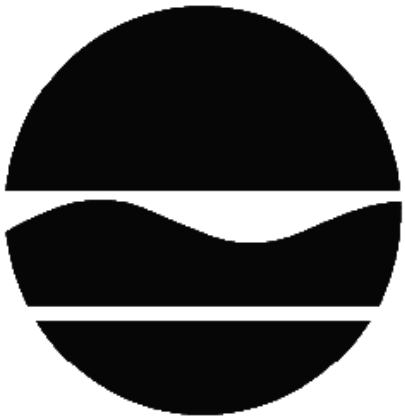
PROPOSED REMEDIAL ACTION PLAN

Wantagh Cleaners
Operable Unit Number 2
Vapor Intrusion Evaluation
State Superfund Project
Wantagh, Nassau County
Site No. 130064
January 2017



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 repositories:

NYSDEC
Attn: Joseph Jones
625 Broadway
12th floor
Albany, NY 12233
Phone: 518-402-9621

Wantagh Public Library
Attn: Librarian
3285 Park Avenue
Wantagh, NY 11793
Phone: 516-221-1200

A public comment period has been set from:

01/09/2017 to 02/09/2017

A public meeting is scheduled for the following date:

January 31, 2017; 7:00 pm

Public meeting location:

Wantagh Public Library

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 02/09/2017 to:

Joseph Jones
NYS Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway
Albany, NY 12233
joseph.jones@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 Wantagh Cleaners site is 0.25 acres in size and is an active dry cleaner located at the northwest corner of Sandhill Road and Wantagh Avenue near the Southern State Parkway in a mixed commercial/residential area.

Site Features: The site's ground surface is flat. The site's main features are a single story commercial building with a paved parking lot.

Current Zoning and Land Use: The site is zoned for commercial use. Properties to the north and west are used commercially, to the east lies a residential neighborhood, and to the south lies a series of on- and off-ramps for the Southern State Parkway.

Past Use of the Site: The site has been the location of a dry cleaning facility from 1974 to the present. Three on-site leaching pools were used for disposing wastewater containing tetrachloroethene into subsurface soils and groundwater from 1974 to 1991. In March 1991, the facility was connected to the public sewer system as ordered by the Nassau County Department of Health. In 1992, based upon the results of a 1991 preliminary site assessment, the on-site leaching pools were emptied, cleaned and backfilled, and a floor drain was cleaned and filled. The Department conducted another preliminary site assessment, in 1994, that resulted in the site being listed as a Class 2 site in May 1995. A Focused Remedial Investigation was conducted from 1997 thru 1998, and an Air Sparge/Soil Vapor Extraction System was installed as an Interim Remedial Measure in 1998/1999. Subsequently, a No Further Action Record of Decision was issued, in May 1999, based on the results of the Interim Remedial Measure. Based upon this work, the site was removed from the State Registry of Inactive Hazardous Waste Disposal Sites in 2003.

In 2009, based upon the results of a 2007 vapor intrusion evaluation required by the Department's soil vapor intrusion legacy site initiative, the site was again classified as Class 2, and a remedial investigation started to investigate soil vapor intrusion impacts.

Site Geology and Hydrogeology: The site is underlain by the Upper Glacial Aquifer. The unsaturated zone consists of brown and black silty and coarse sand intermixed with pebbles. The saturated zone below the water table consists of brown silty sand mixed

with pebbles. The groundwater table is at about 9 feet below ground surface. Regional groundwater flow is south-southeast.

Operable Unit (OU) Number 02 is the subject of this document.

A Record of Decision was issued previously for OU 01.

A site location map is attached as Figure 1.

SECTION 4: LAND USE AND PHYSICAL SETTING

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 commercial use (which allows for 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: ENFORCEMENT STATUS

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:

Stanley Klienfeld

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 from 2011 through 2014. This investigation focused on volatile organic compound contamination. Previous investigations conducted in 1997 and 1998, in support of the 1999 Record of Decision, were sufficient to show that it was unnecessary to sample for semi-volatile organic

compounds, PCBs, Pesticides and inorganics. 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:

- air
- 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 for this Operable Unit at this site is/are:

tetrachloroethene (PCE)
dichloroethene (cis-1,2-)
trichloroethene (TCE)

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

- groundwater
- soil
- 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.

