Department of Environmental Conservation

Division of Environmental Remediation

Record of Decision

Hercules Machine Sales Company Site
Town of Hempstead, Nassau County
New York
Site Number 130083

March 2008

New York State Department of Environmental Conservation
DAVID PATERSON, *Governor* ALEXANDER B. GRANNIS, *Commissioner*

DECLARATION STATEMENT - RECORD OF DECISION

Hercules Machine Sales Company Inactive Hazardous Waste Disposal Site
Town of Hempstead, Nassau County, New York
Site No. 130083

Statement of Purpose and Basis

The Record of Decision (ROD) presents the selected remedy for the Hercules Machine Sales Company site, a Class 2 inactive hazardous waste disposal site. The selected remedial program was chosen in accordance with the New York State Environmental Conservation Law and is not inconsistent with the National Oil and Hazardous Substances Pollution Contingency Plan of March 8, 1990 (40CFR300), as amended.

This decision is based on the Administrative Record of the New York State Department of Environmental Conservation (the Department) for the Hercules Machine Sales Company inactive hazardous waste disposal site, and the public's input to the Proposed Remedial Action Plan (PRAP) presented by the Department. A listing of the documents included as a part of the Administrative Record is included in Appendix B of the ROD.

Assessment of the Site

Actual or threatened releases of hazardous waste constituents from this site, if not addressed by implementing the response action selected in this ROD, presents a current or potential significant threat to public health and/or the environment.

Description of Selected Remedy

Based on the results of the Remedial Investigation and Feasibility Study (RI/FS) for the Hercules Machine Sales Company site and the criteria identified for evaluation of alternatives, the Department has selected remediation of contaminated groundwater using extraction and treatment and remediation of contaminated soil using soil vapor extraction. The components of the remedy are as follows:

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

2. A soil vapor extraction system will be installed to remediate on-site soil contamination. Horizontal vapor extraction wells will be installed beneath the site. The wells will pull volatile vapors from the soil through the vapor extraction wells and treat the vapors using activated carbon, if needed. Any water that the system entrains will be pumped to the

treatment system for the groundwater extraction and treatment system. The soil vapor extraction system will also prevent vapor intrusion from the subsurface into the site building.

3. The asphalt and concrete pavement and buildings at the site will be maintained to prevent infiltration through the contaminated soil.

4. The wall between the on-site building and building on the neighboring Railroad site will be sealed to prevent vapors from migrating from the building on the adjacent Railroad site to the on-site building. Other measures may be implemented to prevent vapor intrusion into the on-site building.

5. Groundwater extraction and treatment will be used to remediate plume area A. Contaminated groundwater will be pumped from extraction wells to an aboveground treatment system using submersible pumps. An air stripper will treat the groundwater by transferring the contaminants from the groundwater to an air stream. Depending on the contaminant levels in the air stream, the air stream may be treated using activated carbon before being discharged to the atmosphere. Activated carbon may also be used to treat the water leaving the air stripper before the water is discharged to the storm sewer.

6. A field inspection at all properties above the plume to search for indications of private water wells will be done. If any private water wells are found above the plume, the property owner will be contacted with information about the groundwater contamination below his/her property and the risks of continued use of the private well, and will be offered sampling.

7. Sub-slab vapor, indoor air and outdoor air samples will be obtained at about five off-site buildings that were not sampled during the Remedial Investigation. After receiving the results of the sampling, action will be taken at these properties in accordance with the NYSDOH vapor intrusion guidance, and conduct additional soil vapor intrusion investigations as needed.

8. Imposition of an institutional control in the form of an environmental easement that will require (a) compliance with the approved site management plan; (b) restricting the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by NYSDOH; (c) the property owner to complete and submit to the Department a periodic certification of institutional and engineering controls; and (d) limiting the use and development of the property to commercial use, which will also permit industrial use.

9. Development of a site management plan which will include the following institutional and engineering controls: (a) management to restrict excavation below the pavement or buildings. Excavated soil will be tested, properly handled to protect the health and safety of workers and the nearby community, and will be properly managed in a manner acceptable to the Department; (b) monitoring of groundwater; and (c) provisions for the continued proper operation and maintenance of the components of the remedy.

10. The property owner will provide a periodic certification of institutional and engineering controls, prepared and submitted by a professional engineer or such other expert acceptable

to the Department, until the Department notifies the property owner in writing that this certification is no longer needed. This submittal will: (a) contain certification that the institutional controls and engineering controls put in place are still in place and are either unchanged from the previous certification or are compliant with Department-approved modifications; (b) allow the Department access to the site; and (c) state that nothing has occurred that would impair the ability of the control to protect public health or the environment, or constitute a violation or failure to comply with the site management plan unless otherwise approved by the Department.

11. The operation of the components of the remedy will continue until the remedial objectives have been achieved, or until the Department determines that continued operation is technically impracticable or not feasible.

New York State Department of Health Acceptance

The New York State Department of Health (NYSDOH) concurs that the remedy selected for this site is protective of human health.

Declaration

The selected remedy is protective of human health and the environment, complies with State and Federal requirements that are legally applicable or relevant and appropriate to the remedial action to the extent practicable, and is cost effective. This remedy utilizes permanent solutions and alternative treatment or resource recovery technologies, to the maximum extent practicable, and satisfies the preference for remedies that reduce toxicity, mobility, or volume as a principal element.

MAR 27 2008

Date

Dale A. Desnoyers, Director
Division of Environmental Remediation

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SECTION 1: SUMMARY OF THE RECORD OF DECISION

The New York State Department of Environmental Conservation (the Department), in consultation with the New York State Department of Health (NYSDOH), has selected this remedy for the Hercules Machine Sales Company ("Hercules") site. The presence of hazardous waste has created significant threats to human health and/or the environment that are addressed by this remedy. As more fully described in Sections 3 and 5 of this document, disposal of contaminated activated carbon and dry cleaning solvents have resulted in the disposal of hazardous wastes, including volatile organic compounds (VOCs). These wastes have contaminated the soil, groundwater and soil vapor at the site, and have resulted in:

- a significant threat to human health associated with current and potential exposure to volatile organic compounds.
- a significant environmental threat associated with the current impacts of contaminants to a sole source aquifer.

To eliminate or mitigate these threats, the Department has selected remediation of contaminated groundwater using extraction and treatment and remediation of contaminated soil using soil vapor extraction.

The Department acknowledges that the selected remedy for the Hercules site is identical to the selected remedy for the Railroad Dry Cleaners site. Separate remedies for each site were considered for each site to ensure the remedy selection process was consistent with State and Federal requirements that are legally applicable or relevant and appropriate to the remedial action to the extent practicable. Because the sites are contiguous to each other and the contamination emanating from each site is commingled, the selected remedy for each site would mitigate the aggregate threat to human health or environment from both sites. This means, for all intents and purposes, the selected remedies for the two contiguous sites will be satisfied by the installation of only one shared groundwater extraction and treatment system and only one shared soil vapor extraction system. The selected remedy will be protective of human health and the environment and will comply with New York State Environmental Conservation Law and is not inconsistent with the National Oil and Hazardous Substances Pollution Contingency Plan of March 8, 1990 (40CFR300), as amended.

The selected remedy, discussed in detail in Section 8, is intended to attain the remediation goals identified for this site in Section 6. The remedy must conform with officially 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.

SECTION 2: SITE LOCATION AND DESCRIPTION

The Hercules site is located on the west side of Lawson Boulevard between Weidner Avenue and Evans Avenue in the Town of Hempstead, Nassau County. The site is located in a suburban area and is 0.25 acres in size. A vending machine business is located in the on-site building. The site is located about 0.2 miles east of the East Rockaway Channel, which connects with the Atlantic Ocean. The Railroad Dry Cleaners site (Site No. 130066) is directly north of the Hercules site and the two sites share a wall. Refer to Figures 1 and 2 for a site location map and site plan, respectively.

The RI Report determined the on-site and off-site geology and hydrogeology to a depth of 150 feet below ground surface (bgs). The Upper Glacial aquifer occupies the shallower part of this depth interval while the Magothy aquifer lies beneath the Upper Glacial aquifer. There is no clear divide between the two aquifers in the vicinity of the site, but boring logs indicate the interface is at about 100 feet bgs. The water table occurs at depths ranging from 1.5 to 6.5 feet bgs and groundwater generally flows west-southwest in the vicinity of the site. The geology from the surface to about 100 feet bgs consists of a mixture of sand and gravel. From 100 feet bgs to 150 feet bgs, the geology consists of fine grained sand inter-bedded with varying amounts of clay, silt and organic material. Clay lenses appeared in some borings at depths ranging from 66 to 117 feet bgs; however, some borings were drilled to 150 feet bgs and did not encounter clay. Therefore, there are no continuous clay layers above 150 feet bgs.

SECTION 3: SITE HISTORY

3.1: Operational/Disposal History

During and prior to the 1990's, the business on this site sold and refurbished dry cleaning machines. This business operated as the Hercules Machine Sales Company part of the time. In 1995, the NCDOH found used activated carbon on the unpaved ground behind the on-site building.

3.2: Remedial History

In 1995, the NCDOH sampled the activated carbon, soil and groundwater behind the on-site building. Tetrachloroethene (PCE) levels in the soil and groundwater were 1,400 parts-per-million (ppm) and 28,000 parts-per-billion (ppb), respectively. These levels exceeded soil and groundwater cleanup standards of 1.3 ppm and 5 ppb, respectively. Cleanup standards are discussed in Section 5.1.1.

In 1996, the Department listed the site as a Class 2 site in the Registry of Inactive Hazardous Waste Disposal Sites in New York. A Class 2 site is a site where hazardous waste presents a significant threat to the public health or the environment and action is required.

