsurface to promote microbial growth. The amendments, method and depth of injection will be determined during the remedial design.

Vapor Mitigation of any on-site and off-site buildings impacted by the site will be required to have a sub-slab depressurization system, or a similar engineered system, to mitigate the migration of vapors into the building from soil and/or groundwater.

The cost to implement this alternative varies based on the specific technology and the chemicals used. The upper range of costs from the feasibility study has been used for comparison purposes below.

Present Worth:..$17,191,000
Capital Cost: $7,358,000
Annual Costs:...$934,000

Alternative 5: Air Sparge/Soil Vapor Extraction (AS/SVE), In-Situ Thermal Remediation (ISTR), and In-Situ Chemical Oxidation (ISCO)

This alternative would include continued use and modification of the existing on-site AS/SVE with on-site ISTR and off-site ISCO, and Vapor Mitigation. This alternative also employs site management, including institutional and engineering controls (IC/EC), to ensure the remedy continues to be protective and to ensure the safe reuse of the property where contamination will remain in place.

Continued operation of the air sparge and soil vapor extraction system that was implemented in October 2012 to address the groundwater plume contaminated by volatile organic compounds (VOCs). At this site, two (2) air injection wells have been installed within the source area at the rear of the main building to a depth of about 92 feet. To capture the volatilized contaminants, four (4) SVE wells have been installed in the vadose zone to depths of about 25 feet and 65 feet below ground surface. This existing system will be optimized and/or modified, based on the data and evaluation conducted during the remedial design phase, so the influence of the system can more efficiently address the soil, soil vapor, and shallow groundwater contamination by volatile organic compounds (VOCs).

In-Situ Thermal Treatment will be implemented to destroy or volatilize volatile organic compounds (VOCs) in the source area located south of the building. Heat will be supplied to the soil and groundwater either by steam or electrical heating methods to mobilize and evaporate the contaminants. The gases produced by the thermal treatment will be collected by vapor extraction wells and treated in an ex-situ treatment unit. Effluent vapors will be treated prior to discharge. Details of the thermal and vapor treatment systems will be determined during the remedial design.

In-situ chemical oxidation (ISCO) will be implemented to treat contaminants in soil and groundwater. A chemical oxidant will be injected into the subsurface to destroy the contaminants south of the building where the chlorinated compounds are elevated. The method and depth of injection will be determined during the remedial design.

Vapor Mitigation of any on-site and off-site buildings impacted by the site will be required to have a sub-slab depressurization system, or a similar engineered system, to mitigate the migration of vapors into the building from soil and/or groundwater.

The cost to implement this alternative varies based on the specific ISTR technology and the ISCO chemicals used. The upper range of costs from the feasibility study has been used for comparison purposes.

Present Worth:..$50,833,000
Capital Cost: $48,688,000
Annual Costs:...$204,000

Alternative 6: Air Sparge/Soil Vapor Extraction (AS/SVE), In-Situ Chemical Oxidation (ISCO), and Enhanced Bioremediation

This alternative would include continued use and modification of the existing on-site AS/SVE with ISCO and off-site Enhanced Bioremediation, and Vapor Mitigation. This alternative also employs site management, including institutional and engineering controls (IC/EC), to ensure the remedy continues to be protective and to ensure the safe reuse of the property where contamination will remain in place.

Continued operation of the air sparge and soil vapor extraction system that was implemented in October 2012 to address the groundwater plume contaminated by volatile organic compounds (VOCs). At this site, two (2) air injection wells have been installed within the source area at the rear of the main building to a depth of about 92 feet. To capture the volatilized contaminants, four (4) SVE wells have been installed in the vadose zone to depths of about 25 feet and 65 feet below ground surface. This existing system will be optimized and/or modified, based on the data and evaluation conducted during the remedial design phase, so the influence of the system can more efficiently address the soil, soil vapor, and shallow groundwater contamination by volatile organic compounds (VOCs).

In-situ chemical oxidation (ISCO) will be implemented to treat contaminants in soil and groundwater. The method and depth of injection will be determined during the remedial design. Prior to the full implementation of this technology, laboratory and on-site pilot scale studies may be conducted to more clearly define design parameters.

Enhanced Bioremediation will be employed to treat contaminants in on-site and off-site groundwater in an area to be determined during the remedial design. The biological breakdown of contaminants through anaerobic reductive dechlorination will be enhanced by the placement of chemical amendments into the subsurface to promote microbial growth. The amendments, method and depth of injection will be determined during the remedial design.

Vapor Mitigation of any on-site and off-site buildings impacted by the site will be required to have a sub-slab depressurization system, or a similar engineered system, to mitigate the migration of vapors into the building from soil and/or groundwater.

The cost to implement this alternative varies based on the specific technology and the chemicals used. The upper range of costs from the feasibility study has been used for comparison purposes.