There were no IRMs performed at this site during the Operable Unit 2 RI.

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 02.

Nature and extent of contamination:

Soil and groundwater were analyzed for volatile organic compounds, semi-volatile organic compounds and Target Analyte List inorganics. Based on investigations conducted to date, the primary contaminants of concern include tetrachloroethene (PCE), trichloroethene (TCE) and cis 1,2-dichloroethene (cis 1,2 DCE).

Groundwater: Groundwater samples were taken from the Upper Glacial Aquifer both on- and off-site. Contaminant levels for Volatile Organic Compounds (VOCs) exceeded Standards, Criteria, and Guidance (SCG) values for both on- and off-site groundwater. On-site concentrations of tetrachloroethene (PCE), trichloroethene (TCE) and cis 1,2-dichloroethene (cis 1,2-DCE) are as high as 20,000 parts per billion (ppb), 4,600 ppb and 2,000 ppb, respectively. The SCG for all three compounds is 5 ppb. On-site groundwater

contamination is found primarily downgradient of the former leaching pools on the southern portion of the site. Off-site concentrations of PCE, TCE and cis 1,2-DCE are as high as 170 ppb, 160 ppb and 180 ppb, respectively. The highest concentrations of contaminants in off-site groundwater are observed about 1,500 feet downgradient of the site at 25 feet below ground surface.

Soils: Subsurface soil samples were collected at a total of 33 locations both on- and off-site. Elevated on-site concentrations of VOCs were observed within the unsaturated zone beneath the on-site building near the northwest corner of the building directly downgradient of the leaching pits. Both PCE at 26 ppm (parts per million) and cis 1-2 DCE at 0.3 ppm, exceed protection of groundwater soil cleanup objectives (1.3 ppm for PCE and 0.25 ppm for cis 1-2 DCE), at 3 and 5 sample locations, respectively. No contaminants of concern exceeding unrestricted soil cleanup objectives were found in off-site sampling.

Soil Vapor and Indoor Air: On-site soil vapor samples were collected at 11 locations. The highest concentration of PCE was 147,000 micrograms per cubic meter (ug/m3). The highest concentration of TCE was 41,000 ug/m3. The highest concentration of cis 1-2 DCE was 84,000 ug/m3. Sub-slab soil vapor concentrations were measured beneath the on-site building. The highest sub-slab concentration of PCE at 517,000 ug/m3, TCE at 180,000 ug/m3, and cis 1,2-DCE at 36,000 ug/m3, were at the same location. Indoor air concentrations for PCE at 112 ug/m3, TCE at 3.28 ug/m3 and cis 1,2 DCE at 2.14 ug/m3, exceeded the New York State Department of Health air guideline values of 30 ug/m3 for PCE and 2 ug/m3 for both TCE.

Off-site sub-slab and indoor air samples were also collected at an adjacent building and three residences. At the adjacent off-site building, TCE was found in the sub-slab vapor and indoor air samples at concentrations of 72 ug/m3 and 3 ug/m3, respectively. PCE was found in the sub-slab vapor and indoor air samples at concentrations of 3,783 ug/m3 and 67 ug/m3 respectively.

The primary soil vapor contaminants are PCE, TCE, and cis 1,2-DCE, which are associated with dry cleaning operations at the site. Sampling of both the on-site building and the adjacent off-site building indicate the need for actions to mitigate potential exposures from soil vapor intrusion. Sampling of the three off-site residences did not indicate the need for actions to mitigate potential exposures from soil vapor intrusion.

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.*

Since some contaminated soils remain at the site below pavement and a building, people will not come in contact with contaminated soils unless they dig below these surfaces. People are not drinking the contaminated groundwater because the area is served by a

public water supply that is not affected by this contamination. Volatile organic compounds in the groundwater 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. Soil vapor intrusion sampling identified impacts to indoor air quality. This impact is limited to the on-site building and one off-site building and represents a health concern.