SECTION 4: 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: Hercules Dry Cleaning Equipment, Inc., Mr. David Goldman and Mr. Joseph Carlucci.

The Department, Mr. David Goldman and Hercules Dry Cleaning Equipment, Inc. entered into a Consent Order on January 7, 2003. The Order obligates the responsible parties to implement a full remedial program. After conducting a portion of the RI, the PRPs refused to complete the work required in the Consent Order. The Department completed the RI/FS using state superfund money.

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 5: SITE CONTAMINATION

A remedial investigation/feasibility study (RI/FS) has been conducted to evaluate the alternatives for addressing the significant threats to human health and the environment. The state funded portion of the RI/FS investigated the Railroad and Hercules sites concurrently.

5.1: Summary of the Remedial Investigation

The purpose of the RI was to define the nature and extent of any contamination resulting from previous activities at the site. The RI was conducted between January 2003 and September 2007. The field activities and findings of the investigation are described in the RI report.

The RI included the collection and analysis of soil, groundwater, soil vapor and air samples. Subsurface soil samples were obtained beneath and around the on-site building. Groundwater samples were obtained on-site and off-site using standard and multi-level monitoring wells. Soil vapor samples were taken off-site to determine the extent of the soil vapor plume. Sub-slab vapor, indoor air and outdoor air samples were obtained at on-site and off-site buildings to evaluate the presence of existing or potential indoor air impacts. All samples were analyzed for volatile organic compounds (VOCs).

5.1.1: Standards, Criteria, and Guidance (SCGs)

To determine whether the soil, groundwater and indoor air contain contamination at levels of concern, data from the investigation were compared to the following SCGs:

- Groundwater, drinking water, and surface water SCGs are based on the Department's "Ambient Water Quality Standards and Guidance Values" and Part 5 of the New York State Sanitary Code.

- Soil SCGs are based on the Department's Unrestricted Use Soil Cleanup Objectives in 6 NYCRR Part 375.

- Concentrations of VOCs in air were evaluated using the air guidelines provided in the NYSDOH guidance document titled "Guidance for Evaluating Soil Vapor Intrusion in the State of New York," dated October 2006. Tetrachloroethene (PCE) and cis-1,2-dichloroethene (DCE) concentrations were compared to values in Matrix 2 in the guidance. Trichloroethene levels were compared to values in Matrix 1 in the guidance.

Based on the RI results, in comparison to the SCGs and potential public health and environmental exposure routes, certain media and areas of the site require remediation. These are summarized in Section 5.1.2. More complete information can be found in the RI report.

5.1.2: Nature and Extent of Contamination

This section describes the findings of the investigation for all environmental media that were investigated.

As described in the RI report, many soil, groundwater, soil vapor and air samples were collected to characterize the nature and extent of contamination. As seen in Figures 3 through 12 and Table 1, the main categories of contaminants that exceed their SCGs are volatile organic compounds (VOCs). For comparison purposes, where applicable, SCGs are provided for each medium.

Chemical concentrations are reported in parts per billion (ppb) for water and parts per million (ppm) for soil. Air samples are reported in micrograms per cubic meter ($\mu g/m^3$).

Figures 3 through 12 illustrate the degree of contamination for the contaminants of concern in soil, groundwater, and soil vapor. Table 1 summarizes the degree of contamination for the contaminants of concern in sub-slab vapor and indoor air and compares the data with the SCGs for the site. The following are the media which were investigated and a summary of the findings of the investigation.

Subsurface Soil

The property owner's consultant collected several soil samples on the Hercules site. Samples located behind and beneath the on-site building contained levels of PCE exceeding the SCG of 1.3 ppm. As shown on Figure 3, maximum PCE concentrations behind and beneath the on-site building were 104 ppm and 13 ppm, respectively. In addition, one soil sample behind the building had a DCE concentration of 6.36 ppm, exceeding the SCG of 0.25 ppm.

Subsurface soil contamination identified during the RI/FS will be addressed in the remedy selection process.

On-Site Groundwater

Groundwater samples were obtained from on-site monitoring wells from eight distinct intervals from the water table [about 5 feet below ground surface (bgs)] to 150 feet bgs. The sampling results are shown in Figures 4 through 11.

As shown in Figure 4, the highest total VOC concentrations in the shallowest groundwater samples (8.1 to 16.4 feet bgs) were detected in MW-8A. PCE, TCE and DCE were detected in this well at 1,300 ppb, 410 ppb and 200 ppb, respectively. These values exceeded the SCG of 5 ppb for PCE, TCE and DCE.

Figure 5 shows that the highest contaminant concentrations found in the 23.4 to 38.7-foot bgs interval were detected in MW-8B. PCE, TCE, and DCE were detected in this well at 160 ppb, 34 ppb, and 30 ppb, respectively. These values exceeded the SCG of 5 ppb for PCE, TCE and DCE.

In the 43.4 to 58.6-foot bgs interval, the highest concentrations of contaminants were detected in MW-8C, as shown in Figure 6. Maximum PCE, TCE, and DCE levels were 78 ppb, 13 ppb, and 12 ppb, respectively. These values exceeded the SCG of 5 ppb for PCE, TCE and DCE.

In the 64.3 to 78.8 bgs interval, PCE was detected in MW-8D at 11 ppb, as shown in Figure 7. This concentration exceeded the SCG of 5 ppb. No other compounds were detected in the 64.3 to 78.8 bgs interval.

In the 83.1 to 99.8-foot bgs interval, PCE (25 ppb), TCE (6 ppb) and DCE (5 ppb) were detected in MW-8E, as shown in Figure 8. The PCE and TCE levels exceeded the SCG of 5 ppb for PCE and TCE.

As shown in Figure 9, PCE (170 ppb), TCE (27 ppb) and DCE (22 ppb) were detected in MW-8F in the 101.4 to 116.9-foot bgs interval. These values exceeded the SCG of 5 ppb for PCE, TCE and DCE.

PCE (36 ppb), TCE (13 ppb) and DCE (12 ppb) were detected in MW-8G (about 130 feet bgs), as shown in Figure 10. These values exceeded the SCG of 5 ppb for PCE, TCE and DCE.

As shown in Figure 11, no VOCs were detected in the 149.0 to 152.1-foot bgs interval.

Off-Site Groundwater

Groundwater samples were obtained at several locations from eight distinct intervals from the water table (about 5 feet bgs) to 150 feet bgs. The sampling results are shown in Figures 4 through 11 and revealed that groundwater contamination is migrating from the Hercules and adjacent Railroad sites as one plume.

As shown in Figure 4, the highest contaminant concentrations in the shallowest groundwater samples (8.1 to 16.4 feet bgs) were detected in MW-1 and MW-3 on the neighboring Railroad site. The maximum PCE, TCE, DCE and vinyl chloride (VC) concentrations detected on the Railroad site were 74 ppb, 40, ppb, 170 ppb and 180 ppb, respectively. These values exceeded the SCGs of 2 ppb for VC and 5 ppb for PCE, TCE and DCE.

Figure 5 shows that the highest contaminant concentrations found in the 23.4 to 38.7-foot bgs interval were detected in MW-17B, a downgradient well. PCE, TCE, DCE and VC were detected in this well at 13,000 ppb, 1,900 ppb, 1,200 ppb and 70 ppb, respectively. These values exceeded the maximum on-site concentrations for these contaminants in this interval and the SCGs of 2 ppb for VC and 5 ppb for PCE, TCE and DCE.

In the 43.4 to 58.6-foot bgs interval, the highest concentrations of contaminants were further downgradient than in shallower intervals, as shown in Figure 6. Maximum PCE and TCE levels were found in downgradient MW-14C at 760 ppb and 180 ppb, respectively. Maximum DCE and VC concentrations were detected in downgradient MW-12C at 660 ppb and 79 ppb, respectively. These values exceeded the maximum on-site concentrations for these contaminants in this interval and the SCGs of 2 ppb for VC and 5 ppb for PCE, TCE and DCE.

Contaminants exceeding SCGs were detected in the 64.3 to 78.8 bgs interval, as shown in Figure 7. The highest TCE and DCE concentrations were detected in MW-9D on the neighboring Railroad site while the highest PCE and VC levels were detected in downgradient MW-21D. Maximum PCE, TCE, DCE and VC levels were 470 ppb, 450 ppb, 430 ppb and 41 ppb, respectively. These values exceeded the maximum on-site concentrations for these contaminants in this interval and the SCGs of 2 ppb for VC and 5 ppb for PCE, TCE and DCE.

In the 83.1 to 99.8-foot bgs interval, the highest contaminant levels were downgradient of the site and were less than levels in shallower intervals, as shown in Figure 8. Maximum PCE and TCE levels were detected in downgradient MW-21E at 39 ppb and 7.7 ppb, respectively. DCE was detected at a maximum level of 20 ppb in downgradient MW-12E while VC was detected at a maximum concentration of 7.4 ppb in downgradient MW-23E. These values exceeded the maximum on-site concentrations for these contaminants in this interval and the SCGs of 2 ppb for VC and 5 ppb for PCE, TCE and DCE.

As shown in Figure 9, the highest contaminant levels were detected on the adjacent Railroad site in the 101.4 to 116.9-foot bgs interval. Maximum PCE, TCE, DCE and VC levels were found in MW-9F at 420 ppb, 520 ppb, 280 ppb and 15 ppb, respectively. These values exceeded the maximum on-site concentrations for these contaminants in this interval and the SCGs of 2 ppb for VC and 5 ppb for PCE, TCE and DCE. MW-9F is located within ten feet of the property line that separates the Railroad and Hercules sites.