Present Worth:..$14,181,000
Capital Cost: $12,036,000
Annual Costs:...$204,000

Exhibit C

Remedial Alternative Costs

Remedial Alternative	Capital Cost ($)	Annual Costs ($) For 20 Years	Total Present Worth ($)
1. No Action	0	0	0
2. Air Sparge/Soil Vapor Extraction, and Enhanced Bioremediation	$7,936,000	$204,000	$10,081,000
3. Air Sparge/Soil Vapor Extraction, In-Situ Thermal Remediation and Enhanced Bioremediation	$18,734,000	$204,000	$20,879,000
4. Air Sparge/Soil Vapor Extraction, Groundwater Extraction and Treatment, and Enhanced Bioremediation	$7,358,000	$934,000	$17,191,000
5. Air Sparge/Soil Vapor Extraction, In-Situ Thermal Remediation, and In-Situ Chemical Oxidation	$48,688,000	$204,000	$50,833,000
6. Air Sparge/Soil Vapor Extraction, In-Situ Chemical Oxidation and Enhanced Bioremediation	$12,036,000	$204,000	$14,181,000

Exhibit D

SUMMARY OF THE PROPOSED REMEDY

The Department is proposing Alternative 6, on-site AS/SVE and ISCO with off-site Enhanced Bioremediation and Vapor Mitigation and site management as the remedy for this site. Alternative 6 would achieve the remediation goals for the site by using multiple technologies to remove the contamination from the soil, destroying the contamination in the groundwater, and monitoring the soil vapor and the groundwater to ensure the concentration of contaminants continues to decrease, and managing remaining contamination and associated human exposures. The elements of this remedy are described in Section 7. The proposed remedy is depicted in Figure 4.

Basis for Selection

The proposed remedy is based on the results of the RI and the evaluation of alternatives. The criteria to which potential remedial alternatives are compared are defined in 6 NYCRR Part 375. A detailed discussion of the evaluation criteria and comparative analysis is included in the FS report.

The first two evaluation criteria are termed "threshold criteria" and must be satisfied in order for an alternative to be considered for selection.

1. <u>Protection of Human Health and the Environment.</u> This criterion is an overall evaluation of each alternative's ability to protect public health and the environment.

The proposed remedy (Alternative 6, on-site AS/SVE and ISCO with Enhanced Bioremediation) will satisfy this criterion by treating the on-site contaminated soils, providing source removal, along with quickly destroying the on-site groundwater contamination in-situ and treating off-site groundwater thereby preventing the further migration of the groundwater plume, capturing soil vapor and managing remaining contamination and associated human exposures. The proposed alternative destroys source area contamination which is the most significant threat to public health and the environment. Alternative 1, the “no action” alternative, will not provide protection to human health and the environment and will not be evaluated further. Alternatives 2 through 6 all protect human health and control human exposure by using soil vapor extraction to capture and treat soil vapor, and restrict the use of contaminated groundwater. Alternatives 3, 5 and 6 provide additional protection by removing or destroying the on-site groundwater contamination at a significantly faster rate which will prevent the further migration of contaminated groundwater. Alternative 4 reduces off-site migration of groundwater by extracting groundwater but both groundwater contamination and the potential for soil vapor intrusion will remain significantly longer. Alternative 5 will reduce contamination in portions of the off-site plume faster than the other alternatives while Alternatives 2, 3, 4 and 6 will provide similar off-site long term protections but not as quickly.

2. <u>Compliance with New York State Standards, Criteria, and Guidance (SCGs).</u> Compliance with SCGs addresses whether a remedy will meet environmental laws, regulations, and other standards and criteria. In addition, this criterion includes the consideration of guidance which the Department has determined to be applicable on a case-specific basis.

Alternative 6 complies with SCGs to the extent practicable. It quickly removes and destroys source area contamination in soil, soil vapor and groundwater, creating conditions necessary to restore groundwater quality. Alternatives 3, 5 and 6 are expected to achieve on-site groundwater SCGs in a much shorter time frame when compared to achievement of SCGs for Alternatives 2 and 4. Alternative 2 and 4 will comply with this criterion with lower certainty to remediate the source area. Because Alternatives 2 through 6 all satisfy the threshold criteria, the remaining criteria are particularly important in selecting a final remedy for the site.

The next six "primary balancing criteria" are used to compare the positive and negative aspects of each of the remedial strategies.

3. Long-term Effectiveness and Permanence. This criterion evaluates the long-term effectiveness of the remedial alternatives after implementation. If wastes or treated residuals remain on-site after the selected remedy has been implemented, the following items are evaluated: 1) the magnitude of the remaining risks, 2) the adequacy of the engineering and/or institutional controls intended to limit the risk, and 3) the reliability of these controls.

Alternatives 2 through 6 all provide adequate long term effectiveness but at varied levels and all require groundwater use restrictions and site management. Long-term effectiveness is best accomplished by Alternative 3, 5, and 6, involving quick reduction of the source area contamination which will in turn reduce both the potential for soil vapor intrusion and off-site migration of the plume. Alternative 6 will permanently destroy the source area contamination by chemical oxidation, reduce contamination from migrating and reduce the potential for soil vapor intrusion. Alternatives 3 and 5 will use heat to effectively volatize contamination from the subsurface on-site which can be beneficial to the downgradient biological aspects of these alternatives. Alternative 4 will reliably control off-site migration but the source area remediation will be much slower and therefore less effective than alternatives 3, 5 and 6. Alternative 4 will also require long term operation of a groundwater treatment system which will have difficulty removing the source area contamination. Alternative 2 will be the least effective at quickly reducing the source area contamination.