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.

Soil

RAOs for Public Health Protection

- 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.

Soil Vapor

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: SUMMARY OF THE PROPOSED REMEDY

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 Air Sparge/Soil Vapor Extraction, Bioremediation and Vapor Mitigation remedy.

The estimated present worth cost to implement the remedy is $2,919,000. The cost to construct the remedy is estimated to be $1,995,000 and the estimated average annual cost is $146,000.

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. 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.

Prior to the completion of the remedial design, a pre-design investigation will be performed to confirm and finalize the remediation target zones and to evaluate the site characteristics for the remedial design.

2. Air Sparge with Soil Vapor Extraction (AS/SVE))

Air sparging will be implemented 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 the 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 will be installed. The SVE system will apply a 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 will be treated as necessary prior to being discharged to the atmosphere. At this site, about 10 air injection wells will be installed in the area around the on-site building, in the parking lot south of the building and on the south side of Sand Hill Rd. to a depth of about 20 feet below ground surface, which is about 10 feet below the water table. To capture the volatilized contaminants, and to remove VOCs from the overburden soil beneath and around the building, about 10 SVE wells will be installed in the vadose zone at a depth of about 5-10 feet below ground surface. The air containing VOCs extracted from the SVE wells will be treated by passing the airstream through activated carbon which removes the VOCs from the air prior to it being discharged to the atmosphere.

3. Enhanced Bioremediation

In-situ enhanced biodegradation will be employed to treat contaminants in groundwater along the north side of the on-ramp to the Southern State Parkway and on the cloverleaf opposite Wantagh Avenue. The biological breakdown of contaminants will be enhanced by injecting amendments, such as organic substrates or other electron donors/acceptors, nutrients, and other compounds, via injection wells into the subsurface to promote microbe growth. The method and depth of injection will be determined during the remedial design.

4. Vapor Mitigation

The adjacent structure located to the west of 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 soil vapor extraction points installed near the on-site building as part of the remedy will mitigate soil vapor intrusion at that location.

5. 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 commercial 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 County DOH, and
- require compliance with the Department approved Site Management Plan.

6. 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 Environmental Easement above.

Engineering Controls: The Air Sparge/Soil Vapor Extraction System, Enhanced Bioremediation and Vapor Mitigation systems discussed 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,
- a provision for further investigation and remediation should large scale redevelopment occur, if any of the existing structures are demolished, or if the subsurface is otherwise made accessible, including by failure of the existing site cover which consists of the building and asphalt pavement. The nature and extent of contamination in areas where access was previously limited or unavailable will be immediately and thoroughly investigated pursuant to a plan approved by the Department. Based on the investigation results and the Department determination of the need for a remedy, a Remedial Action Work Plan (RAWP) will be developed for the final remedy for the site, including removal and/or treatment of any source areas to the extent feasible. Citizen Participation Plan (CPP) activities will continue through this process. Any necessary remediation will be completed prior to, or in association with, redevelopment. This includes the area beneath the current on-site building,

- descriptions of the provisions of the environmental easement including any land use and groundwater use restrictions,
- a provision for evaluation of the potential for soil vapor intrusion in any reoccupied existing or future buildings developed on the site, 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 on and off-site groundwater to assess the performance and effectiveness of the remedy,
- monitoring for vapor intrusion for any buildings required by the Institutional and Engineering Control Plan discussed above,
- a schedule of monitoring and frequency of submittals to the Department, monitoring for vapor intrusion for any occupied existing or future buildings developed on the site, as may be 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.

Exhibit A

Nature and Extent of Contamination

This section describes the findings of the Remedial Investigation, performed during 2011-2014, 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 include volatile organic compounds (VOCs) and metals. 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.