The highest contaminant levels were detected on the neighboring Railroad site for the 129.1 to 130.7-foot bgs interval, as shown in Figure 10. Maximum PCE, TCE and DCE levels were found in MW-9G at 46 ppb, 90 ppb and 42 ppb, respectively. These values exceeded the SCGs of 5 ppb for PCE, TCE and DCE. MW-9G is located within ten feet of the property line that separates the Railroad and Hercules sites.

As shown in Figure 11, the highest contaminant levels were detected on the neighboring Railroad site in the 149.0 to 152.1-foot bgs interval. Maximum PCE, TCE and DCE levels were found in MW-9H at 90 ppb, 77 ppb and 24 ppb, respectively. These values exceeded the SCG of 5 ppb for these compounds. MW-9H is located within ten feet of the property line that separates the Railroad and Hercules sites.

In summary, the on-site and off-site groundwater is contaminated with VOCs at levels exceeding SCGs. The highest contaminant levels were found in MW-17B (16,224 ppb of total VOCs), which is located about 100 feet downgradient of the site and is screened from 27.6 to 28.6 feet bgs. On-site VOC levels exceeded 1000 ppb of total VOCs from approximately 8.1-16.4 feet bgs. On-site contaminant levels exceeded 100 ppb of total VOCs from the water table to 38.7 feet bgs and from 101.4-116.9 feet bgs. Downgradient groundwater concentrations exceeded 1,000 ppb of total VOCs from approximately 23.4 to 58.6 feet bgs and exceeded 100 ppb of total VOCs from approximately 23.4 to 78.8 feet bgs.

Groundwater contamination identified during the RI/FS will be addressed in the remedy selection process.

Soil Vapor/Sub-Slab Vapor/Air

Soil vapor was screened using field instrumentation, and samples were obtained on the site and at off-site locations to determine the extent of soil vapor contamination. Soil vapor readings were taken at 38 locations using a photoionization detector (PID), which is a field instrument that measures levels of volatile organic compounds in air. Based on the PID readings, soil vapor samples at seven locations were collected in SUMA canisters and sent to a laboratory for analysis as per NYSDOH guidelines. As shown in Figure 12, PCE levels in soil vapor ranged from 13 $\mu g/m^3$ to 274 $\mu g/m^3$.

The soil vapor sampling results were used to identify seven buildings where sub-slab vapor, indoor air and outdoor air samples were collected, including the on-site building and one upgradient building. Indoor and outdoor air samples were also obtained at an eighth building (Structure 9); however, the property owner did not allow the Department's consultant to obtain a sub-slab vapor sample. The building on the adjacent Railroad site was not sampled because an active dry cleaner occupies the building.

As shown in Table 1, the results were compared to the matrixes in the NYSDOH guidance. According to the guidance, the on-site building requires mitigation. PCE levels in the sub-slab vapor, indoor air and outdoor air at the site were 793 $\mu g/m^3$, 52 $\mu g/m^3$, and 29 $\mu g/m^3$, respectively. Detections of TCE were found in the indoor air at two other properties (Structures 2 and 5); however these detections were likely due to sources other than soil vapor intrusion since sub-slab soil vapor levels were found to be low. At these properties, the property owner should take reasonable and practical actions to identify actions to identify source(s) and reduce exposure. At four properties (Structures 3, 4, 6 and 7) sampling results indicate that no further action is required. Finally, the indoor air concentrations of PCE and TCE at Structure 9 were within background levels. However, the potential for vapor intrusion at Structure 9 could not be assessed because no sub-slab vapor samples were taken.

Soil vapor and indoor air contamination identified during the RI/FS will be addressed in the remedy selection process.

5.2: 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 completion of the RI/FS.

There were no IRMs performed at this site during the RI/FS.

5.3: Summary of Human Exposure Pathways

This section describes the types of human exposures that may present added health risks to persons at or around the site. A more detailed discussion of the human exposure pathways can be found in Section 8 of the RI report. An exposure pathway describes the means by which an individual may be exposed to contaminants originating from a site. An exposure pathway has five elements: [1] a contaminant source, [2] contaminant release and transport mechanisms, [3] a point of exposure, [4] a route of exposure, and [5] a receptor population.

The source of contamination is the location where contaminants were released to the environment (any waste disposal area or point of discharge). Contaminant release and transport mechanisms carry contaminants from the source to a point where people may be exposed. The exposure point is a location where actual or potential human contact with a contaminated medium may occur. The route of exposure is the manner in which a contaminant actually enters or contacts the body (e.g., ingestion, inhalation, or direct contact). The receptor population is the people who are, or may be, exposed to contaminants at a point of exposure.

An exposure pathway is complete when all five elements of an exposure pathway exist. An exposure pathway is considered a potential pathway when one or more of the elements currently does not exist, but could in the future.

The only complete exposure pathway identified for the site is inhalation of chemicals of concern found to be present in indoor air at the Hercules Machine Sales building; the level of volatile organic compounds found in the building's sub-slab and indoor air environments indicate that mitigation measures are required. Soil vapor intrusion investigations were done at a limited number of upgradient and down gradient off-site residential and commercial buildings. The results indicate that inhalation of indoor air contaminated with chemicals of concern above background levels is not occurring at this time for those structures sampled. The results of soil vapor screening and sampling in the area of the site indicate that soil vapor intrusion evaluation should continue.

On-site and off-site exposure to contaminants in groundwater by ingestion is not expected since the area is serviced by public water. Use of groundwater in the future is possible but not likely. There are no public water supply wells located within the identified groundwater plume.

Contaminants of concern in subsurface soil and groundwater present a potential exposure route via direct contact and/or inhalation of volatilized organic compounds for persons working in excavations on-site, within the area of the plume, and for persons using groundwater drawn from private wells located over the plume, if any are found to exist.

5.4: Summary of Environmental Assessment

This section summarizes the assessment of existing and potential future environmental impacts presented by the site. Environmental impacts include existing and potential future exposure pathways to fish and wildlife receptors, as well as damage to natural resources such as aquifers and wetlands.

Site contamination has impacted the groundwater resource in the Upper Glacial and Magothy aquifers. These aquifers are federally designated sole source aquifers and are the sole source of drinking water for Long Island, although at this time no public water supply wells are affected by site related contaminants.

SECTION 6: SUMMARY OF THE REMEDIATION GOALS

Goals for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375. At a minimum, the remedy selected must eliminate or mitigate all significant threats to public health and/or the environment presented by the hazardous waste disposed at the site through the proper application of scientific and engineering principles.

The remediation goals for this site are to eliminate or reduce to the extent practicable:

- exposures of persons at or around the site to volatile organic compounds in soil, groundwater and soil vapor;
- the release of contaminants from soil into groundwater that may create exceedances of groundwater quality standards; and
- the release of contaminants from subsurface soil under buildings into indoor air through soil vapor.

Further, the remediation goals for the site include attaining to the extent practicable:

- ambient groundwater quality standards
- soil cleanup standards; and
- indoor air guidance values.

SECTION 7: <u>SUMMARY OF THE EVALUATION OF ALTERNATIVES</u>

The selected 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. Potential remedial alternatives for the Hercules Machine Sales Company site were identified, screened and evaluated in the FS report which is available at the document repositories established for this site.

A summary of the remedial alternatives that were considered for this site is discussed below. The present worth 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.

7.1: <u>Description of Remedial Alternatives</u>

The following potential remedies were considered to address the contaminated soils, groundwater, soil vapor, and indoor air at the site. To make the descriptions of the remedial alternatives easier to understand, the groundwater contamination plume has been divided into two sections. The on-site and near off-site groundwater contamination will be referred to as Plume Area A. The groundwater contamination located downgradient of Plume Area A will be known as Plume Area B. The boundaries of the plume sections are shown on Figure 13. All time periods are for developing cost estimates to compare alternatives on an equal basis.

Alternative 1: No Action with Monitoring

Present Worth: *$1,100,000*
Capital Cost: *$170,000*
Annual Costs:
(Year 1): *$16,000*
(Years 5, 10, 15, 20, 25, 30): *$69,000*
(All Other Years from Years 2-30): *$59,000*

The No Action Alternative is evaluated as a procedural requirement and as a basis for comparison. It requires continued monitoring only, allowing the site to remain in an unremediated state. This alternative would leave the site in its present condition and would not provide any additional protection to human health or the environment.

This alternative would include groundwater monitoring, indoor air monitoring, an environmental easement and a site management plan. On-site and off-site groundwater monitoring wells would be sampled to track the extent of the groundwater contamination plume over time. In addition, sub-slab vapor, indoor air and outdoor air samples would be obtained at about five off-site buildings that were not sampled during the RI. Periodic sub-slab vapor, indoor air and outdoor air sampling would be conducted at the Hercules site and any off-site property where the NYSDOH guidance indicates that monitoring or mitigation is needed. The details of the groundwater and indoor air monitoring would be included in a site management plan. Also, periodic reviews would be conducted to determine the effectiveness of the remedy. The costs shown above assume that periodic reviews would be conducted every five years. An environmental easement would be recorded for the site which would require performance of the periodic reviews and compliance with the site management plan.

Alternative 2: In-situ Chemical Oxidation

Present Worth:	*$5,800,000*
Capital Cost:	*$3,500,000*
Annual Costs:	
(Year 1):	*$66,400*
(Years 5, 10, 15, 20, 25, 30):	*$161,400*
(All Other Years from Years 2-30):	*$151,400*

Groundwater would be treated under this alternative via in-situ chemical oxidation. Several chemical oxidants are commercially available for use with this technology. For the purpose of this discussion sodium permanganate will be the oxidant evaluated. When this chemical oxidant comes into contact with organic compounds such as PCE, TCE or DCE, an oxidation reaction occurs breaking down the organic compounds to relatively benign compounds such as carbon dioxide and water. Figure 14 shows a process schematic.