4. Reduction of Toxicity, Mobility or Volume. Preference is given to alternatives that permanently and significantly reduce the toxicity, mobility or volume of the wastes at the site.

Alternatives 3, 5 and 6 will quickly and permanently remove on-site contamination and provide a reduction in toxicity, mobility and volume. The fast removal of the source area contamination will also significantly limit the continued source area contribution to the off-site plume and reduce the potential for soil vapor intrusion. Alternative 5 provides additional reduction in toxicity, mobility and volume by treating the off-site portion of source area contamination. Alternatives 2 and 4 will provide a much slower reduction of on-site contaminant volume and toxicity which will allow greater mobility when compared to the other alternatives.

5. Short-term Impacts and Effectiveness. The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment during the construction and/or implementation are evaluated. The length of time needed to achieve the remedial objectives is also estimated and compared against the other alternatives.

Alternatives 2 through 6 all have similar and controllable short term on-site impacts associated with the installation and operation of the on-site AS/SVE system. Overall, the time necessary to achieve the remediation goals is the shortest for Alternative 5, followed by Alternatives 3 and 6 which will reach the goals faster than Alternatives 2 and 4. Alternatives 2 and 6 have the smallest overall short-term on-site impacts. The on-site short term chemical injection impacts associated with Alternative 6 are easily controlled. Alternatives 3 and 5 will have the greatest short term impacts including using large portions of the current parking lot to install and operate the thermal treatment system. Alternative 4 will have considerable on-site short term impacts related to well drilling and pumping along with the construction of on-site water treatment and discharge systems. Alternatives 2, 3, 4, and 6, all have similar minor short term off-site community impacts since they all use the same common and short duration well drilling and injection methods of remedial products into groundwater while Alternative 5 will have larger short term impacts due to the additional off-site chemical injection impacts.

6. Implementability. The technical and administrative feasibility of implementing each alternative are evaluated. Technical feasibility includes the difficulties associated with the construction of the remedy and the ability to monitor its effectiveness. For administrative feasibility, the availability of the necessary personnel and materials is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, institutional controls, and so forth.

Each of the alternatives is technically and administratively implementable but with varied degree of difficulty. Alternatives 2 and 6 are readily implemented using industry standard drilling and injection methods. Alternative 4 is implementable using industry standard construction but has increased complexity from operating and monitoring a groundwater treatment system and associated treated water discharge. Alternatives 3 and 5 are less implementable in that they require both additional electric power sources and complete access to a large portion of the on-site parking lot. Alternatives 2 through 6 all have similar off-site implementability by use of similar injection methods for oxidants and/or biological amendments.

7. Cost-Effectiveness. Capital costs and annual operation, maintenance, and monitoring costs are estimated for each alternative and compared on a present worth basis. Although cost-effectiveness is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the other criteria, it can be used as the basis for the final decision.

The costs of the alternatives vary significantly and are summarized in Exhibit C. Alternative 2 has the lowest total cost but will take significantly longer to remediate contamination in the source area. Alternative 6 has the second lowest total cost but removes a substantial amount of source area contamination very quickly which limits off-site migration. Alternative 5 has the highest total cost and highest capital cost to achieve the shortest remediation time. Alternative 4 has the highest annual operation and maintenance (O&M) cost due to operation of the long term groundwater extraction and treatment system which contributes to Alternative 4 having a larger total cost than Alternative 6 and 2.

8. Land Use. When cleanup to pre-disposal conditions is determined to be infeasible, the Department may consider the current, intended, and reasonable anticipated future land use of the site and its surroundings in the selection of the soil remedy.

The site will be restricted to industrial use. Alternatives 2 and 4 are the least desirable because in addition to being the slowest remedial methods they would most likely to leave residual contamination in the source area. Alternatives 3, 5 and 6 would be more desirable since they will remove or permanently treat the on-site source area. Alternative 6 is the most desirable since it will permanently destroy or treat the entire source area. Alternatives 2 through 6 all require that remaining contamination be monitored and controlled with a site management plan that includes provisions for the testing of groundwater and soil vapor and also requires an environmental easement restricting the use of on-site groundwater.

The final criterion, Community Acceptance, is considered a "modifying criterion" and is taken into account after evaluating those above. It is evaluated after public comments on the Proposed Remedial Action Plan have been received.

9. Community Acceptance. Concerns of the community regarding the investigation, the evaluation of alternatives, and the PRAP are evaluated. A responsiveness summary will be prepared that describes public comments received and the manner in which the Department will address the concerns raised. If the selected remedy differs significantly from the proposed remedy, notices to the public will be issued describing the differences and reasons for the changes.

Alternative 6 is being proposed because, as described above, it satisfies the threshold criteria and provides the best balance of the balancing criterion.