Groundwater

Groundwater samples were collected from the Upper Glacial Aquifer, both on- and off-site. Contaminant levels for VOCs were found to exceed SCGs for both on- and off-site groundwater. On-site concentrations of tetrachloroethene (PCE), trichloroethene (TCE) and cis-1,2-dichloroethene (cis-1,2-DCE) are as high as 20,000 parts per billion (ppb), 4,600 ppb and 2,000 ppb, respectively. The NYSDEC SCG for all three compounds is 5 ppb. On-site groundwater contamination is found primarily downgradient of the former leaching pools on the southern portion of the site. Off-site concentrations of PCE, TCE and cis-1,2-DCE are as high as 170 ppb, 160 ppb, and 180 ppb, respectively. The highest concentrations of contaminants in off-site groundwater are observed about 1,500 ft. downgradient of the site at 25 ft. below ground surface (bgs). See Figures 2, 3, and 4.

Table # 1- Groundwater		Screening Criteria in use: NEW YORK STATE CLASS GA	
Detected Constituents	**Concentration Range Detected (ppb)**	**SCG (ppb)**	**Frequency Exceeding SCG**
Metals NYS CLASS GA			
Antimony	0-2.20	3	0/7
Arsenic	0-2.30	25	0/7
Barium	0-69.1	1000	0/7
Chromium, Total	0-6.70	50	0/7
Copper	0-6.50	200	0/7
Iron	325-990	300	7/7
Magnesium	1,200-2,720	35000	0/7
Manganese	0-171	300	0/7
Manganese	30.0-560	300	1/7
Nickel	0-13.5	100	0/7
Sodium	18,700-43,300	20000	6/7
Zinc	0-165	2000	0/7
VOC NYS CLASS GA			
1,1-Dichloroethane	0-5.00	5	1/351
1,1-Dichloroethene	0-8.40	5	1/351
Acetone	0-3.00	50	0/351
Benzene	0-7.00	1	1/351
Chlorobenzene	0-1.00	5	0/351
Chloroethane	0-0.680	5	0/351
Chloroform	0-11.0	7	1/351
Chloromethane	0-4.00	5	0/351
Cis-1,2-Dichloroethylene	0-2,600	5	71/351
Dichlorodifluoromethane	0-4.00	5	0/351
Isopropylbenzene (Cumene)	0-2.00	5	0/351
Methyl Ethyl Ketone (2-Butanone)	0-2.00	50	0/351
Tert-Butyl Methyl Ether	0-72.0	10	19/351
Tetrachloroethylene (PCE)	0-20,000	5	92/351
Trans-1,2-Dichloroethene	0-61.0	5	7/351
Trichloroethylene (TCE)	0-4,600	5	48/351
Vinyl Chloride	0-100	2	8/351

Based on the findings of the RI, the past disposal of hazardous waste has resulted in the contamination of on-site and off-site 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 PCE, TCE, and cis 1,2-DCE.

Soil

No on-site surface soil samples were collected because the site is completely paved or covered by the on-site building. No off-site surface samples were collected because the on-site disposal was underground and migrated beneath the surface. Consequently, only subsurface soil samples were collected both on- and off-site. Elevated on-site concentrations of VOCs were observed underground within the unsaturated zone beneath the on-site building near the northwest corner of the building and directly downgradient of the leaching pits LP-1 and LP-2 at soil borings MW-02I and MW-03S, respectively. The subsurface soil contamination seems to be beneath the on-site building and around the leaching pits adjacent to the southeast corner of the building. Both PCE at 26 parts per million (ppm) and cis-1,2-DCE at 0.3 ppm, exceed protection of groundwater SCOs (1.3 ppm for PCE and 0.25 ppm for cis 1-2 DCE). No exceedances were found in off-site sampling.

The primary soil contaminants are PCE and cis-1,2-DCE associated with dry cleaning operations at the site. See Figure 5.