For cost estimating purposes, assume that the chemical oxidant would be applied through injection wells from 16 to 70 feet deep to treat saturated soils as well as groundwater. This is to target groundwater with total VOC concentrations in excess of 1000 ppb. Figure 15 shows the planned injection area. The treatment area could be expanded, depending on the results of the pilot studies.

Prior to the full implementation of this technology, laboratory and on-site pilot scale studies would be conducted to more clearly define design parameters. Between the pilot and the full scale implementations, it is estimated that 216 injection points would be installed. It is estimated that the chemical oxidant would be injected during about two separate events over several months. During implementation, groundwater concentrations, groundwater color and oxidation/reduction potential would be monitored.

This alternative would not actively treat all of the contaminated groundwater. The alternative would actively treat the most contaminated groundwater in Plume Area A, but would not actively treat Plume Area B. The remaining groundwater contamination would be remediated using natural attenuation. With natural attenuation, the groundwater is monitored to demonstrate that natural conditions are decreasing VOC levels using physical, chemical and biological processes. These processes include intrinsic biodegradation, advection, hydrodynamic dispersion and other chemical reactions.

The site is currently covered entirely with asphalt, concrete and a building. As part of this alternative, these would be maintained to prevent infiltration of precipitation through the unsaturated soil. This maintenance would inhibit soil contamination from mobilizing into the groundwater.

This alternative would also address soil vapor intrusion. A sub-slab depressurization system would be installed to mitigate vapors entering the on-site building. In addition, the wall between the on-site building and the building on the neighboring Railroad site would be sealed to prevent vapors from traveling from the adjacent Railroad site building to the on-site building. Other measures may also be implemented to prevent vapor intrusion into the on-site building. Also, sub-slab vapor, indoor air and outdoor air samples would be obtained at about five off-site buildings that were not sampled during the RI. After receiving the results of the sampling, action would be taken at these properties in accordance with the NYSDOH vapor intrusion guidance.

Finally, the alternative would use institutional controls to prevent contact with on-site contaminated soil and on-site and off-site contaminated groundwater. A site management plan would be written and would include requirements for managing contaminated soils during excavation. Also, periodic reviews would be conducted to determine the effectiveness of the remedy. The costs shown above assume a periodic review frequency of every five years. An environmental easement would be placed on the property to require performance of the periodic review and compliance with the site management plan. In addition, a public and private well survey conducted in 2007 did not find any on-site or off-site water wells, and Nassau County ordinances prohibit the installation and use of new private water wells in areas where public water supplies are available. However, additional efforts are needed to determine if private water wells are in use at properties located above the plume. Examples of efforts to determine if private wells are in use include field surveys and contacting individual property owners/occupants by mail. If wells are identified, the property owner would be contacted and offered sampling/analysis.

The estimated time to meet the remediation goals for this alternative is 30 years. Remedial design will require about one year and implementation of the remedy would also require about one year.

Alternative 3A: Plume Area A Groundwater Extraction and Treatment and Soil Vapor Extraction

Present Worth: *$4,900,000*
Capital Cost: *$1,100,000*
Annual Costs:
(Year 1): *$190,000*
(Years 2-4): *$270,000*
(Year 5): *$280,000*
(Years 10, 15, 20, 25, 30): *$250,000*
(All Other Years from Years 6-30): *$240,000*

This alternative would remediate contaminated soil using soil vapor extraction (SVE). SVE wells would be installed in the vadose zone (the area below ground but above the water table). At this site the vadose zone extends from the surface to a depth of about 3.5 feet. A vacuum would be applied to the SVE wells to draw air through the volatile organic compound (VOC) contaminated soils. The VOC's would vaporize from the soil into the air and the air containing the VOCs would be pulled into the SVE wells. The VOC contaminated air from the SVE wells would then be run through an activated carbon treatment canister to remove the volatile contaminants before the air is discharged to the ambient air. The SVE wells would be installed horizontally due to the high water table. Any groundwater captured by the SVE well would be directed to the treatment system for the groundwater remedy (see below). A process schematic for this alternative is shown in Figure 16. The proposed location of the SVE system is shown on Figure 17.

The SVE system would also address soil vapor intrusion by mitigating vapors beneath the on-site building. In addition, the wall between the on-site building and the building on the neighboring Railroad site would be sealed to prevent vapors from the adjacent Railroad site building from entering the on-site building. Other measures may be implemented to prevent vapor intrusion into the on-site building. Also, sub-slab vapor, indoor air and outdoor air samples would be obtained at about five off-site buildings that were not sampled during the RI. After receiving the results of the sampling, action would be taken at these properties in accordance with the NYSDOH vapor intrusion guidance.

As discussed in the previous alternative, the site is currently covered entirely with asphalt, concrete and a building. As part of this alternative, these would be maintained to prevent infiltration of precipitation through the unsaturated soil. This maintenance would inhibit soil contamination from mobilizing into the groundwater while the SVE system remediates the contaminated soil.

Groundwater extraction and treatment would be used to remediate contaminated groundwater as part of this alternative. Contaminated groundwater would be pumped to an aboveground treatment system using submersible pumps. An air stripper would treat the groundwater by transferring the contaminants from the groundwater to an air stream. Depending on the contaminant levels in the air stream, the air stream may be treated using activated carbon before being discharged to the atmosphere. Activated carbon may also be used to treat the water leaving the air stripper before the water is discharged to the storm sewer. The proposed locations of the extraction wells and treatment system are shown in Figure 17.

For this alternative, the groundwater extraction and treatment system would only treat Plume Area A. This is to target groundwater with total VOC concentrations in excess of 1000 ppb. About three extraction wells would pump from Plume Area A and the wells would range between 75-95 feet deep. Each well would be pumped at an approximate rate of 10 gallons per minute (gpm). The remedy for the groundwater contamination in Plume Area B would be natural attenuation. With natural attenuation, the groundwater is monitored to demonstrate that natural conditions are decreasing VOC levels using physical, chemical and biological processes. These processes include intrinsic biodegradation, advection, hydrodynamic dispersion and other chemical reactions.

Finally, the alternative would use institutional controls to prevent contact with on-site contaminated soil and on-site and off-site contaminated groundwater. A site management plan would be written and would include requirements for managing contaminated soils during excavation. Also, periodic reviews would be conducted to determine the effectiveness of the remedy. The costs shown above assume a periodic review frequency of every five years. An environmental easement would be placed on the property to require performance of the periodic review and compliance with the site management plan. In addition, a public and private well survey conducted in 2007 did not find any on-site or off-site water wells, and Nassau County ordinances prohibit the installation and use of new private water wells in areas where public water supplies are available. However, additional efforts are needed to determine if private water wells are in use at properties located above the plume. Examples of efforts to determine if private wells are in use include field surveys and contacting individual property owners/occupants by mail. If wells are identified, the property owner would be contacted and offered sampling/analysis.

The estimated time to meet the remediation goals for this alternative is 30 years. Remedial design would require about one year and construction of the remedy would also require about one year.

Alternative 3B: Groundwater Extraction and Treatment for Entire Plume and Soil Vapor Extraction

Present Worth:	*$6,500,000*
Capital Cost:	*$1,800,000*
Annual Costs:	
(Year 1):	*$320,000*
(Years 2-4):	*$370,000*
(Year 5):	*$380,000*
(Years 10 and 15):	*$350,000*
(All Other Years from Years 6-14):	*$340,000*
(Years 20, 25, and 30):	*$220,000*
(All Other Years from Years 16-30):	*$210,000*

This alternative would remediate contaminated soil using soil vapor extraction (SVE). SVE wells would be installed in the vadose zone (the area below ground but above the water table). At this site the vadose zone extends from the surface to a depth of about 3.5 feet. A vacuum would be applied to the SVE wells to draw air through the volatile organic compound (VOC) contaminated soils. The VOC's would vaporize from the soil into the air and the air containing the VOCs would be pulled into the SVE wells. The VOC contaminated air from the SVE wells would then be run through an activated carbon treatment canister to remove the volatile contaminants before the air is discharged to the ambient air. The SVE wells would be installed horizontally due to the high water table. Any groundwater captured by the SVE well would be directed to the treatment system for the groundwater remedy (see below). A process schematic for this alternative is shown in Figure 16. The proposed location of the SVE system is shown on Figure 18.

The SVE system would also address soil vapor intrusion by mitigating vapors beneath the on-site building. In addition, the wall between the on-site building and the building on the neighboring Railroad site would be sealed to prevent vapors from the adjacent Railroad site building from entering the on-site building. Other measures may be implemented to prevent vapor intrusion into the on-site building. Also, sub-slab vapor, indoor air and outdoor air samples would be obtained at about five off-site buildings that were not sampled during the RI. After receiving the results of the sampling, action would be taken at these properties in accordance with the NYSDOH vapor intrusion guidance.

As discussed in the previous alternatives, the site is currently covered entirely with asphalt, concrete and a building. As part of this alternative, these would be maintained to prevent infiltration of precipitation through the unsaturated soil. This maintenance would inhibit soil contamination from mobilizing into the groundwater while the SVE system remediates the contaminated soil.

Groundwater extraction and treatment would be used to remediate contaminated groundwater as part of this alternative. Contaminated groundwater would be pumped to an aboveground treatment system using submersible pumps. An air stripper would treat the groundwater by transferring the contaminants from the groundwater to an air stream. Depending on the contaminant levels in the air stream, the air stream may be treated using activated carbon before being discharged to the atmosphere. Activated carbon may also be used to treat the water leaving the air stripper before the water is discharged to the storm sewer. The proposed locations of the extraction wells and treatment system are shown in Figure 18.