Table # 2- Soil		Screening Criteria in use: 375 SOIL - COMMERCIAL USE, 375 SOIL - PROTECTION OF GROUNDWATER, 375 SOIL - UNRESTRICTED USE			
Detected Constituents	**Concentration Range Detected (ppm)**	**Unrestricted Use SCG (ppm)**	**Frequency Exceeding Unrestricted Use SCG**	**Restricted Use SCG (ppm)**	**Frequency Exceeding Restricted Use SCG**
VOC PART 375					
1,1,1-Trichloroethane	0.00410-1.40	0.68	2/33	0.68	2/33
1,1-Dichloroethane	0.00410-1.40	0.27	2/33	0.27	2/33
1,1-Dichloroethene	0.000900-1.40	0.33	2/33	0.33	2/33
1,2-Dichlorobenzene	0.00410-1.40	1.1	2/33	1.1	2/33
1,2-Dichloroethane	0.00410-1.40	0.02	2/33	0.02	2/33
1,3-Dichlorobenzene	0.00410-1.40	2.4	0/33	2.4	0/33
1,4-Dichlorobenzene	0.00410-1.40	1.8	0/33	1.8	0/33
Acetone	0.00400-0.180	0.05	4/33	0.05	4/33
Benzene	0.00410-1.40	0.06	2/33	0.06	2/33
Carbon Tetrachloride	0.00410-1.40	0.76	2/33	0.76	2/33
Chlorobenzene	0.00410-1.40	1.1	2/33	1.1	2/33
Chloroform	0.00410-1.40	0.37	2/33	0.37	2/33
Cis-1,2-Dichloroethylene	0.00400-280	0.25	5/33	0.25	5/33
Ethylbenzene	0.00410-1.40	1	2/33	1	2/33
Methyl Ethyl Ketone (2-Butanone)	0.00240-1.40	0.12	2/33	0.12	2/33
Methylene Chloride	0.000800-1.40	0.05	2/33	0.05	2/33
O-Xylene (1,2-Dimethylbenzene)	0.00410-0.00500	0.26	0/16	1.6	0/16
Tert-Butyl Methyl Ether	0.00410-1.40	0.93	2/33	0.93	2/33
Tetrachloroethylene (PCE)	0.00100-26.0	1.3	3/33	1.3	3/33
Toluene	0.000800-1.40	0.7	2/33	0.7	2/33
Trans-1,2-Dichloroethene	0.00200-1.40	0.19	2/33	0.19	2/33
Trichloroethylene (TCE)	0.00250-0.840	0.47	3/33	0.47	3/33
Vinyl Chloride	0.000900-8.90	0.02	3/33	0.02	3/33
Xylenes, Total	0.00700-1.40	0.26	2/17	1.6	0/17

Based on the findings of the Remedial Investigation, the past disposal of hazardous waste has resulted in the contamination of soil. The site contaminant identified in soil, which is

considered to be the primary contaminant of concern to be addressed by the remedy selection process is PCE.

Soil Vapor and Indoor Air

The evaluation of the potential for both on-site and off-site soil vapor intrusion resulting from the presence of site related soil or groundwater contamination was evaluated by the sampling of 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.

On-site soil vapor samples were collected at 11 locations. The highest concentration of PCE was observed in SV-02 at 147,000 micrograms per cubic meter (ug/m3). The highest concentration of TCE was also observed at SV-02 at 41,000 ug/m3. The highest concentration of cis 1-2 DCE was observed at SV-07 at 84,000 ug/m3.

Sub-slab soil vapor concentrations were measured beneath the on-site building. The highest concentration of PCE at 517,000 µg/m3, TCE at 180,000 µg/m3, and cis-1,2-DCE at 36,000 ug/m3, were all at SB-02. Indoor air concentrations for PCE, 112 µg/m3 and TCE, 3.28 µg/m3, exceed the New York State Department of Health air guideline values of 30 µg/m3 for PCE and 2 µg/m3 for TCE. See Figure 6. Based on these results, actions are needed to address potential exposures from soil vapor intrusion.

Off-site sub-slab and indoor air samples were also collected at an adjacent building and three residences. At the adjacent building, TCE was found in the sub-slab vapor and indoor air samples at concentrations of 72 ug/m3 and 3 ug/m3, respectively. PCE was found in the sub-slab vapor and indoor air samples at concentrations of 3,783 ug/m3 and 67 ug/m3, respectively. Based on these results, actions are needed to address potential exposures from soil vapor intrusion for the adjacent building. Soil vapor intrusion sampling in the three off-site residences did not indicate actions were needed to address potential exposures from soil vapor intrusion. Figure 6 shows soil vapor intrusion data for the site.