For this alternative, the groundwater extraction and treatment system would treat the entire length of the contaminant plume. About five extraction wells would pump groundwater from Plume Areas A and B and well depths would likely range between 75-95 feet deep. Each well would be pumped at an approximate rate of 10 gpm.

Finally, the alternative would use institutional controls to prevent contact with on-site contaminated soil and on-site and off-site contaminated groundwater. A site management plan would be written and would include requirements for managing contaminated soils during excavation. Also, periodic reviews would be conducted to determine the effectiveness of the remedy. The costs shown above assume a periodic review frequency of every five years. An environmental easement would be placed on the property to require performance of the periodic review and compliance with the site management plan. In addition, a public and private well survey conducted in 2007 did not find any on-site or off-site water wells, and Nassau County ordinances prohibit the installation and use of new private water wells in areas where public water supplies are available. However, additional efforts are needed to determine if private water wells are in use at properties located above the plume. Examples of efforts to determine if private wells are in use include field surveys and contacting individual property owners/occupants by mail. If wells are identified, the property owner would be contacted and offered sampling/analysis.

The estimated time to meet remediation goals for this alternative is 15 years and 30 years for Plume Area B and Plume Area A, respectively. Remedial design would require about one year and construction of the remedy would also require about one year.

Alternative 4A: Plume Area A Groundwater Extraction and Treatment

Present Worth: *$4,700,000*
Capital Cost: *$1,100,000*
Annual Costs:
(Year 1): *$160,000*
(Years 5, 10, 15, 20, 25, 30): *$250,000*
(All Other Years from Years 6-30): *$240,000*

Groundwater extraction and treatment would be used to remediate contaminated groundwater as part of this alternative. Contaminated groundwater would be pumped to an aboveground treatment system using submersible pumps. An air stripper would treat the groundwater by transferring the contaminants from the groundwater to an air stream. Depending on the contaminant levels in the air stream, the air stream may be treated using activated carbon before being discharged to the atmosphere. Activated carbon may also be used to treat the water leaving the air stripper before the water is discharged to the storm sewer. A process schematic is shown in Figure 19. The proposed locations of the extraction wells are shown in Figure 20.

For this alternative, the groundwater extraction and treatment system would only treat Plume Area A. Approximately two extraction wells would pump from Plume Area A and each well would be approximately 75 feet deep. Each well would be pumped at an approximate rate of 10 gpm. The remedy for the groundwater contamination in Plume Area B would be natural attenuation. With natural attenuation, the groundwater is monitored to demonstrate that natural conditions are decreasing VOC levels using physical, chemical and biological processes. These processes include intrinsic biodegradation, advection, hydrodynamic dispersion and other chemical reactions.

As discussed in the above alternatives, the site is currently covered entirely with asphalt, concrete and a building. As part of this alternative, these would be maintained to prevent infiltration of precipitation through the unsaturated soil. This maintenance would inhibit soil contamination from mobilizing into the groundwater.

This alternative would also address soil vapor intrusion. A sub-slab depressurization system would be installed to mitigate vapors entering the on-site building. In addition, the wall between the on-site building and the building on the neighboring Railroad site would be sealed to prevent vapors from the adjacent Railroad site building from entering the on-site building. Other measures may be implemented to prevent vapor intrusion into the on-site building. Also, sub-slab vapor, indoor air and outdoor air samples would be obtained at about five off-site buildings that were not sampled during the RI. After receiving the results of the sampling, action would be taken at these properties in accordance with the NYSDOH vapor intrusion guidance.

Finally, the alternative would use institutional controls to prevent contact with on-site contaminated soil and on-site and off-site contaminated groundwater. A site management plan would be written and would include requirements for managing contaminated soils during excavation. Also, periodic reviews would be conducted to determine the effectiveness of the remedy. The costs shown above assume a periodic review frequency of every five years. An environmental easement would be placed on the property to require performance of the periodic review and compliance with the site management plan. In addition, a public and private well survey conducted in 2007 did not find any on-site or off-site water wells, and Nassau County ordinances prohibit the installation and use of new private water wells in areas where public water supplies are available. However, additional efforts are needed to determine if private water wells are in use at properties located above the plume. Examples of efforts to determine if private wells are in use include field surveys and contacting individual property owners/occupants by mail. If wells are identified, the property owner would be contacted and offered sampling/analysis.

The estimated time to meet the remediation goals for this alternative is 30 years. Remedial design would require about one year and construction of the remedy would also require about one year.

Alternative 4B: Groundwater Extraction and Treatment for Entire Plume

Present Worth: *$6,300,000*
Capital Cost: *$1,800,000*
Annual Costs:
(Year 1): *$290,000*
(Years 5, 10 and 15): *$350,000*
(All Other Years from Years 2-15): *$340,000*
(Years 20, 25, and 30): *$220,000*
(All Other Years from Years 16-30): *$210,000*

Groundwater extraction and treatment would be used to remediate contaminated groundwater as part of this alternative. Contaminated groundwater would be pumped to an aboveground treatment system using submersible pumps. An air stripper would treat the groundwater by transferring the contaminants from the groundwater to an air stream. Depending on the contaminant levels in the air stream, the air stream may be treated using activated carbon before being discharged to the atmosphere. Activated carbon may also be used to treat the water leaving the air stripper before the water is discharged to the storm sewer. A process schematic is shown in Figure 19. The proposed locations of the extraction wells are shown in Figure 21.

For this alternative, the groundwater extraction and treatment system would treat the entire length of the contaminant plume. About five extraction wells would pump groundwater from Plume Areas A and B and well depths would likely range between 75-95 feet deep. Each well would be pumped at an approximate rate of 10 gpm.

As discussed in the above alternatives, the site is currently covered entirely with asphalt, concrete and a building. As part of this alternative, these would be maintained to prevent infiltration of precipitation through the unsaturated soil. This maintenance would inhibit soil contamination from mobilizing into the groundwater.

This alternative would also address soil vapor intrusion. A sub-slab depressurization system would be installed to mitigate vapors entering the on-site building. In addition, the wall between the on-site building and the building on the neighboring Railroad site would be sealed to prevent vapors from the Railroad site building from entering the Hercules site building. Other measures may also be implemented to prevent vapor intrusion into the on-site building. Also, sub-slab vapor, indoor air and outdoor air samples would be obtained at about five off-site buildings that were not sampled during the RI. After receiving the results of the sampling, action would be taken at these properties in accordance with the NYSDOH vapor intrusion guidance.

Finally, the alternative would use institutional controls to prevent contact with on-site contaminated soil and on-site and off-site contaminated groundwater. A site management plan would be written and would include requirements for managing contaminated soils during excavation. Also, periodic reviews would be conducted to determine the effectiveness of the remedy. The costs shown above assume a periodic review frequency of every five years. An environmental easement would be placed on the property to require performance of the periodic review and compliance with the site management plan. In addition, a public and private well survey conducted in 2007 did not find any on-site or off-site water wells, and Nassau County ordinances prohibit the installation and use of new private water wells in areas where public water supplies are available. However, additional efforts are needed to determine if private water wells are in use at properties located above the plume. Examples of efforts to determine if private wells are in use include field surveys and contacting individual property owners/occupants by mail. If wells are identified, the property owner would be contacted and offered sampling/analysis.

The estimated time to meet remediation goals for this alternative is 15 years and 30 years for Plume Area B and Plume Area A, respectively. Remedial design would require about one year and construction of the remedy would also require about one year.

7.2 Evaluation of Remedial Alternatives

The criteria to which potential remedial alternatives are compared are defined in 6 NYCRR Part 375, which governs the remediation of inactive hazardous waste disposal sites in New York 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.

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.

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

3. Short-term 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.

4. 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.

5. 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.

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.

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 for each alternative are presented in Table 2.

This final criterion 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.

8. Community Acceptance. Concerns of the community regarding the RI/FS reports and the PRAP have been evaluated. The responsiveness summary (Appendix A) presents the public comments received and the manner in which the Department addressed the concerns raised.

In general, the public comments received were supportive of the selected remedy.

SECTION 8: SUMMARY OF THE SELECTED REMEDY

Based on the Administrative Record (Appendix B) and the discussion presented below, the Department has selected Alternative 3A, Plume Area A Groundwater Extraction and Treatment and Soil Vapor Extraction as the remedy for this site. The elements of this remedy are described at the end of this section.

Alternative 3A has been selected because, as described below, it satisfies the threshold criteria and provides the best balance of the primary balancing criteria described in Section 7.2. It would achieve the remediation goals for the site by removing the contaminants from the contaminated soil and from groundwater with total VOC concentrations in excess of 1000 ppb. Alternative 3B would attain soil and groundwater SCGs through active means, Alternative 3A would attain soil and groundwater SCGs through both active and natural attenuation, and Alternatives 2, 4A and 4B would rely on either natural attenuation or capping to achieve groundwater SCGs or soil SCGs, respectively. The soil vapor extraction system in Alternatives 3A and 3B would remove contaminated vapors from beneath impacted buildings to attain sub-slab vapor and indoor air SCGs, while Alternatives 2, 4A and 4B would meet this goal using sub-slab depressurization. As Alternative 1 includes no remedial actions, Alternative 1 would not meet SCGs. Alternatives 2, 3A, 3B, 4A and 4B would also meet the following goals related to protection of human health and the environment, which are to eliminate or reduce to the extent practicable:

- exposures of persons at or around the site to volatile organic compounds in soil, groundwater and soil vapor;

- the release of contaminants from soil into groundwater that may create exceedances of groundwater quality standards; and

- the release of contaminants from subsurface soil under buildings into indoor air through soil vapor.

Alternative 3B would achieve these goals entirely using active remediation. Alternatives 2, 3A, 4A and 4B would achieve these goals through either natural attenuation for a portion of the groundwater plume or capping for the soil contamination. As Alternative 1 includes no remediation and would not meet these goals, Alternative 1 would not be protective of human health or the environment. Alternative 1 has been excluded from further consideration, as it does not meet either of the threshold criteria.

Because Alternatives 2, 3A, 3B, 4A, and 4B satisfy the threshold criteria, the five balancing criteria are particularly important in selecting a final remedy for the site. The short-term effectiveness criterion considers construction impacts and the time needed to achieve remedial goals. Alternatives 3A, 3B and 4B would involve installing extraction wells and piping in a residential community located downgradient of the site, so precautions would have to be taken to prevent accidents or exposures during construction. In Alternatives 2 and 4A, all treatment activities would occur near the site. The FS Report estimated that all of the alternatives would require at least 30 years to meet remedial goals.

The long-term effectiveness and permanence of each alternative was also assessed. All five active remedial alternatives are considered to be effective and permanent. Each alternative would include remediation of the site-related groundwater contamination, although only alternatives 3B and 4B would actively remediate the entire length of the plume. Alternatives 2, 3A and 4A would rely on natural attenuation to remediate the downgradient portion of the plume. Alternatives 3A and 3B would remediate soil contamination using soil vapor extraction while Alternatives 2, 4A and 4B would maintain pavement and buildings over the soil contamination. For Alternatives 3A and 3B, the soil vapor extraction system could be shut down once the sources of vapor intrusion are removed. However, the sub-slab depressurization system in Alternatives 2, 4A and 4B may need to be run indefinitely because the contaminated soil would remain beneath the Hercules building.

Each alternative would present implementation challenges. Once the remedial design determines the size of the treatment system for Alternatives 3A, 3B, 4A and 4B, an on-site or off-site location for the system would have to be secured. Additionally, Alternatives 3A, 3B and 4B would also involve construction in a residential neighborhood. Alternative 2 involves injecting oxidant into the aquifer through over 200 injection wells. As the water table is shallow in the vicinity of the site (1.5 to 6.5 feet bgs), injecting liquid into the subsurface would risk surfacing of the oxidant during injections.

Alternative 3B would be superior in reducing toxicity, mobility and volume of contaminants. Alternative 3B would actively treat contaminated soil and the full length of the contaminant plume, reducing the toxicity and volume of contaminants. Alternatives 2, 3A, and 4A would only actively treat a portion of the contaminant plume. Alternatives 2, 4A and 4B would not treat contaminated soil and would rely on the current pavement and buildings, which would only reduce the mobility of soil contaminants. Alternatives 3A, 3B, 4A and 4B would reduce the mobility of groundwater contaminants by establishing hydraulic control over the aquifer.

The costs of Alternatives 2, 3A, 3B, 4A, and 4B range from $4,900,000 to $6,500,000. Considering the analysis from the other six criteria, the Department proposes Alternative 3A as the remedy for this site.

The estimated present worth cost to implement the remedy is $4,900,000. The cost to construct the remedy is estimated to be $1,100,000 and the estimated present worth of annual costs for 30 years is $3,800,000.

The Department acknowledges that the selected remedy for the Hercules site is identical to the selected remedy for the Railroad Dry Cleaners site. Separate remedies for each site were considered for each site to ensure the remedy selection process was consistent with State and Federal requirements that are legally applicable or relevant and appropriate to the remedial action to the extent practicable. Because the sites are contiguous to each other and the contamination emanating from each site is commingled, the selected remedy for each site would mitigate the aggregate threat to human health or environment from both sites. This means, for all intents and purposes, the selected remedies for the two contiguous sites will be satisfied by the installation of only one shared groundwater extraction and treatment system and only one shared soil vapor extraction system. The selected remedy will be protective of human health and the environment and will comply with New York State Environmental Conservation Law and is not inconsistent with the National Oil and Hazardous Substances Pollution Contingency Plan of March 8, 1990 (40CFR300), as amended.

The elements of the selected remedy are as follows:

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

2. A soil vapor extraction system will be installed to remediate on-site soil contamination. Horizontal vapor extraction wells will be installed beneath the site. The wells will pull volatile vapors from the soil through the vapor extraction wells and treat the vapors using activated carbon, if needed. Any water that the system entrains will be pumped to the treatment system for the groundwater extraction and treatment system. The soil vapor extraction system will also prevent vapor intrusion from the subsurface into the site building.

3. The asphalt and concrete pavement and buildings at the site will be maintained to prevent infiltration through the contaminated soil.

4. The wall between the on-site building and building on the neighboring Railroad site will be sealed to prevent vapors from migrating from the building on the adjacent Railroad site to the on-site building. Other measures may be implemented to prevent vapor intrusion into the on-site building.

5. Groundwater extraction and treatment will be used to remediate plume area A. Contaminated groundwater will be pumped from extraction wells to an aboveground treatment system using submersible pumps. An air stripper will treat the groundwater by transferring the contaminants from the groundwater to an air stream. Depending on the contaminant levels in the air stream, the air stream may be treated using activated carbon before being discharged to the atmosphere. Activated carbon may also be used to treat the water leaving the air stripper before the water is discharged to the storm sewer.

6. A field inspection at all properties above the plume to search for indications of private water wells will be done. If any private water wells are found above the plume, the property owner will be contacted with information about the groundwater contamination below his/her property and the risks of continued use of the private well, and will be offered sampling.

7. Sub-slab vapor, indoor air and outdoor air samples will be obtained at about five off-site buildings that were not sampled during the Remedial Investigation. After receiving the results of the sampling, action will be taken at these properties in accordance with the NYSDOH vapor intrusion guidance, and conduct additional soil vapor intrusion investigations as needed.

8. Imposition of an institutional control in the form of an environmental easement that will require (a) compliance with the approved site management plan; (b) restricting the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by NYSDOH; (c) the property owner to complete and submit to the Department a periodic certification of institutional and engineering controls; and (d) limiting the use and development of the property to commercial use, which will also permit industrial use.

9. Development of a site management plan which will include the following institutional and engineering controls: (a) management to restrict excavation below the pavement or buildings. Excavated soil will be tested, properly handled to protect the health and safety of workers and the nearby community, and will be properly managed in a manner acceptable to the Department; (b) monitoring of groundwater; and (c) provisions for the continued proper operation and maintenance of the components of the remedy.

10. The property owner will provide a periodic certification of institutional and engineering controls, prepared and submitted by a professional engineer or such other expert acceptable to the Department, until the Department notifies the property owner in writing that this certification is no longer needed. This submittal will: (a) contain certification that the institutional controls and engineering controls put in place are still in place and are either unchanged from the previous certification or are compliant with Department-approved modifications; (b) allow the Department access to the site; and (c) state that nothing has occurred that would impair the ability of the control to protect public health or the environment, or constitute a violation or failure to comply with the site management plan unless otherwise approved by the Department.

11. The operation of the components of the remedy will continue until the remedial objectives have been achieved, or until the Department determines that continued operation is technically impracticable or not feasible.

Since the remedy results in untreated hazardous waste remaining at the site, a long-term monitoring program will be instituted. Several on-site and off-site monitoring wells will be sampled periodically to monitor the effectiveness of the extraction and treatment remedy. The site management plan will specify which wells would be sampled and the frequency of sampling. Also, the effluent from the soil vapor extraction system will be monitored at a minimum frequency of quarterly to monitor the effectiveness of the soil vapor extraction remedy. This program will be a component of the long-term management for the site.

SECTION 9: <u>HIGHLIGHTS OF COMMUNITY PARTICIPATION</u>

As part of the remedial investigation process, a number of Citizen Participation activities were undertaken to inform and educate the public about conditions at the site and the potential remedial alternatives. The following public participation activities were conducted for the site:

- Repositories for documents pertaining to the site were established.
- A public contact list, which included nearby property owners, elected officials, local media and other interested parties, was established.
- Fact sheets were mailed to the public contact list in July 2003 and February 2008.
- A public meeting was held on March 3, 2008 to present and receive comment on the PRAP.
- A press release was sent to local media in February 2008 to announce the public meeting.
- A responsiveness summary (Appendix A) was prepared to address the comments received during the public comment period for the PRAP.

Table 1
Soil Vapor Intrusion Recommendations Based on NYSDOH Decision Matrices

NYSDEC Railroad Dry Cleaners and
Hercules Machine Sales Sites

Location	Compound	Sub-slab Air Concentration	Indoor Air Concentration	Outdoor Air Concentration	Action Recommended	Final Action Recommended
Structure 1 Hercules Property	PCE	793	52	29	Mitigate	Based on PCE results, mitigation is recommended to minimize current or potential exposures associated with soil vapor intrusion.
	TCE	2.4	0.81	0.25 U	Reasonable Action	
	cis-1,2-DCE	0.83	0.83	0.44 U	No Further Action	
	1,1,1-TCA	0.55 U	0.55 U	0.55 U	NA	
Structure 2	PCE	9.3	6.2	0.68 U	Reasonable Action	Based on PCE and TCE results, reasonable and practical actions should be taken to identify source(s) and reduce exposure, as concentrations are likely due to sources other than soil vapor intrusion.
	TCE	0.54	0.59	0.25 U	Reasonable Action	
	cis-1,2-DCE	0.44 U	0.44 U	0.44 U	NA	
	1,1,1-TCA	0.55 U	0.6	0.55 U	NA	
Structure 3	PCE	0.68	0.95	0.81	No Further Action	Based on PCE and TCE results, no further action is necessary due to the low concentrations detected.
	TCE	1.6	0.25 U	0.25 U	No Further Action	
	cis-1,2-DCE	0.44 U	0.44 U	0.44 U	NA	
	1,1,1-TCA	0.55 U	0.55 U	0.55 U	NA	
Structure 4	PCE	1.1	1.4	0.95	No Further Action	Based on PCE results, no further action is necessary due to the low concentrations detected.
	TCE	0.25 U	0.25 U	0.25 U	NA	
	cis-1,2-DCE	0.44 U	0.44 U	0.44 U	NA	
	1,1,1-TCA	0.55 U	0.55 U	0.55 U	NA	

Notes:
1. Concentrations in ug/m^3.
2. PCE = Tetrachloroethene.
3. TCE = Trichloroethene.
4. cis-1,2-DCE = cis-1,2-Dichloroethene.
5. 1,1,1-TCA = 1,1,1-Trichloroethane.
6. Compounds listed were detected in at least one sample.
7. "U" indicates the compound was not detected at or above the quanititation limit shown.
8. "NA" indicates that there were no detected concentrations of relevant compounds, so matrix is not used.
9. "NS" indicates that the respective sample was not collected.
10. "Action Recommended" based on NYSDOH Decision Matrices for Soil Vapor Intrusion.
11. "Final Action Recommended" is strictest action recommended for the structure based on recommendations listed.