Based on the findings of the Remedial Investigation, the disposal of hazardous waste has resulted in the contamination of soil vapor. 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 PCE and 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 Further Action

The No Further Action Alternative recognizes the remediation of the site completed by the IRM(s) described in Section 6.2. This alternative leaves the site in its present condition and does not provide any additional protection of the environment.

Alternative 2: Soil Vapor Extraction, Enhanced Bioremediation, and Vapor Mitigation

This alternative will include on-site soil vapor extraction and enhanced bioremediation with vapor mitigation at the adjacent western property structure. This alternative also employs site management, including institutional and engineering controls (IC/EC), to ensure the remedy continues to be protective and to allow the appropriate reuse of the property where contamination will remain in place.

Soil vapor extraction (SVE) will be implemented to remove volatile organic compounds (VOCs) from the subsurface. VOCs will be physically removed from the soil by applying a vacuum to wells that have been installed into the vadose zone (the area below the ground but above the water table). The vacuum draws air through the soil matrix which carries the VOCs from the soil to the SVE well. The air extracted from the SVE wells is then treated as necessary prior to being discharged to the atmosphere. To capture the volatilized contaminants, and to remove VOCs from the overburden soil beneath and around the building, about 10 SVE wells will be installed in the vadose zone at a depth of about 5-10 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.

In-situ enhanced biodegradation will be employed to treat contaminants in groundwater upgradient of the on-site building, beneath the on-site building, in the parking lot south of the building, and south of Sand Hill Road. The biological breakdown of contaminants through anaerobic reductive dechlorination will be enhanced by injecting amendments, such as organic substrates or other electron donors/acceptors, nutrients, and other compounds into the subsurface to promote microbe growth. The method and depth of injection will be determined during the remedial design.

The adjacent structure located to the west of 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.

Present Worth: $3,315,000
Capital Cost:..... $2,215,000
Annual Costs:..... $146,000

Alternative 3: Soil Vapor Extraction, In-Well Vapor Stripping, and Vapor Mitigation

This alternative will include on-site soil vapor extraction and in-well vapor stripping with vapor mitigation at the adjacent western property structure. This alternative also employs site management, including institutional and engineering controls (IC/EC), to ensure the remedy continues to be protective and to allow the appropriate reuse of the property where contamination will remain in place.

Soil vapor extraction (SVE) will be implemented to remove volatile organic compounds (VOCs) from the subsurface. VOCs will be physically removed from the soil by applying a vacuum to wells that have been installed into the vadose zone (the area below the ground but above the water table). The vacuum draws air through the soil matrix which carries the VOCs from the soil to the SVE well. The air extracted from the SVE wells is then treated as necessary prior to being discharged to the atmosphere. To capture the volatilized contaminants, and to remove VOCs from the overburden soil beneath and around the building, about 9 SVE wells will be installed in the vadose zone at a depth of about 5-10 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.

In Well Vapor Stripping will be employed to treat both the contaminated vadose zone and the groundwater source area. The well will be installed in the area for the former leach pit located to the south of the on-site building. The well will be screened at the water table and at about 30 ft bgs. In-well vapor stripping technology involves the creation of a ground-water circulation pattern and simultaneous aeration within the stripping well to volatilize VOCs from the circulating groundwater. Air-lift pumping is used to lift groundwater and strip it of contaminants. Contaminated vapors may be drawn off for aboveground treatment or released to the vadose zone for biodegradation. Partially treated ground-water is forced out of the well into the vadose zone where it re-infiltrates to the water table. Untreated groundwater enters the well at its base, replacing the water lifted through pumping. Eventually, the partially treated water is cycled back through the well through this process until contaminant concentration goals are met.

The adjacent structure located to the west of 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.