Table 1
Soil Vapor Intrusion Recommendations Based on NYSDOH Decision Matrices

NYSDEC Railroad Dry Cleaners and Hercules Machine Sales Sites

Location	Compound	Sub-slab Air Concentration	Indoor Air Concentration	Outdoor Air Concentration	Action Recommended	Final Action Recommended
Structure 5	PCE	7.7	1.6	0.95	No Further Action	Based on TCE results, reasonable and practical actions should be taken to identify source(s) and reduce exposure, as concentrations are likely due to sources other than soil vapor intrusion.
	TCE	0.48	3.4	0.25 U	Reasonable Action	
	cis-1,2-DCE	0.56	0.44 U	0.44 U	No Further Action	
	1,1,1-TCA	0.55 U	0.55 U	0.55 U	NA	
Structure 6	PCE	12	0.68 U	0.68 U	No Further Action	Based on PCE results, no further action is necessary due to the low concentrations detected.
	TCE	0.25 U	0.25 U	0.25 U	NA	
	cis-1,2-DCE	0.44 U	0.44 U	0.44 U	NA	
	1,1,1-TCA	0.55 U	0.55 U	0.55 U	NA	
Structure 7	PCE	3.9	0.95	1.1	No Further Action	Based on PCE results, no further action is necessary due to the low concentrations detected.
	TCE	0.25 U	0.25 U	0.25 U	NA	
	cis-1,2-DCE	0.44 U	0.44 U	0.44 U	NA	
	1,1,1-TCA	0.55 U	0.55 U	0.55 U	NA	
Structure 9	PCE	NS	1.1	0.68 U	NA	No actions could be recommended due to the fact that a sub-slab sample was not collected and the matrices could not be used.
	TCE	NS	0.25 U	0.25 U	NA	
	cis-1,2-DCE	NS	0.44 U	0.44 U	NA	
	1,1,1-TCA	NS	0.55 U	0.55 U	NA	

Notes:
1. Concentrations in ug/m^3.
2. PCE = Tetrachloroethene.
3. TCE = Trichloroethene.
4. cis-1,2-DCE = cis-1,2-Dichloroethene.
5. 1,1,1-TCA = 1,1,1-Trichloroethane.
6. Compounds listed were detected in at least one sample.
7. "U" indicates the compound was not detected at or above the quanititation limit shown.
8. "NA" indicates that there were no detected concentrations of relevant compounds, so matrix is not used.
9. "NS" indicates that the respective sample was not collected.
10. "Action Recommended" based on NYSDOH Decision Matrices for Soil Vapor Intrusion.
11. "Final Action Recommended" is strictest action recommended for the structure based on recommendations listed.

Table 2
Remedial Alternative Costs

Remedial Alternative	Capital Cost ($)	Year of Site Management	Annual Costs ($)	Total Present Worth ($)
Alternative 1: No Action with Monitoring	$170,000	1 5, 10, 15, 20, 25 and 30 All Other Years from Years 2-30	$16,000 $69,000 $59,000	$1,100,000
Alternative 2: In-situ Chemical Oxidation	$3,500,000	1 5, 10, 15, 20, 25 and 30 All Other Years from Years 2-30	$66,000 $160,000 $150,000	$5,800,000
Alternative 3A: Plume Area A Groundwater Extraction and Treatment and Soil Vapor Extraction	$1,100,000	1 2-4 5 10, 15, 20, 25, 30 All Other Years from Years 6-30	$190,000 $270,000 $280,000 $250,000 $240,000	$4,900,000
Alternative 3B: Groundwater Extraction and Treatment for Entire Plume and Soil Vapor Extraction	$1,800,000	1 2-4 5 10 and 15 All Other Years from Years 6-14 20, 25, and 30 All Other Years from Years 16-30	$320,000 $370,000 $380,000 $350,000 $340,000 $220,000 $210,000	$6,500,000
Alternative 4A: Plume Area A Groundwater Extraction and Treatment	$1,100,000	1 5, 10, 15, 20, 25, 30 All Other Years from Years 6-30	$160,000 $250,000 $240,000	$4,700,000
Alternative 4B: Groundwater Extraction and Treatment for Entire Plume	$1,800,000	1 5, 10 and 15 All Other Years from Years 2-15 20, 25, and 30 All Other Years from Years 16-30	$290,000 $350,000 $340,000 $220,000 $210,000	$6,300,000

July 2007

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PLOT DATE: ARIAL 6

FIGURE 1

Legend

⊕ Monitoring Well Locations

HERCULES
MACHINE SALES
OCEANSIDE, NEW YORK

SITE LOCATION MAP

0 75 150 300
Feet

September 2007
Figure 6-1_A.mxd

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PLOT DATE: August 2007

FIGURE 2

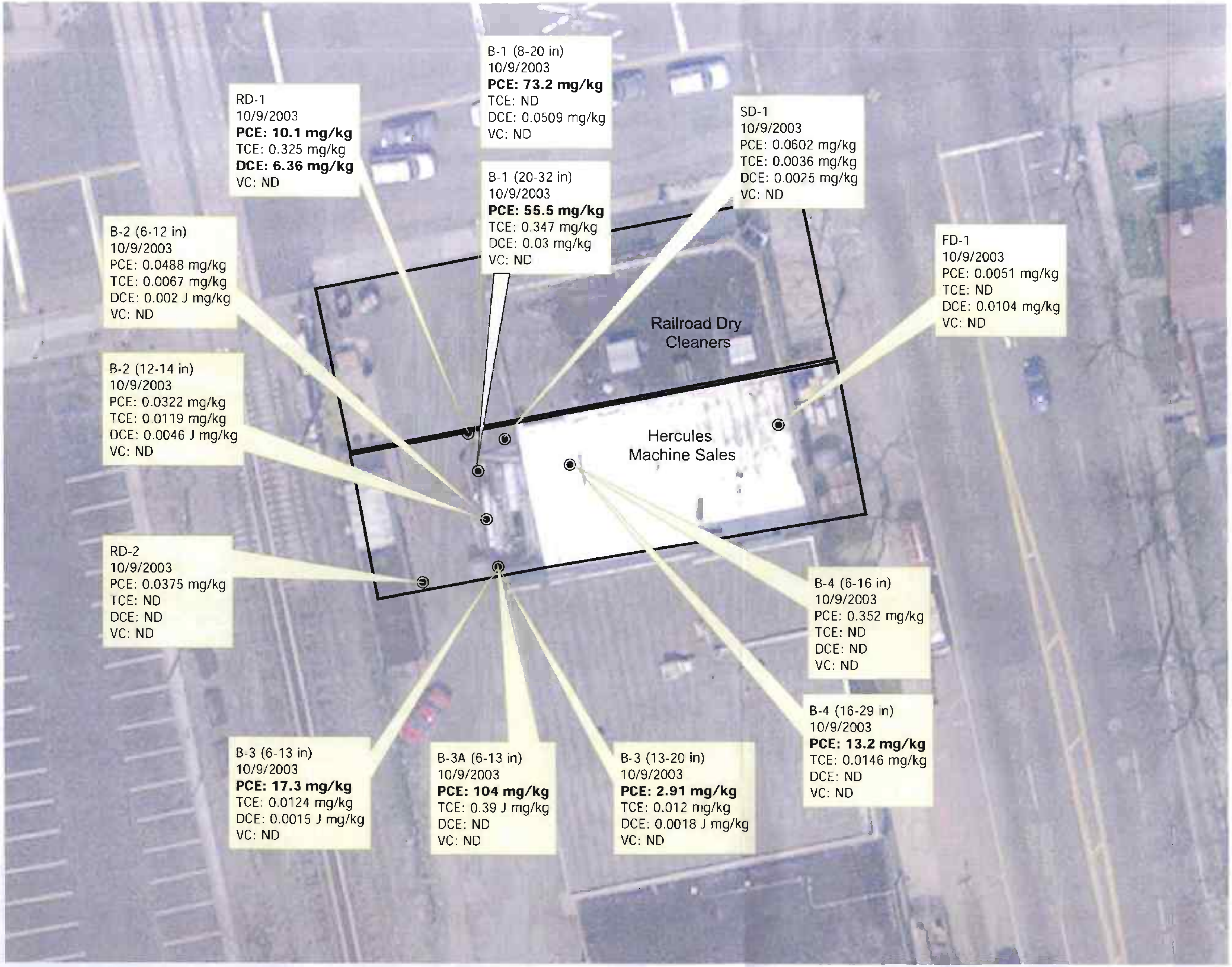
HERCULES
MACHINE SALES
OCEANSIDE, NEW YORK

SITE PLAN

0 12.5 25 50
Feet

September 2007
Figure 2-6 hist AIR.mxd

FIGURE 3



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PLOT DATE: August 2007

Legend

◉ Subsurface Soil Sample

Notes:
PCE: Tetrachloroethene
TCE: Trichloroethene
DCE: cis-1,2-Dichloroethene
VC: Vinyl chloride

Concentrations that exceed NYCRR Part 375.6 unrestricted soil cleanup objectives are bolded.