Present Worth: $3,208,000
Capital Cost:..... $2,095,000
Annual Costs:..... $146,000

Alternative 4: Air Sparging/Soil Vapor Extraction, Enhanced Bioremediation, and Vapor Mitigation

This alternative will include on-site air sparging with soil vapor extraction, enhanced bioremediation downgradient of the on-site building and vapor mitigation at the adjacent western property structure. This alternative also employs site management, including institutional and engineering controls (IC/EC), to ensure the remedy continues to be protective and to allow the appropriate reuse of the property where contamination will remain in place.

Air Sparging will be implemented 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 the 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 will be installed. The SVE system will apply a 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 will be treated as necessary prior to being discharged to the atmosphere. At this site, about 10 air injection wells will be installed in the area around the on-site building, in the parking lot south of the building and on the south side of Sand Hill Rd. to a depth of about 20 feet bgs, which is about 10 feet below the water table. To capture the volatilized contaminants, and to remove VOCs from the overburden soil beneath and around the building, about 10 SVE wells will be installed in the vadose zone at a depth of about 5-10 feet below ground surface. The air containing VOCs extracted from the SVE wells will be treated by passing the airstream through activated carbon which removes the VOCs from the air prior to it being discharged to the atmosphere.

In-situ enhanced biodegradation will be employed to treat contaminants in groundwater along the north side of the on-ramp to the Southern State Parkway and on the cloverleaf opposite Wantagh Avenue. The biological breakdown of contaminants through anaerobic reductive dechlorination will be enhanced by injecting amendments, such as organic substrates or other electron donors/acceptors, nutrients, and other compounds into the subsurface to promote microbe growth. The method and depth of injection will be determined during the remedial design.

The adjacent structure located to the west of 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.

Present Worth: $2,919,000
Capital Cost:..... $1,995,000
Annual Costs:..... $146,000

Alternative 5: Soil Vapor Extraction, In-situ Thermal Remediation, and Vapor Mitigation

This alternative will include on-site soil vapor extraction, in-situ thermal remediation and vapor mitigation measures at the adjacent western property structure. This alternative also employs site management, including institutional and engineering controls (IC/EC), to ensure the remedy continues to be protective and to allow the appropriate reuse of the property where contamination will remain in place.

Soil vapor extraction (SVE) will be implemented to remove volatile organic compounds (VOCs) from the subsurface. VOCs will be physically removed from the soil by applying a vacuum to wells that have been installed into the vadose zone (the area below the ground but above the water table). The vacuum draws air through the soil matrix which carries the VOCs from the soil to the SVE well. The air extracted from the SVE wells is then treated as necessary prior to being discharged to the atmosphere. To capture the volatilized contaminants, and to remove VOCs from the overburden soil beneath and around the building, about 9 SVE wells will be installed in the vadose zone at a depth of about 5-10 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.

In-Situ Thermal Treatment will be implemented to destroy or volatilize volatile organic compounds (VOCs) beneath and around the on-site building**.** Electrical resistance heating (ERH) will be utilized to perform the treatment. An electrical current will be produced in the treatment area between electrodes installed underground. Resistance to the current flow in the soils generates heat greater than 100ºC, producing steam and volatilized contaminants that are recovered. 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 by adsorption on granular activated carbon.

The adjacent structure located to the west of 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.

Present Worth: $9,490,000
Capital Cost:..... $8,601,000
Annual Costs:..... $134,000

Exhibit C

Remedial Alternative Costs

Remedial Alternative	Capital Cost ($)	Annual Costs ($)	Total Present Worth ($)
No Action	0	0	0
Alternative 2: Soil Vapor Extraction, Enhanced Bioremediation and Vapor Mitigation	2,215,000	146,000	$3,315,000
Alternative 3: Soil Vapor Extraction, In Well Vapor Stripping and Vapor Mitigation	2,095,000	146,000	3,208,000
Alternative 4: Air Sparging/Soil Vapor Extraction, Enhanced Bioremediation and Vapor Mitigation	1,995,000	146,000	2,919,000
Alternative 5: Soil Vapor Extraction, In-situ Thermal Remediation Vapor Mitigation	8,601,000	134,000	9,490,000

Exhibit D

SUMMARY OF THE PROPOSED REMEDY

The Department is proposing Alternative 4, Air Sparging/Soil Vapor Extraction, Enhanced Bioremediation, and Vapor Mitigation, as the remedy for this site. Alternative 4 will achieve the remediation goals for the site by on-site air sparging with soil vapor extraction, enhanced bioremediation downgradient of the on-site building and vapor mitigation at the adjacent western property structure. Additionally, site management, including institutional and engineering controls (IC/EC), will be employed to ensure the remedy continues to be protective and to allow the appropriate reuse of the property where contamination will remain in place. Soil vapor mitigation will be carried out at the structure on the adjacent western property. The elements of this remedy are described in Section 7. The proposed remedy is depicted in Figure 7.

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

The proposed remedy Alternative 4 will satisfy this criterion by removing groundwater contamination through air sparging coupled with soil vapor extraction to deal with the vapor and soil source area. In addition, Alternative 4 will mitigate downgradient migration of remaining contamination by enhanced bioremediation south of the site. Alternative 4 addresses the source of the groundwater contamination, which is the most significant threat to public health and the environment. Alternative 1 (No Action) does not provide any protection to public health and the environment and will not be evaluated further. Alternative 2 will satisfy this criterion by employing enhanced bioremediation to reduce contaminant levels in on-site (source area) and downgradient groundwater. Alternative 3 will satisfy this criteria by creating a groundwater recirculation cell in the source area and removing contaminants from the recirculating groundwater by air-stripping. Alternative 5 will satisfy this criteria by heating the on-site soils in the source area to a depth of about 20 ft bgs and capturing the resultant contaminated vapors by soil vapor extraction. Alternatives 2, 3, 4 and 5 rely on a restriction of groundwater use at the site to protect human health. The potential for soil vapor intrusion will be significantly reduced by Alternatives 2, 3, 4 and 5. Soil vapor mitigation is required at the adjacent convenience store under Alternatives 2, 3, 4 and 5 in order to protect human health.

2. Compliance with New York State Standards, Criteria, and Guidance (SCGs). 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 4 complies with SCGs to the extent practicable. It addresses source areas of contamination. It also creates the conditions necessary to restore groundwater quality to the extent practicable. Alternative 5 also fully meets this criteria. Alternatives 2 and 3 also comply with this criterion but to a lesser degree or with lower certainty. It is expected Alternative 5 will achieve groundwater SCGs in the shortest time. Because Alternatives 2, 3, 4, and 5 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, 3, 4 and 5 are all expected to meet this criteria equally. All will require a groundwater use restriction, and all will reduce the potential for soil vapor intrusion.

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.

Alternative 5 will have the most reduction of toxicity, mobility and volume, closely followed by Alternative 4. Alternatives 2 and 3 will also acceptably reduce toxicity, mobility and volume of contaminants. All will require a groundwater use restriction and all will reduce the potential for soil vapor intrusion.

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.

The time needed to achieve the remedial goals is shortest for Alternative 5. However, Alternative 5 will have the most impact on the site building and the on-site business due to the In Situ Thermal Remediation component, which will be the most disruptive to operation of the on-site business. Alternatives 2, 3 and 4 will achieve the remedial goals in reasonable time, and be significantly less disruptive.

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.

Alternative 2 is the most easily implemented because it will not require continued operation and maintenance of a system as will be the case for the in-well air stripper for Alternative 3 and the air sparge system for Alternative 4. Alternatives 3 and 4 are also readily implementable. Alternative 5 will be the least implementable as it will require shutting down most of the on-site business and parking lot for the In Situ thermal Remediation system installation, and possibly protective measures for the workers on-site.

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.

Alternative 4 is the least costly followed by Alternatives 3, 2, and 5, in that order.

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.

Since the anticipated use of the site is commercial, Alternatives 2, 3, 4 and 5 will all be compatible with anticipated future land use.

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