Milligrams per kilogram (mg/kg) is equivalent to parts-per-million (ppm).

HERCULES
MACHINE SALES
OCEANSIDE, NEW YORK

HISTORICAL SOIL COC RESULTS AT HERCULES SITE

0 12.5 25 50
Feet

September 2007
Figure 2-4 hist SO mxd

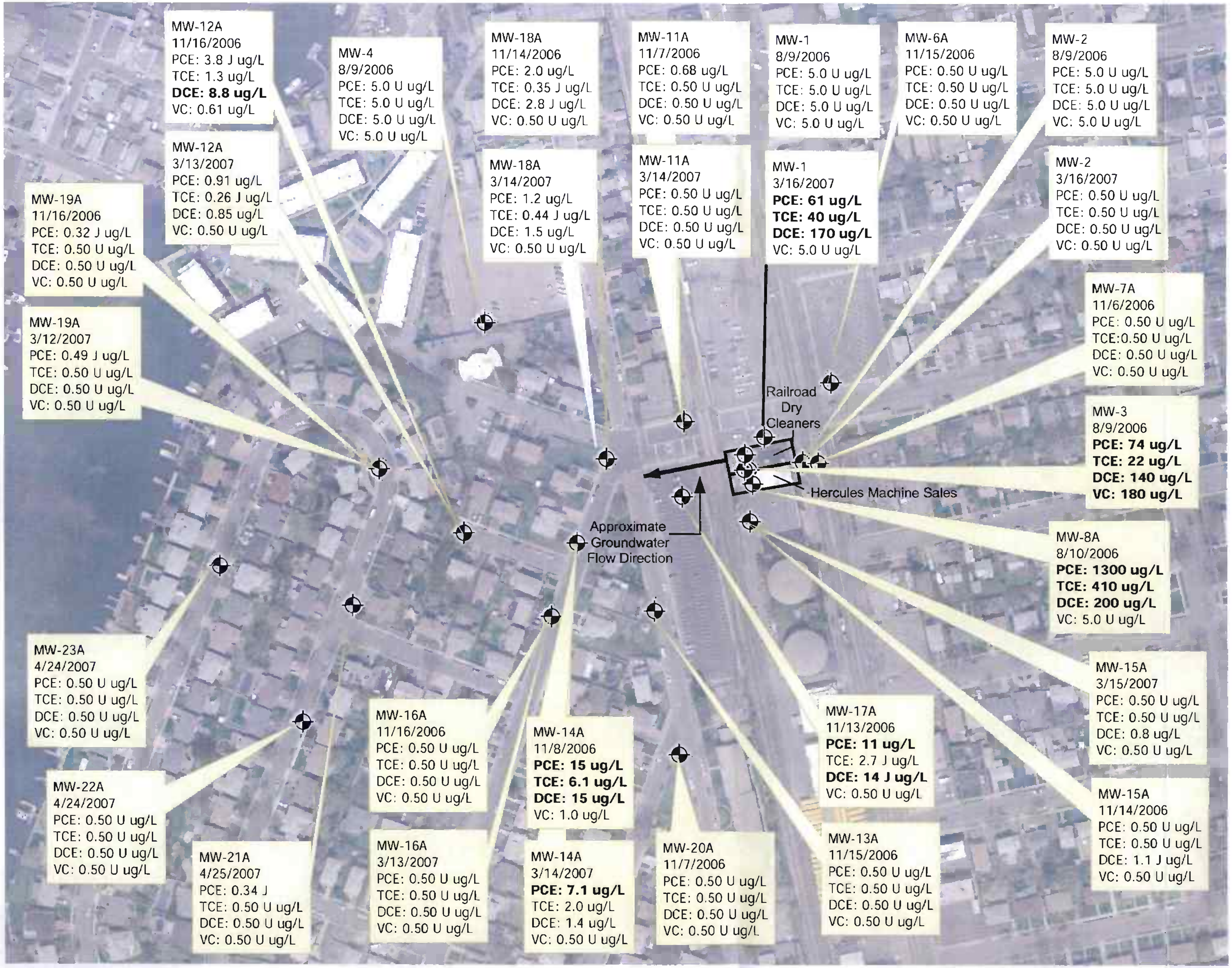

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FIGURE 4

Legend

Monitoring Well Locations

Notes:
PCE: Tetrachloroethene
TCE: Trichloroethene
DCE: cis-1,2-Dichloroethene
VC: Vinyl chloride

Concentrations that exceed NYS Class GA ground water standards are bolded.

Micrograms per liter (ug/L) is equivalent to parts-per-billion (ppb).

HERCULES
MACHINE SALES
OCEANSIDE, NEW YORK

GROUND WATER COC RESULTS "A" INTERVAL SCREENED 8.1-16.4 ft bgs

0 85 170 340
Feet

September 2007
Figure 6-1_A mxd

PLOT DATE: ARIAL 6

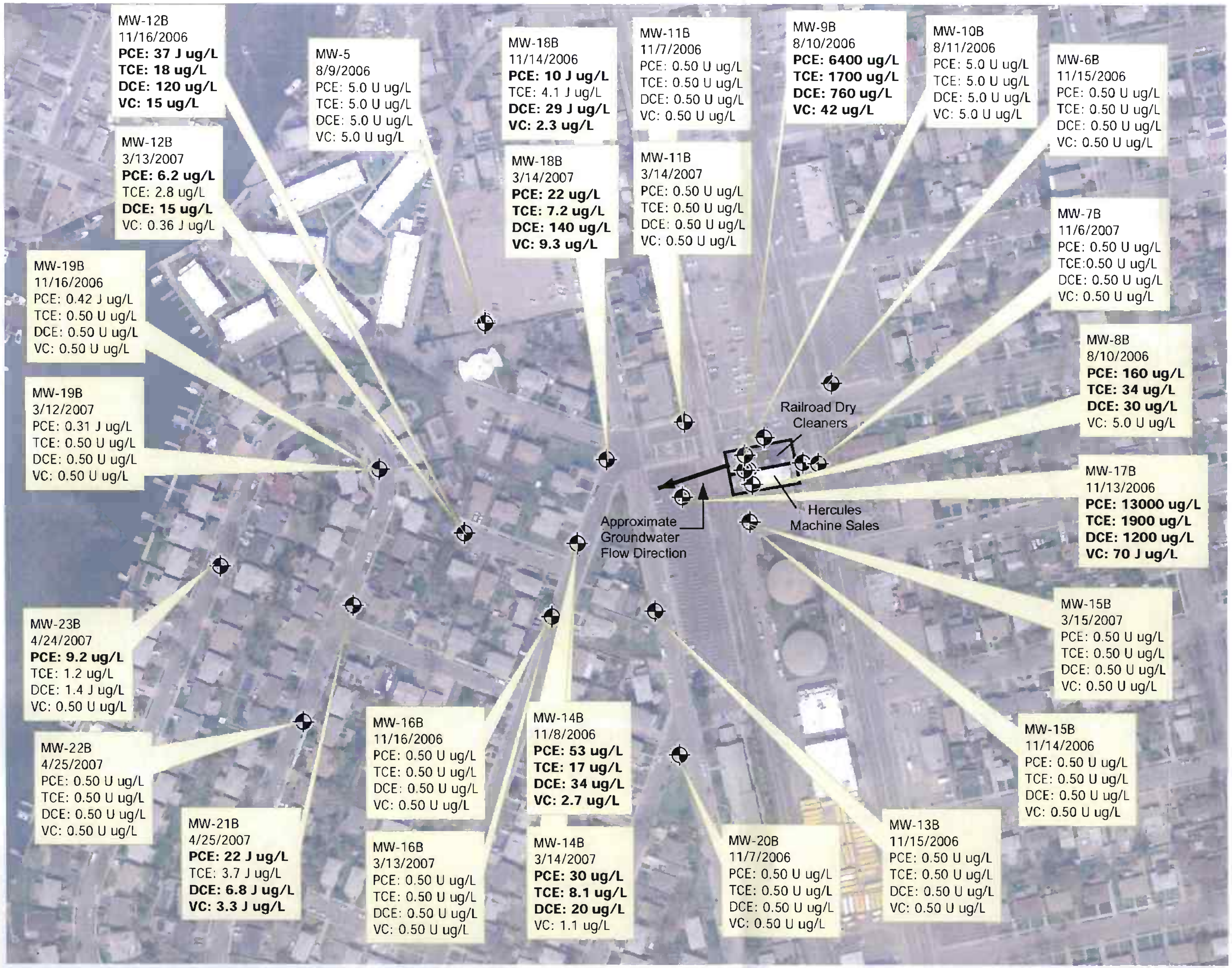

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FIGURE 5

Legend

Monitoring Well Locations

Notes:
PCE: Tetrachloroethene
TCE: Trichloroethene
DCE: cis-1,2-Dichloroethene
VC: Vinyl chloride

Concentrations that exceed NYS Class GA ground water standards are bolded.

Micrograms per liter (ug/L) is equivalent to parts-per-billion (ppb).

HERCULES
MACHINE SALES
OCEANSIDE, NEW YORK

GROUND WATER COC RESULTS "B" INTERVAL SCREENED 23.4-38.7 ft bgs

0 85 170 340
Feet

September 2007
Figure 6-2 B.mxd

July 2007

PLOT DATE: ARIAL 6